Access and Benefit Sharing of Marine Genetic Resources from Areas beyond National Jurisdiction: Intellectual Property—Friend, Not Foe

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Abstract

The applicable international legal framework for the governance of marine genetic resources from areas beyond national jurisdiction is difficult to sort out: at best, it is unclear under which regime such resources fall, and at worst, there is no applicable regime. Despite the ambiguity, the bioprospecting of these resources is ongoing and increasingly being undertaken for commercial purposes. It follows that intellectual property claims, such as patents on inventions and copyrights on publications describing discoveries, are being sought in relation to inventions and publications deriving from these bioprospecting efforts. As a result, nation states are raising important questions regarding the protection of knowledge deriving from these resources using intellectual property rights and the implications of such protection in international law, including the rights granted by the United Nations Convention on the Law of the Sea, as well as with regard to access and benefit sharing obligations under the Convention on Biological Diversity.

This Article identifies some of the options available to nation states to fulfill access and benefit sharing obligations using the intellectual property right system, rather than acting in spite of it, by briefly discussing the tenets of this system and the possibilities it unleashes.

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I. INTRODUCTION

Marine genetic resources (MGRs) from areas beyond national jurisdiction are currently the focus of great interest in the fields of both science and international law. Scientists are attracted to the immense potential of this mostly untapped resource, notably for applications in the medical and pharmaceutical industries. Not surprisingly, the potential of these resources has also attracted much attention from the international and legal spheres with respect to the intellectual property protections that can be afforded to discoveries and inventions stemming from MGRs in areas beyond national jurisdiction.

The value of these MGRs lies in their genetic material, particularly in the genetic variability of the material in question. Those variations codify the particular adaptations of every living organism. The genetic material, which makes them different, is also the genetic material that can be most useful.

A momentous example of the value of deep-sea genetic resources is the discovery of the green fluorescent protein (GFP), from the bioluminescent _Aequorea victoria_ jellyfish.\(^1\) GFP was developed into what many call the “microscope of the twenty-first century.”\(^2\) Indeed, GFP is essentially used as a biological highlighter, oftentimes to literally light up a particular protein produced by a specific GFP-tagged gene. GFP can illuminate growing cancer tumors, reveal the development of Alzheimer’s disease in the brain, and show how HIV travels from infected to noninfected cells.\(^3\) Osamu Shimomura, Martin Chalfie and Roger Y. Tsien received the Nobel Prize in Chemistry for the discovery and development of GFP.\(^4\)

It is a longstanding scientific tradition to draw inspiration from nature. The genetic material of the living resources of the deep sea is particularly interesting because of their adaptability to extreme environments. It is also important to note that the abundant biodiversity of the deep sea may in fact rival tropical forests in species diversity, and it is believed that proteins having useful applications are more likely to be found in marine microbial life than terrestrial organisms.\(^5\) MGRs are therefore in the spotlight and may hold the key to many useful and beneficial discoveries. As an example, more than 150 natural products

\(^3\) MARC ZIMMER, GLOWING GENES (Prometheus Books 2005).
with promising levels of anti-HIV activity have been isolated from marine organisms.\textsuperscript{6} 

Hence, marine research is increasingly undertaken for a commercial purpose and is now commonly referred to as marine bioprospecting, although it is still unclear whether all bioprospecting is a commercial endeavor. Bioprospecting involves a series of phases, starting from the initial discovery of a marine genetic resource. A sample is then recovered from the environment. These steps are usually part of a collaboration between industry and public researchers, such as scientists from institutions like public oceanographic research centers. The recovered sample is then brought back to a laboratory where the phenotype and genotype are identified. The genetic material of interest is isolated and studied to determine its possible applications.\textsuperscript{7} This labor-intensive process may lead to intellectual property (IP) claims, including patents on inventions and copyrights on publications describing discoveries.\textsuperscript{8} 

Many states are, however, expressing their concerns regarding IP claims on discoveries that stem from MGRs found in areas beyond national jurisdiction. These states generally fear that granting intellectual property rights (IPRs) to these discoveries may result in less knowledge available to the public. On the other hand, some states insist that restricting the intellectual property regime with regards to MGRs will decrease incentives for investments, thereby stifling research and development in this field and depriving the public of valuable advancements.\textsuperscript{9} 

This Article aims to reflect on these concerns in light of international law and current policy discussions. Firstly, the relevant legal instruments that govern marine areas beyond national jurisdiction and the genetic resources contained therein will be described. It should be noted that marine genetic resources found within areas of national jurisdiction are beyond the scope of this work. Following this description, this Article will explore the international legal framework of IP, including the possibilities arising from the IP system to


\textsuperscript{8} As an example, an initial patent on GFP uses was issued to Martin Lee Chalfie et al. in 1976 (U.S. Patent No. 5491084) and was followed by over 500 patents in the U.S. alone covering GFP in some form in the patent claims, according to the USPTO. Regarding copyrights, the number of peer-reviewed scholarly articles published on GFP worldwide is on the order of 2000 publications per year, according to SciFinder.

balance global interests while maintaining the incentives for marine bioprospecting in areas beyond national jurisdiction.10

II. THE ESTABLISHED PAST11

This section will describe the existent legal framework that is relevant to marine genetic resources found in areas beyond national jurisdiction.

A. The Law of the Sea and Biodiversity

Although the United Nations Convention on the Law of the Sea (UNCLOS) does not specifically refer to biodiversity conservation or utilization of genetic resources, the convention is highly relevant to our discussion. Indeed, UNCLOS is often referred to as the constitution for the oceans because it regulates all activities carried out in the seas and oceans.12 Furthermore, UNCLOS refers to the responsibility of conservation of the living resources13 and recognizes the desirability of the equitable and efficient utilization of marine resources.14

In areas beyond national jurisdiction, which are the focus of this work, the seabed (the Area)15 and the water column are governed by two different legal regimes.16 The MGRs of interest in this work can be found in both environments: within the marine seabed of areas beyond national jurisdiction as well as in the water column above it.

1. The Area: common heritage of mankind (Part XI).

UNCLOS Part XI regulates the Area (the seabed and its subsoil beyond areas of national jurisdiction) and states that it and its mineral resources are the

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10 Although bioprospecting may have a significant impact on the environment, such issues will only be discussed in the context of the potential role of intellectual property in addressing them.


14 Id., Preamble.

15 Id., art. 1(1)(1).

16 Salpin, supra note 7, at 12.
common heritage of mankind.\textsuperscript{17} In particular, Articles 136 and 137 of UNCLOS establish that no state shall claim sovereign rights over these resources and that activities in the Area must be carried out for the benefit of mankind. For the purposes of UNCLOS, these activities are defined as exploration for, and exploitation of, the mineral resources.\textsuperscript{18} The International Seabed Authority (ISA) is the organization through which states organize and control activities in the Area and that provides for the equitable sharing of financial and other economic benefits derived from these activities.\textsuperscript{19}


UNCLOS also establishes in Articles 87 and 89 that the high seas (the water column beyond areas of national jurisdiction) are open to all states and governed by the principles of freedom of the high seas. This regime includes the freedom of navigation, the freedom of overflight, and the freedom of fishing\textsuperscript{20} but is restricted, as these freedoms must be exercised with due regard for other states’ interests in their exercise of these same freedoms.\textsuperscript{21} States also possess the freedom of scientific research, which will be discussed in the following section.

