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ACCESS TO AND BENEFIT SHARING OF MARINE GENETIC RESOURCES BEYOND NATIONAL JURISDICTION: DEVELOPING A NEW LEGALLY BINDING INSTRUMENT

Carlos M. Correa

RESEARCH PAPERS

79

ACCESS TO AND BENEFIT-SHARING OF MARINE GENETIC RESOURCES BEYOND NATIONAL JURISDICTION: DEVELOPING A NEW LEGALLY BINDING INSTRUMENT

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SEPTEMBER 2017

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TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

I. INTRODUCTION 3

II. THE REGULATORY GAP 5

III. DESIGNING A LEGALLY-BINDING INSTRUMENT 8

IV. LESSONS FROM THE CURRENT INTERNATIONAL REGIME 12

IV.1. Definitions 12

IV.2. Benefits 14

IV.3. Intellectual Property 17

V. CONCLUSIONS 21

BIBLIOGRAPHY 22

EXECUTIVE SUMMARY

The geographical coverage of the Convention on Biological Diversity and the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization, leaves a noticeable gap in the international regime regarding marine genetic resources in **areas beyond national jurisdiction** (ABNJ). The legal framework established by these international treaties is based on the recognition of States' sovereign rights on the genetic resources that reside in their territories. Several studies and reports have noted, however, the immense and still vastly untapped value of marine genetic resources in the deep seabed and the high seas for a range of industries including pharmaceuticals, food and beverage, cosmetics, agriculture and industrial biotechnology. Those resources are considered today to be more valuable than the mineral resources found in the seabed or terrestrial genetic resources. Marine bioprospecting in areas within and beyond national jurisdiction is taking place. There is particular interest in marine species that live in extreme environments, such as hydrothermal vents, seamounts, cold seeps and submarine trenches.

According to one view, marine genetic resources and their derivatives should be deemed to be subject to the principle of "Freedom of the High Seas", as established by the United Nations Convention on the Law of the Sea (UNCLOS). If this principle were accepted, there would be free access to genetic resources in the ABNJ, freedom to undertake not only scientific research but also bioprospecting activities for commercial purposes, without any obligation to ensure the public availability of the information obtained or to share benefits with States not involved in those activities. A different view is that all the resources of the ABNJ, including marine genetic resources, should be deemed to be the "common heritage of the mankind" (article 136, UNCLOS) and consequently, all activities (including bioprospecting) should "'be carried out for the benefit of mankind as a whole"' (article 140.1, UNCLOS) subject to "'the equitable sharing of financial and other economic benefits"' (article 140.2, UNCLOS). An important limitation to this view is