3. Marine scientific research.

Part XIII of UNCLOS, which establishes that states have the right to conduct marine scientific research, generally governs such research in areas beyond national jurisdiction, but this right is again subject to the rights and duties of other states.\textsuperscript{22} UNCLOS also prescribes that marine scientific research shall only be conducted for peaceful purposes and in conformity with regulations adopted for the protection and preservation of the marine environment.\textsuperscript{23} UNCLOS establishes a balance with respect to the exercise of this right to research, stating that research projects cannot unjustifiably interfere with other legitimate uses of the sea but that research shall be respected in the course of such other uses.\textsuperscript{24} UNCLOS establishes that all marine scientific research “shall not constitute the legal basis for any claim to any part of the marine environment or

\textsuperscript{17} UNCLOS, \textit{supra} note 13, arts. 133, 136.
\textsuperscript{18} Id., art. 1(1)(3).
\textsuperscript{19} Id., art. 140.
\textsuperscript{20} Id., art. 87(1).
\textsuperscript{21} UNCLOS, \textit{supra} note 13, art. 87(2).
\textsuperscript{22} Id., art. 238.
\textsuperscript{23} Id., art. 240(a), (d).
\textsuperscript{24} Id., art. 240(c).
its resources. Moreover, states are required to actively promote the flow of scientific data and information and the transfer of knowledge resulting from this research.

Marine scientific research in the Area, like all activities in the Area, must be conducted for the benefit of mankind as a whole, and states are obligated to promote international cooperation in marine scientific research and the transfer of technology, particularly to developing states. As noted above, states enjoy the freedom of scientific research in the water column beyond national jurisdiction.

Importantly, no provision of UNCLOS distinguishes between marine scientific research carried out for commercial purposes and research that does not have direct commercial applications or potential.


The primary objectives of the Convention on Biological Diversity (CBD) are "the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources." To achieve the latter objective, the Conference of the Parties to the CBD adopted the Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of the Benefits Arising out of Their Utilization. These

26 UNCLOS, supra note 13, art. 244.
27 Id., art. 143(1).
28 Id., art. 144.
29 Id., arts. 87.1(6), 257.
31 Convention on Biological Diversity, art. 1, Jun. 5, 1992, 1760 U.N.T.S. 79 [hereinafter "CBD'"). Pursuant to article 22(2) of the CBD, contracting parties are required to implement the convention with respect to the marine environment consistent with the rights and obligations of states under the law of the sea.
32 Adopted by the sixth meeting of the Conference of the Parties of the CBD, as part of its Decision VI/24, found in the Report of the Sixth Meeting of the Conference of the Parties to the Convention on Biological Diversity, Annex, UNEP/CBD/COP/6/20 (May 27, 2002) [hereinafter "Bonn Guidelines"). The CBD has thus become the primary global forum addressing access and benefit sharing (ABS). As a pioneering ABS instrument, the CBD principles have influenced various other fora, including the Antarctic Treaty System, the Food and Agriculture Organization, the U.N. General Assembly, the World Health Organization, and the World Trade Organization with its work on Trade-Related Aspects of Intellectual Property. See Lyle Glowka,
guidelines are notably meant to assist states in developing and drafting legislative, administrative, and policy measures on the access to genetic resources and the sharing of benefits deriving from them.33

The CBD framework was expanded with the adoption of the Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization (Nagoya Protocol) on October 29, 2010 by the Conference of the Parties to the CBD.34 The Nagoya Protocol, which aims to provide a legal framework for the effective implementation of the third objective of the CBD, namely fair and equitable sharing of benefits, will enter into force ninety days after the fiftieth instrument of ratification.35 The Nagoya Protocol aims to establish more predictable conditions for access to genetic resources and help ensure benefit sharing when genetic resources leave the contracting party providing the genetic resources.36 For instance, the Protocol establishes an Access and Benefit Sharing (ABS) Clearing-House as part of the clearing-house mechanism of the CBD, which will provide access to information made available by each party relevant to the implementation of the Protocol.37 The Protocol also establishes issuance of internationally recognized certificates by the relevant national authority, which certify that a genetic resource has been obtained, accessed, and used in accordance with prior consent of the national authority having jurisdiction over the genetic resource.38 The Nagoya Protocol also addresses specific transborder cases and other cases where it is not possible to obtain prior consent from the relevant national authority by setting out a Global Multilateral Benefit Sharing Mechanism.39 The parties have agreed to further develop this mechanism according to their needs and as such, it may be an

Genetic Resources, Marine Scientific Research and the International Seabed Area, 8 REV. EUR. COMMUNITY & INT’L ENVTL. L. 56 (1999) [hereinafter “Glowka”].

33 WIPO Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (7th Sess.), Genetic Resources: Draft Intellectual Property Guidelines for Access and Equitable Benefit-Sharing, ¶ 26, WIPO/GRTKF/IC/7/9 (Jul. 30, 2004) [hereinafter “WIPO/GRTKF/IC/7/9”].


35 As of the date of publication of this Article, there were twenty-six ratifications to the Nagoya Protocol. See Status of Signature, and Ratification, Acceptance, Approval or Accession, CONVENTION OF BIOLOGICAL DIVERSITY, http://www.cbd.int/abs/nagoya-protocol/signatories (last visited Nov. 5, 2013).

36 Nagoya Protocol, supra note 34, Introduction.

37 Id., art. 14; CBD, supra note 31, art. 18(3).

38 Nagoya Protocol, supra note 34, art. 17.

39 Id., art. 10.
interesting approach to monitor in solving the issues surrounding marine genetic resources from areas beyond national jurisdiction.\textsuperscript{40}

Generally speaking, however, the CBD regime applies to the utilization of genetic resources that are found \textit{within areas of national jurisdiction}. Therefore, CBD ABS requirements have limited applicability to MGRs in areas beyond national jurisdiction since they apply only to activities beyond national jurisdiction to the extent that states regulate the activities of their own nationals.\textsuperscript{41} Specifically, the Convention applies to all processes and activities carried out under the national jurisdiction or control of a Contracting State, whether within the area of its national jurisdiction or beyond its limits and regardless of where the effects occur.\textsuperscript{42}

In areas beyond national jurisdiction, the CBD provides that states must cooperate directly with each other or through competent international organizations for the conservation and sustainable use of biological diversity.\textsuperscript{43} According to G. Kristin Rosendal, the CBD regards equitable sharing as a prerequisite for achieving the objectives of conservation and sustainable use.\textsuperscript{44} CBD provisions do not affect the rights and obligations of member states that arise from other existing international agreements, unless the exercise of those rights and obligations would cause a serious damage or threat to biological diversity.\textsuperscript{45} The CBD also provides that member states must cooperate to ensure that intellectual property rights are in line with the CBD's objectives, subject to national and international law.\textsuperscript{46}

\textbf{B. Intellectual Property Law: Patents and Copyrights}

Intellectual property refers to creations of the mind such as inventions, literary and artistic works, as well as symbols, names, images, and designs used in commerce.\textsuperscript{47} IP protections encompass patents, copyrights, trademarks, industrial designs, and geographical indications. This work will focus on patents and copyrights because they are the most relevant to marine genetic resources.

\textsuperscript{40} Id., supra note 34, Introduction.

\textsuperscript{41} United Nations Informal Consultative Process on Oceans and the Law of the Sea (8th mtg.), \textit{An Update on Marine Genetic Resources: Scientific Research, Commercial Uses and a Database on Marine Bioprospecting}, at 32 (Jun. 2007) [hereinafter "An Update on MGRs"].

\textsuperscript{42} CBD, supra note 31, art. 4(b).

\textsuperscript{43} Id., art. 5.

\textsuperscript{44} Rosendal, supra note 5, at 432.

\textsuperscript{45} CBD, supra note 31, art. 22.

\textsuperscript{46} Id., art. 16(5).

and associated discoveries, and perhaps the most discussed in this context. All intellectual property protection is a matter of national jurisdiction, although it is subject to international agreements entered into by states.

The rationale of the UNCLOS provisions on marine scientific research actually corresponds well with the objectives of intellectual property protections, as they are both largely founded on the belief that universality of scientific knowledge is a foundation for the advancement of mankind. 48

1. Purpose and general principles.

Patent and copyrights are the oldest forms of intellectual property protection and thus the ones with the greatest historical foundations. The policies underlying patents and copyrights are comparable, as both seek to increase the store of human knowledge. 49 The IP system accomplishes this by creating incentives for inventors and creators to produce and reveal new scholarship and inventions, in the form of exclusive rights with respect to these works for a limited time. 50 After that time, the work passes into the public domain. 51

The United States Supreme Court has notably equated the public policies of copyright and patent, stating that the economic philosophy behind patent and copyright protection is "the conviction that encouragement of individual effort by personal gain is the best way to advance public welfare through the talents of authors and inventors in 'Science and useful Arts.'" 52

The promise of an exclusive right encourages the reduction to practice of an invention, 53 and the disclosure of inventions and creations such that they become useful to the public. The justification for a limited exclusive right is

48 Salpin, supra note 7, at 17.
49 Lasercomb America, Inc. v. Reynolds, 911 F.2d 970, 975–76 (4th Cir. 1990).
50 David W. Oderbeck, A Virtue-Centered Approach to the Biotechnology Commons (Or, the Virtuous Penguin), 59 Me. L. Rev. 316, 317 (2007).
51 See Roger E. Schechter & John R. Thomas, Intellectual Property—The Law of Copyrights, Patents and Trademarks § 1.2.4 (Thomson West, 2003) (describing the benefit to the public domain after expiration of patent or copyright) [hereinafter "Schechter"].
53 Schechter, supra note 51, § 16.3.2.4 (stating that an invention can be reduced to practice in two ways: (1) constructively, by filing a patent that adequately discloses the invention, in a manner that enables one skilled in the art to practice the invention without the exercise of inventive facilities; or (2) by constructing a working physical embodiment of the invention).
grounded in the premise that had it not been for the inventor's (or creator's) work and its disclosure, the public would never have benefited from it.\textsuperscript{54}

These intellectual property rights promote information sharing by encouraging the creator or inventor to make the work publically known, in exchange for the benefits of exclusive rights. The protection of intellectual goods prompts creators and inventors to share their work immediately rather than keep it secret, by giving them a right of action against imitations and forgeries. This incentive promotes the dissemination of knowledge.\textsuperscript{55} Indeed, the public benefits both immediately from the disclosure of the work, and later from the work's incorporation to the public domain when the term of protection of the work expires. IP rights also stimulate innovation and encourage technology transfer, due to the increased confidence in information sharing.

It is important to realize that the IP system does not grant the right to use these works, only granting the right to exclude others from using them.\textsuperscript{56} This distinction is significant in the context of works that are harmful or otherwise dangerous; patents on biological weapons, for instance, would be allowed but criminal and other laws would regulate their use. Indeed, the use of patented works is regulated by legal instruments that are not necessarily related to intellectual property protections.

2. Rules and minimum standards of IP protection in international law.

As many developed nations moved towards knowledge-based economies, IP became the pivot of their global competitiveness.\textsuperscript{57} These nations thus became vulnerable to free riding practices and piracy and lobbied for the inclusion of intellectual property in the framework of the General Agreement on Tariffs and Trade (GATT), which is meant to promote the reduction of tariff barriers to the international movement of goods.\textsuperscript{58} This inclusion occurred in 1994 at the Uruguay Round of GATT negotiations and led to the Trade Related

\begin{footnotesize}
\begin{enumerate}
\item Id., § 1.3.
\item This fundamental purpose of IP is compatible with the UNCLOS principles of enhanced flow of marine scientific research information. UNCLOS, supra note 13, Art. 244. In general terms, the interaction of UNCLOS with other international agreements is handled by Art. 311 (stating that UNCLOS does not alter the rights and obligations of States arising from other agreements, which are compatible with UNCLOS and do not affect other States' enjoyment of their rights or the performance of their obligations under UNCLOS).
\item Schechter, supra note 51, § 1.2.2.
\item Haochen Sun, Overcoming the Achilles Heel of Copyright Law, 5 NW. J. TECH. & INTELL. PROP. 265, 274 (2007).
\end{enumerate}
\end{footnotesize}
Aspects of Intellectual Property (TRIPs) Agreement,\textsuperscript{59} which provides international minimum standards for IP protection.\textsuperscript{60}

TRIPs aims to reduce impediments to international trade and to ensure that the enforcement of IPRs does not become a barrier to legitimate trade.\textsuperscript{61} The minimum national protection standards for IP are intended to promote the free flow of trade by providing safeguards against piracy.\textsuperscript{62} These international protections will be discussed below for inventions and discoveries deriving from marine genetic resources, marine scientific research, and bioprospecting.\textsuperscript{63}

\textit{a) Copyrights on scholarly publications of marine scientific research and bioprospecting.}

Although works must be creative to be protected, the creativity requirement in copyright law is not very strict and admits almost any original creation, including scientific reporting.\textsuperscript{64} Therefore, it is entirely possible that copyrights would protect scientific communications of information regarding MGRs found in areas beyond national jurisdiction. Despite this protection extending to the expression of scientific information, it is important to remember that scientific content cannot be protected by copyright. This fundamental notion of copyright law, often referred to as the “idea-expression dichotomy,” establishes that only the expression of an idea can be protected, rather than the idea itself.\textsuperscript{65}


\textsuperscript{60} K. Russell LaMotte, Access to Benefit Sharing: Risks and Opportunities in the Regulation of Bioprospecting for Genetic Resources, ALI-ABA Course of Study Materials in International Environmental Law, at 3 (2006) [hereinafter "LaMotte"].

\textsuperscript{61} TRIPs, supra note 59, Preamble.


\textsuperscript{64} Sam Ricketson & Jane C. Ginsburg, International Copyright and Neighboring Rights: The Berne Convention and Beyond 406 (2005) (noting that scientific articles are subject to copyright if they contain “written description of an experiment, process, device or the like”). See also id. at 413 (including “technical and scientific” writings as being subject to copyright); Merges, supra note 52, at 372 (stating that only a modicum of originality was required).

\textsuperscript{65} Merges, supra note 52, at 395-96.
Requirements of "copyrightability" reflect the desire to foster dissemination of knowledge. In particular, creative efforts must be materially supported, by expressing them in writing for instance, in order to become copyrightable subject matter. This requirement pressures creators to record their work, thereby making it more easily disseminated. Such a requirement additionally facilitates the preservation of works for the benefit of future generations.

b) Patents on inventions deriving from marine genetic resources.

TRIPs establishes the types of innovation that must be granted patent protection. Inventions in all fields of technology are patentable, whether products or processes, provided that they are new, involve an inventive step (nonobvious), and are capable of industrial application (useful).66

TRIPs also provides states with the possibility to exclude certain inventions from patent protection. Some specific exceptions allow the denial of a patent covering subject matter such as diagnostic, therapeutic, and surgical methods for the treatment of humans or animals.67 The Agreement also provides general exceptions to protect human, animal, or plant life or health, for reasons of morality or to avoid serious prejudice to the environment.68

TRIPs also specifically provides that states may choose to exclude plants and animals other than microorganisms, as well as essentially biological processes for the production of plants or animals (other than nonbiological and microbiological processes).69 Protection must therefore be provided for microorganisms, microbiological processes, and nonbiological processes.70 Genes, however, are not mentioned in the TRIPs Agreement. States may be allowed to exclude genes from patentability, on moral grounds for instance. If

66 TRIPs, supra note 59, Art. 27(1) and accompanying note 5. As a result, three categories of subject matter typically fall outside the scope of patentability: "The laws of nature, physical phenomena, and abstract ideas." Diamond v. Chakrabarty, 447 U.S. 303, 309 (1980) [hereinafter "Chakrabarty"].

67 Id., art. 27(3)(a).

68 Id., art. 27(2). Interestingly, this permitted exception is in line with the CBD provisions, requiring the dismissal of international obligations that would cause serious damage or threat to biological diversity. See CBD, supra note 31, art. 22.

69 TRIPs, supra note 59, art. 27(3).

70 Id., art. 27(3). For discussion on the meaning of these categories of inventions, see GRAHAM DUTFIELD, et al., EXPLORING THE FLEXIBILITIES OF TRIPS TO PROMOTE BIOTECHNOLOGY CAPACITY BUILDING AND APPROPRIATE TECHNOLOGY TRANSFER, FINAL REPORT IPDEV WORK PACKAGE 7 (Nov. 2006) [hereinafter "IPDEV Report"].
this exception is not accepted, an exception might be carved out for the use of genes as an essentially biological process.71

Genetic inventions and biotechnological patents, defined as those related to nucleotide DNA or RNA sequences, are available and increasingly common in many jurisdictions, including several OECD countries.72 In the 1980 Diamond v. Chakrabarty case, the United States Supreme Court decided an important legal landmark attracting global attention. In Chakrabarty, inventions involving man-made biological materials and some life forms were held patentable; the court famously stating that patentable subject matter includes "anything under the sun that is made by man."73

The Supreme Court of Canada tempered this view in 2002, when it denied a patent on the Harvard oncomouse, a manmade, genetically modified mouse with increased susceptibility to developing cancer, making them useful for animal carcinogenic studies.74 The Court drew a distinction between lower life forms and higher life forms, such as mice, countering the generous practices of the United States Patent Office and the European Patent Office, which granted a patent on the oncomouse.75

As stated above, Chakrabarty established the practice of patenting nonnaturally occurring living organisms. On the other hand, while products of nature are excluded from patentability, naturally occurring substances that are isolated from their surroundings may also be patented.76 Indeed, the isolation of such substances may be sufficient to render the product inventive, especially if significant inventive skill was required to obtain the product, rather than mere action of a technician. Evidently, the product must also pass the other patenting requirements such as utility. Thus, the isolated product must manifest a particular use, which arises from the purification or isolation.77

Any application for patent for an invention derived from MGRs must also meet the disclosure requirements of patent law, such as disclosure of known prior art, identity of inventor, and best mode of carrying out the invention.

71 IPDEV Report, supra note 70, at 63 (describing that while a gene may not be excluded as a biological process, the use made of genes could be excluded from patent since a gene is what governs most biological processes).
72 DAVID KENNETH LEARY, INTERNATIONAL LAW AND THE GENETIC RESOURCES OF THE DEEP SEA ¶7.5.2 (Publications on Ocean Development 2007) [hereinafter "LEARY"].
73 Chakrabarty, supra note 66, at 309.
75 Id. at 47.
76 See SCHECHTER, supra note 51, § 14.3.1 (significant artificial changes to a product of nature may render it patentable).
77 See, for example, Parke-Davis & Co. v. H.K. Mulford & Co., 189 F.95 (S.D.N.Y. 1911), aff'd 196 F.496 (2d Gr. 1912).
These requirements range from substantive, which can cause the invalidation of a patent, to formality requirements (such as the names and addresses of inventors), which can be rectified unless fraud is proven. Typically, fraud upon the patent office (fraudulently hiding known information) is punishable by loss of patent rights.

Indeed, the patent system was engineered to promote transparency and full disclosure: "[T]he concept of laying open for public inspection is the source of the English word 'patent.'" As a result, the invention may be effectively and freely practiced by the public at the expiration of patent protection.

TRIPs incorporates this requirement and states that patent applications shall "disclose the invention in a manner sufficiently clear and complete for the invention to be carried out by a person skilled in the art." Hence, the written description of a patent must be enabling, meaning that it must contain a description of the invention in sufficient detail to permit a person skilled in the art to repeat the invention.

However, enabling descriptions are particularly elusive in the field of biotechnology, since microorganisms and biological material are difficult to describe in written form. As a result, patent applicants may satisfy disclosure requirements by depositing a sample of the invention, according to the Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure. This deposit ensures that the patented material will be accessible to persons other than the inventor, for experimental use purposes during the patent lifetime as well as any use after the expiration of patent protection.

III. THE PRESENT AND ITS CONTROVERSIES

Many international issues have yet to be resolved with regard to marine genetic resources found in areas beyond national jurisdiction. These issues relate to both the law of the sea and IP law.

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78 UNEP/CBD/COP/8/INF/7, supra note 63, ¶ 179. See Draft Treaty Supplementing the Paris Convention for the Protection of Industrial Property as Far as Patents Are Concerned (Patent Law Treaty), art. 10(1), WIPO Doc. PLT/DC/3 (Dec. 21, 1990) [hereinafter “PLT”] (providing that failure to meet substantive requirements renders a patent invalid, whereas failure to meet formal requirements may be rectified, unless fraudulent).

79 UNEP/CBD/COP/8/INF/7, supra note 63, ¶ 95.

80 TRIPs, supra note 59, art. 29(1).

A. Some Questions of Relevance in the Law of the Sea Sector

As previously mentioned, UNCLOS did not address the Area’s biological resources and focused on its mineral resources. Thus, the international legal regime that applies to these resources is unclear and consists of a patchwork of legal instruments, including UNCLOS, the CBD, and intellectual property rights agreements, none of which directly address MGRs in areas beyond national jurisdiction nor provide a comprehensive mechanism governing activities such as bioprospecting in these areas.

Nevertheless, as the “constitution of the oceans,” UNCLOS is generally accepted to be the starting point for handling legal questions regarding MGRs located beyond areas of national jurisdiction. In particular, UNCLOS has been the basis for the highly contested legal regime governing these resources, which could either be found analogous to seabed mineral resources and part of the common heritage of mankind, or instead could fall under the resources of the high seas, generally free to be collected and sampled by all.

The outcome of this categorization would have very serious consequences on states. Indeed, should MGRs fall under the common heritage of mankind as many developing states maintain, equitable benefit sharing would apply and, consequently, products derived from these resources should also be the common heritage of mankind. On the other hand, should MGRs be considered part of the high seas, the obligation of sharing benefits might be eliminated,

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82 Glowka, supra note 32, at 56.
83 LaMotte, supra note 60 (noting that a number of instruments exist that may be relevant to bioprospecting activities, including international mechanisms to protect the marine environment and measures to establish marine protected areas).
84 A/65/68, supra note 9, ¶¶ 71-72, which explains the divergent views expressed on the legal regime of MGRs beyond areas of national jurisdiction under UNCLOS:

Several delegations observed that, according to General Assembly resolution 2749 (XXV) and Part XI of the Convention, which they noted was part of customary international law, the seabed and ocean floor and the subsoil thereof beyond the limits of national jurisdiction (the “Area”), as well as its resources, were the common heritage of mankind. They emphasized that the common heritage of mankind, including the fair and equitable sharing of benefits, applied to the biological resources of the Area. . . . Other delegations stressed that Part XI only addressed mineral resources, and expressed the view that marine genetic resources beyond areas of national jurisdiction were regulated by the high seas regime in Part VII of the Convention.

depending on the interpretation of marine bioprospecting. Indeed, if bioprospecting is considered to be marine scientific research, the products of bioprospecting would fall under UNCLOS Part XIII, which contains information dissemination obligations and specifies that such research cannot constitute the legal basis for any claim to any part of the marine environment or its resources. If, however, bioprospecting is found to be distinct from marine scientific research, then products of marine bioprospecting in the high seas would be free for all to capture.

The interpretation of bioprospecting is difficult. To be sure, while bioprospecting includes a component of pure research, it is unclear whether the commercial objective of bioprospecting makes this activity tantamount to exploitation, especially considering that the outcome of bioprospecting is often highly uncertain.

Should bioprospecting be considered marine scientific research, it would appear that granting patents protecting inventions derived from such activities would be contrary to UNCLOS provisions regarding scientific research that prohibit the use of such activities as the legal basis for any claim to any part of the marine environment or its resources. Furthermore, many states are concerned about the use of IP rights as a means to privatize genetic resources without sharing benefits.

**B. Intellectual Property—Misconceptions and Realities**

To be sure, IP protection is often regarded as the granting of a monopoly, with benefits falling solely on the right holder. However, IP is not necessarily contrary to benefit sharing. It should be recalled that intellectual property protection is not a dam, used to fend off users; rather it is a river, meant to channel and direct the use of the material subject to its rule.

For instance, as stated above, patents and copyrights promote disclosure, which is in line with UNCLOS objectives of dissemination of knowledge and

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85 UNCLOS does not define, nor even mention, the term bioprospecting. A/60/63/Add.1, supra note 12, ¶ 203 (stating that there is no internationally agreed definition for either marine scientific research or bioprospecting).

86 UNCLOS, supra note 13, arts. 241, 244.

87 Unless Area marine genetic resources are brought together with mineral resources under the authority and governance of the International Seabed Authority.

88 UNCLOS, supra note 13, art. 241.

89 WIPO/GRTKF/IC/7/9, supra note 33, Annex (Preliminary Note).

access to information. On this topic, some important principles can be drawn from TRIPs, which states that protection and enforcement of intellectual property rights should contribute to the advancement and transfer of technology. For instance, protection of patent rights reassures inventors that they will not lose control of their inventions, thereby facilitating collaborations that promote technology transfer and capacity building. Collaborations also maximize the scientific returns from resources available and minimize the impact of research on the environment.

This was foreseen in drafting the CBD, which recognizes that IP can be supportive of, and not run counter to, the objectives of the CBD. Interestingly, the CBD Secretariat’s review of the impact of IPRs on the CBD’s objectives stated that “[i]dentifying and allocating IPR will be an important part of controlling access to genetic resources and facilitating the fair and equitable sharing of benefits.”

Further to this point, it should also be noted that the application for a patent should not be considered to be a claim to part of the marine environment or its resources, in a sense contrary to Article 241 of UNCLOS. Indeed, a patent is only granted in respect of new and useful inventions; it may not be granted in respect of naturally occurring elements—for in that event the inventor did not invent, he merely discovered. Therefore, when a patent is granted in respect of an invention, it does not grant any right to the patent holder in respect of the natural resources on which that invention may be based, nor does it grant any kind of ownership right to the patent holder. A patent grants the right to exclusive use of the invention covered by the patent, for the duration of the patent term.

In light of these realizations, there is a common need to understand the full range of options offered by IP that promote global interests and benefit sharing. Several of these options will be explored in the following section.

Before discussing the use of IP to promote access and benefit sharing, it should be noted that states are permitted by international law to create limitations and exceptions to IP rights. These domestic limitations and

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91 See UNCLOS, supra note 13, arts. 143(3)(c), 244.
92 TRIPs, supra note 59, art. 7.
93 See Charles Lawson & Susan Downing, It’s Patently Absurd—Benefit Sharing Genetic Resources from the Sea Under UNCLOS, the CBD and TRIPs, 5 J. INT‘L WILDLIFE L. & POL’Y 211, 223 (2002).
95 TRIPs, supra note 59, arts. 27, 28, 33.
exceptions are valid, subjected to the validity test provided in TRIPs.\textsuperscript{96} As seen above, TRIPs specifically allows states to deny certain types of patents, such as patents on therapeutic methods for the treatment of humans for instance, and also enables states to make exceptions to protect human life or health and for reasons of morality.

While national limitations and exceptions to IP rights must comply with international law, international limitations and exceptions can form a \textit{sui generis} system of IP protection, provided that it is supported by the international community.

\textbf{IV. THE ENLIGHTENED FUTURE: MOVING AWAY FROM THE CONTROVERSIES}

International law leaves many questions unanswered: Are marine genetic resources found in areas beyond national jurisdiction part of the common heritage of mankind? If they are not, do they fall under the freedom of the high seas of UNCLOS Part VII? Is marine bioprospecting in the Area simply marine scientific research, which must be conducted for the benefit of all mankind?

Due to the highly controversial nature of these questions, it appears that engaging in these debates will only prolong the stalemate.\textsuperscript{97} It seems more productive to move away from the controversy and proceed towards a solution by using the legal means that are already available, by tailoring a special IP regime to handle access to information on marine genetic resources found beyond national jurisdiction and benefits that derive from them.

Firstly, it is important to note that entirely barring protection for inventions deriving from MGRs from areas beyond national jurisdiction is difficult, as patents constitute a key incentive behind research and product development in relation to these resources.\textsuperscript{98} Patent protection rewards the inventor for the effort, cost, and investment in developing the product; without such protection, it is unlikely that product development would occur to the

\textsuperscript{96} \textit{Id.}, art. 13 (copyrights: “Members shall confine limitations or exceptions to exclusive rights to certain special cases which do not conflict with a normal exploitation of the work and do not unreasonably prejudice the legitimate interests of the right holder”), art. 30 (Patents: “Members may provide limited exceptions to the exclusive rights conferred by a patent, provided that such exceptions do not unreasonably conflict with a normal exploitation of the patent and do not unreasonably prejudice the legitimate interests of the patent owner, taking account of the legitimate interests of third parties”).

\textsuperscript{97} Leary, \textit{supra} note 72, ¶ 7.8.

\textsuperscript{98} \textit{Id.}, ¶ 7.7.1.
extent it does today.\textsuperscript{99} Thus, it is important to maintain the incentives created by
the patent system while balancing the global interests in benefit sharing.

In a recent article, Angelica Bonfanti and Seline Trevisanut suggest that the
exploitation of MGRs should be carried out according to two fundamental
principles: prior and informed consent to access MGRs, and the fair and
equitable sharing of benefits from these resources.\textsuperscript{100} Although the first principle
finds little or no application in areas beyond national jurisdiction, fair and
equitable sharing of benefits is a notion that is central to the issue and is
supported by the majority of states.\textsuperscript{101}

Benefit sharing lessons can be extracted from other international
instruments, such as the International Treaty on Plant Genetic Resources for
Food and Agriculture (FAO Treaty) and the CBD. The former treaty creates an
open, public space of research commons by calling upon states to share their
genetic resources for food and agriculture with the rest of the world in exchange
for free access to resources from other parts of the world. To this end, the FAO
Treaty establishes the Multilateral System of Access and Benefit Sharing (MLS).
Recipients of MLS materials who commercialize a product that is a plant genetic
resource for food and agriculture incorporating material accessed through the
MLS pay to a trust account a share of the benefits arising from commercialization.\textsuperscript{102} These funds are intended to benefit mostly farmers who
conserve and use plant genetic resources for food and agriculture in a
sustainable manner.\textsuperscript{103} Nonmonetary benefits are also emphasized by the FAO
Treaty, including information exchange, access to and transfer of technology,
and capacity building.\textsuperscript{104} The CBD, and the Bonn Guidelines that accompany it,
also provide for sharing of monetary and nonmonetary benefits.

\textsuperscript{99} A/60/63/Add.1, supra note 12, at 28 (noting that “due to the high costs involved, patenting is
presently the main avenue for securing economic benefit as a return for investment”).

\textsuperscript{100} Angelica Bonfanti & Seline Trevisanut, TRIPS on the High Seas: Intellectual Property Rights on Marine

\textsuperscript{101} See Director General of the World Trade Organization, Issues Related to the Extension of the Protection
of Geographical Indications Provided for in Article 23 of the TRIPS Agreement to Products other than Wines
and Spirits and those Related to the Relationship between the TRIPS Agreement and the Convention on Biological
Diversity, TN/C/W/50, ¶ 5 (June 9, 2008); Report of the WTO Director-General on Issues Related
to the Extension of the Protection of Geographical Indications Provided for in Article 23 of the TRIPS Agreement
to Products other than Wines and Spirits and those Related to the Relationship between the TRIPS Agreement
and the Convention on Biological Diversity, TN/C/W/61, at ¶ 18 (April 21, 2011) [hereinafter “2011
report of the WTO Director-General”].

\textsuperscript{102} International Treaty on Plant Genetic Resources for Food and Agriculture, art. 13(2)(d)(ii),

\textsuperscript{103} Id., art. 13(3).

\textsuperscript{104} Id., art. 13(2).
However, many aspects of these ABS systems cannot be easily transferred to MGRs beyond national jurisdiction, since the sovereignty of these resources is not yet legally established. For instance, the FAO Treaty is based on mutual recognition of the Contracting Parties’ sovereign rights over their own plant genetic resources, but they agree to provide access to others for food and agriculture.105 Similarly, the Bonn Guidelines suggest collaborations with the provider country of the genetic resources, 106 which are impossible for resources in areas beyond national jurisdiction given that there is no “provider country.”

As previously mentioned, IP protection can work hand in hand with benefit sharing mechanisms and with the interests of many states who both wish for the expansion of scientific knowledge and the protection of IP as well as the short and long term benefits to all mankind from marine genetic resources from areas beyond national jurisdiction.107

In order to harness the IP protections system in pursuit of global interests with respect to marine genetic resources from areas beyond national jurisdiction, it would first be helpful to identify which inventions and publications derive from bioprospecting beyond areas of national jurisdiction. To this end, several propositions and approaches have included the insertion of a disclosure of origin requirement.108

A. Declaring the Source: Increased Disclosure Requirements

The proposal requiring the declaration of source for MGRs has been supported by the document prepared in part by the United Nations University: An Update on Marine Genetic Resources: Scientific Research, Commercial Uses and a Database on Marine Bioprospecting.109

In the case of patents, the requirement could be inserted either as a substantial requirement or mere formal element of disclosure into national law, or could be an amendment to one of a number of international instruments, such as the Budapest Treaty on the International Recognition of the Deposit of

105 Id., art. 10(1).
106 See, for example, Bonn Guidelines, supra note 32, art. 26(d) and Appendix II art. 2(b).
109 An Update on MGRs, supra note 41.
Microorganisms for the Purposes of Patent Procedure, the Patent Cooperation Treaty, or TRIPs. In fact, several WTO members, including the European Communities, Switzerland, and many developing countries such as Brazil have agreed that TRIPs should be amended to include a mandatory requirement for the disclosure of the source of genetic resources in patent applications.

If a source disclosure requirement implemented in national law is considered to be a mere formality, such a requirement would likely be consistent with TRIPs, which allows states to require compliance with reasonable procedures and formalities as a condition of the acquisition of maintenance of IP rights. Even if the disclosure of source would be made a substantial requirement of protection, it may remain consistent with TRIPs provided that the implementation of such a requirement is necessary to manage obligations under international treaties such as UNCLOS and the CBD.

Further, such a requirement does not appear to be inconsistent with the Patent Cooperation Treaty (PCT) or the Patent Law Treaty (PLT). For instance, the PCT is not intended to restrict the freedom of states to prescribe substantive conditions of patentability. National law may require that the applicant furnish evidence in respect to any substantive condition of patentability such as novelty, utility, inventiveness, or disclosure. Similarly, the PCT provides that national law may require patent applicants to furnish any document relating to the applicant’s entitlement to apply or be granted a patent.

Furthermore, given that the declaration of source could facilitate the practice of an invention (an important element of fully enabling disclosures), such a requirement may even be derived from the obligation to disclose the

110 While the Budapest Treaty does not currently require disclosure of source, the Assembly of Contracting parties is allowed to amend its regulations by a majority vote of two-thirds. Budapest Treaty, supra note 81, art. 12(3)-(4).

111 WTO Trade Negotiations Comm. (Doha Round), Draft Decision to Enhance Mutual Supportiveness Between the TRIPS Agreement and the Convention on Biological Diversity, TN/C/W/59 (April 19, 2011). See also WTO Trade Negotiations Comm. (Doha Round), Draft Modalities for TRIPs Related Issues, TN/C/W/52, Item 4 (July 19, 2008).

112 TRIPs, supra note 59, art. 62.


114 See UNEP/CBD/COP/8/INF/7, supra note 63, ¶ 196.

115 PCT, supra note 63, art. 27. See also MERGES, supra note 52, at 124 (describing patentability requirements in US).

116 PCT, supra note 63, Rule 51 bis.
invention sufficiently for it to be carried out by a person skilled in the art and where appropriate, to disclose the best mode known by the inventor.

In the case of genetic resources located within national jurisdiction, the advantage of declaring their source would be to enable states to monitor whether samples have been obtained in accordance with the CBD framework that requires that ABS arrangements have been made. The Berne Declaration reaffirms this advantage by noting that source disclosure requirements are “one important tool to make sure that no patents are granted for inventions which are based on genetic resources . . . which have been accessed in contradiction with CBD rules.” If the genetic resources are located in areas beyond national jurisdiction, a special IP regime, which will be described below, could be triggered.

Should source disclosures become a requirement, some wrinkles must be ironed out. Firstly, the consequences for lack of disclosure must be established. In other words, it must be decided whether the disclosure of source is a substantive requirement, or a mere formality. Typically, formalities can be rectified once good faith error is established, whereas failures to comply with substantial disclosure requirements void the patent entirely whether fraudulent or not. These general principles, however, can be modified. For instance, loss of patent rights for failure to comply could be triggered for inventions deriving from MGRs located in areas beyond national jurisdiction only in cases of fraud. Another option is to trigger the loss of patent rights for lack of compliance only in cases where the inventions would be subject to ABS regulations, or if it is shown that disclosure of origin would have likely denied the application for reasons of ordre public, lack of novelty, or otherwise.

On the other hand, a softer disclosure requirement could cause mere unenforceability in infringement cases rather than invalidity of the patent rights. This would therefore constitute a defense for infringement rather than a claim of invalidity. Softer requirements, which have less important consequences for noncompliance, are more similar to the absence of requirements. In this sense, decreasing the severity of noncompliance sanctions also enhances the requirement’s consistency with freedom of high seas principles.

Before moving forward with this requirement, it must be established whether noncompliance can be challenged by any party or only an infringing

117 Comments by the Berne Convention on WIPO/IP/GR/05/1 in UNEP/CBD/COP/8/INF/7, supra note 63, ¶112.

118 Note that according to PLT, supra note 78, art. 10(2), a patentee must be given the opportunity to make observations on the intended revocation of a patent, and to make amendments and corrections where permitted under the law, within a reasonable time limit.

119 See PLT, supra note 78, art. 10.
party. On this topic, it should be noted that in all cases, the burden of proof should lie with the party alleging noncompliance. This follows the generally accepted presumption that patents are valid and ensures more stability in the patent system.

Secondly, it is necessary to determine the kind of link that triggers the disclosure of source requirement. TRIPs and the PCT would suggest that the requirement would be triggered in cases when the source of the genetic material or the access to it is necessary to carry out or replicate the invention as claimed. This requirement might also be triggered if access to the material is necessary to implement the best mode disclosed in the application or to practice another example given in description of the patent. Other options would trigger this requirement if the physical deposit of a sample were required for enablement, when material used directly led to the invention and is essential to deriving the invention, or when material used led to the invention but was only incidental to the attainment of the invention.

Interestingly, the European Community welcomes disclosure of source, stating that, "if an invention is based on biological material of plant or animal origin or it uses such material, the patent application should, where appropriate, include information on the geographical origin of such material, if known." The language ("where appropriate," "if known") suggests, however, that this is a soft requirement and that failure to comply is without prejudice to the processing of patent applications or the validity of rights granted. In Norway, the requirement appears to be stricter: "If an invention concerns or uses biological material, the patent application shall include information on the country from which the inventor collected or received the material." Despite the support for source disclosure, the U.S. maintains that such a disclosure requirement would create uncertainties in the patent system that would discourage research and development and the corresponding publication of inventions. In light of this statement, it should be kept in mind that full

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120 See UNEP/CBD/COP/8/INF/7, supra note 63, ¶ 85.
121 TRIPs, supra note 59, art. 29; PCT, supra note 63, art. 5.
122 EC proposal, in UNEP/CBD/COP/8/INF/7, supra note 63, ¶ 122.
123 Communication by the European Community and its Member States to the TRIPs Council on the Review of Article 27.3(b) of the TRIPs Agreement, and the Relationship between the TRIPs Agreement and the Convention on Biological Diversity and the Protection of Traditional Knowledge and Folklore, Directorate General for Trade (Sept. 12, 2002).
125 Patents Act, May 7, 2004, § 8(b).
disclosure is germane to the patent system and has always played a role in ensuring that patents do not reward inequitable behavior.

The disclosure of source would enable the implementation of a special IP regime, applying to IP deriving from bioprospecting in areas beyond national jurisdiction. However, as noted by the WTO Director-General in 2011, many states continue to differ on whether the formulation and application of a disclosure mechanism relating to genetic resources in TRIPs would be useful and effective in ensuring that the patent system promotes CBD objectives, or whether other mechanisms should be preferred. The other mechanisms proposed by states include (1) disclosure through the World Intellectual Property Organization by amending the regulations of the PCT (and, by reference, the PLT) so that domestic laws may ask inventors to disclose the source of genetic resources when they apply for patents. Failure to meet the requirement could hold up a patent being granted or, when done with fraudulent intent, could entail a granted patent being invalidated; (2) disclosure outside patent law, such that all patent applicants would be required to disclose the source or origin of genetic material, with legal consequences of not meeting this requirement which lie outside the scope of patent law; and (3) use of national legislation, including contracts rather than a disclosure obligation, which could include commitments on disclosing any commercial application of genetic resources.

B. New Possibilities for a Special IP Regime

The disclosure of the source would enable the establishment of a sui generis protection regime for IP deriving from MGRs located in areas beyond national jurisdiction. The list that follows is by no means exhaustive, but does reflect many current suggestions regarding the possible options.

Whether the options are adopted through international implementation agreements or an ad hoc convention, these would be supported by the Nagoya Protocol, which requires that Contracting States consider “the need for and modalities of a global multilateral benefit sharing mechanism to address the fair and equitable sharing of benefits derived from the utilization of genetic resources” that occur, inter alia in situations for which it is not possible to grant or obtain prior informed consent, such as in the case of resources from areas beyond national jurisdiction.

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126 2011 Report of the WTO Director-General, supra note 101, ¶ 27.
127 Nagoya Protocol, supra note 34, art. 10.
128 Bonfanti & Trevisanut, supra note 100, at 229.
1. Commons Repository.

First and foremost, the disclosure of source would allow the creation of a Commons Repository, where all IP (patents and scholarly publications) deriving from MGRs from areas beyond national jurisdiction would be compiled. In support of the common heritage of mankind approach, the Repository would effectively become a central archive and compendium, recording all advancements deriving from these resources, leading to increased accessibility to information. While providing access to information, the Repository would, however, fully preserve IP protection, therefore perhaps tending more towards the principles of the high seas. Tending even further towards the freedom of the high seas approach, deposit of protected IP could be made mandatory only after the lapse of a certain length of time (for instance after two, six, or twelve months).

Several advantages would stem from the heightened “searchability” of information, including better informed policy debates.129 Such a record would also permit better prior art searches, enabling the defensive protection of MGRs by preventing the grant of patents over resources that are not novel or obvious.130

2. Commons Trust Fund: patent royalties.

The Commons Trust Fund ("Fund") is frequently mentioned as a viable option for ABS regarding MGRs from areas beyond national jurisdiction.131 The Fund would be similar to the FAO Treaty, whereby developers of a commercial product using designated resources (MLS materials, or MGRs from areas beyond national jurisdiction in this case) are required to pay royalties to the Fund. The Fund would be used to protect these resources, thereby providing benefits to all mankind. In other words, the use of commons resources is made dependent on some of the benefits arising from their use flowing back into their protection.

This Fund would provide the long awaited link between international IP protections and the conservation of biodiversity. Indeed, the need for funding biodiversity conservation and sustainable development is notably recognized in the CBD, and has been for some time already (at least since 1987, by the Bruntland Commission).132

129 A/60/63/Add.1, supra note 12, at 74.
130 WIPO Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore, *Genetic Resources: List of Options*, Annex 1, ¶ 5-6, WIPO/GRTKF/IC/11/8(a), (June 3, 2007).
131 A/60/63/Add.1, supra note 12, at 28.
132 An Update on MGRs, supra note 41.
Interestingly, India has already established a similar system whereby all inventors must obtain the consent of the National Biodiversity Authority before applying for patent rights based on an Indian biological resource, and grants the Authority the power to impose the sharing of financial benefits arising out of the commercial utilization of such rights.\textsuperscript{133}

In the spectrum of options between the common heritage of mankind and the freedom of the high seas approaches, the Commons Trust Fund falls closer to the realm of the common heritage of mankind. However, the royalty rate can be varied resulting in the displacement of the option towards the freedom of the high seas principles in the case of lower royalty rates. Indeed, one can imagine that if these rates are lowered to an infinitesimal amount, the existence of the patentee’s obligation to pay royalties will be negligible, thereby harmonizing the option with freedom of high seas principles.

This work is not geared towards finance and economy, and will therefore not determine the exact value that should be given to a royalty rate. However, a suitable benchmark figure might be similar to the amounts paid under ABS arrangements within national jurisdictions. In the determination of the royalty rate, it should be kept in mind that research and development costs might be higher for deep-sea research, thus suggesting that royalty rates be lower for such efforts. On this topic, it is interesting to consider that a royalty rate of 1.1 percent of product sales\textsuperscript{134} was agreed to by the FAO Treaty’s governing body and is reflected in the MLS standard material transfer agreement (Annex II).

The management of the Commons Trust Fund could naturally be entrusted to the International Seabed Authority (ISA), who already has the mandate to distribute wealth generated from the exploitation of the mineral resources of the Area pursuant to Article 82 of UNCLOS. Having said that, it is unclear whether the ISA would be enabled to face the difficulties of managing such a system.\textsuperscript{135} Indeed, the ISA has not yet developed rules or procedures for equitable sharing of benefits and its ability to distribute wealth is still unproven.

On the other hand, the Global Environmental Facility (GEF) already has experience in providing funding to assist developing countries in meeting the objectives of international environmental conventions and serves as the financial mechanism for four conventions: the CBD, the UNFCCC, the United Nations Convention to Combat Desertification, and the Stockholm Convention on


\textsuperscript{134} As deep-sea bioprospecting is a high-risk enterprise, royalties should be based on actual sales of product to ensure that only profitable patents are required to contribute to the fund. See \textit{Leary}, \textit{supra} note 72, ¶ 7.7.2.

\textsuperscript{135} See, for example, Bonfanti & Trevisanut, \textit{supra} note 100, at 217.
Persistent Organic Pollutants. The GEF handles a range of projects that address global issues related to sustainable development and the environment, like biodiversity, climate change, international waters, land degradation, and ozone depletion.

The GEF may be well placed to act as the financial mechanism for managing the benefit sharing of proceeds deriving from patents based on MGRs from areas beyond national jurisdiction.

As previously mentioned, the Fund could provide funding for research on the conservation and sustainable development of these resources. In assessing funding applications, consideration could be given to efforts on behalf of the applicant to transfer technology, provide capacity building, and contribute to the local economy of developing states. Along these lines, those applicants having voluntarily published to the Repository could also be rewarded.

Furthermore, research projects funded by the Fund could be granted free access to copyrighted material and use of patented inventions pushing this option even closer to the common heritage of mankind approach.

3. Experimental and customary use exceptions.

The experimental use exception is broadly accepted by many states and allows the use of protected material for noncommercial research. This exemption is generally used as a defense to infringement claims.

The definition of noncommercial research is central to the application of this exemption. Generally speaking, research with the goal of adding knowledge to the public domain, without restrictions or proprietary interests, is noncommercial in nature. In practice, it occasionally becomes difficult to distinguish between experimental research and commercial enterprises. Participants in the Bonn workshop compiled a list of indicators that separate noncommercial from commercial research, such as restrictions on dissemination of research results, restrictions on access to reference specimens and patent applications.

Another post facto defense is the customary use (or prior use) exemption, which maintains the right of communities to use inventions that are already known by them.

136 This option could be pursued under the auspices of the GEF's International Waters or Biodiversity Projects. Global Environmental Facility Focal Areas, at http://www.thegef.org/gef/International_Waters and http://www.thegef.org/gef/biodiversity. See Leary, supra note 72, ¶ 7.7.3.

A stricter option for experimental use, distancing this exception from the common heritage of mankind approach, admits the experimental use exception only for experimental projects funded by the Commons Trust, as mentioned above.

Another option, which renders the exemptions even more restrictive, would require a prior agreement between the user and the right holder. Such an option leaves the experimental and customary use exceptions tantamount to a compulsory license because of the individualized contractual relationship between the parties. Note, however, that unlike conventional compulsory licenses, it provides no compensation to the right holder.

4. Compulsory and commons licenses.

Compulsory licenses force IP right holders to grant permission to others to use their protected IP. In exchange for this permission, licensors are compensated as provided by law. Compulsory licenses may be ornamented by various terms that tend to lessen the impact of compulsory licenses on IP right holders. For instance, grant-back or assign-back clauses make improvements made by the licensee freely available to the licensor. Minimum performance clauses set specific performance targets in order to ensure sufficient payments to the licensor.

Some license terms tend away from the full protection of IP and thus, the freedom of the high seas, such as provisions requiring that the licensor assist the licensee in effective exploitation of the licensed IP by furnishing technical support, training and advice. Cross-licenses, on the other hand, theoretically benefit licensors and licensees equally as they allow both parties to use each other’s IP.

In the sui generis IP regime, tiered pricing of compulsory licenses could be established for developing states or projects funded by the Commons Trust Fund, for example. Pushing towards the common heritage of mankind approach, a fraction of proceeds generated by compulsory licenses on copyrighted and patented material could be paid to the Fund.

Commons licensing is also gaining momentum and acceptance as a “mechanism for improving access, documenting ownership, and giving attribution to providers while prohibiting commercial use.”138 The IP right holder grants these licenses to a licensee to freely use the protected material. As a result, creative and science commons licenses do not generate income for the licensor, contrary to compulsory licenses (which do generate income, but can be used for commercial exploitation). Hence, such licenses resemble the experimental use exceptions. Licenses can be individually tailored as the parties

138 Id. at 5.
see fit and are useful when the relationship between licensor and licensee requires particular arrangements.

5. Shorter time window of exclusivity and technology transfer expiration of protection.

Although IP protection should continue to be granted, the duration of exclusivity could be shortened for IP derived from MGRs from areas beyond national jurisdiction. This would allow for earlier technology transfer to the public, which occurs at the expiration of protection.

It should be noted that TRIPs provides for minimum protection terms. These international standards can therefore only be modified by consensus, or be permitted under the validity tests of Articles 13 and 30.

V. CONCLUSION

Intellectual property holds at its core the public interest objective of advancing the common store of knowledge. To pursue this aim, IP offers limited exclusive rights to inventors and creators in order to create incentives for the production of their work. These exclusive rights do not however preclude access and benefit sharing. In fact, IP offers several possibilities that can be harnessed to address the concerns of states in this field regarding MGRs found in areas beyond national jurisdiction.

Indeed, IP enhances access by encouraging the disclosure of works. Access can be further facilitated by the creation of a Commons Repository, special access privileges and licenses, for instance. Additionally, the lifetime of IP protection could be reduced, to expedite full access to the work. IP also provides a means to share benefits that are derived from MGRs. Beyond the inherent benefits of access to knowledge and technology, financial profits can be subject to royalty payments to a trust fund for the benefit of all.

Nevertheless, it appears that the more feasible options are those that do not alter the current IP system too significantly and rather use the current features of the system to serve the interests of states and the marine environment. Changing the lifetime of IP protection might be more difficult than, for instance, establishing a Commons Repository.

In the short term, state governments can act by directing state funding agencies to attach special provisions to grants given for marine scientific research in areas beyond national jurisdiction. States could, if they chose to, condition research grants on the deposit of all copyrighted and patented works to a special repository. One hopes that such individual state efforts might pave

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139 TRIPs, supra note 59, arts. 12, 33.
the way to worldwide participation in an effort to protect and preserve the marine environment, promote economic growth, and foster technological innovation. Intellectual property can, and ought to be, a valuable player in this endeavor.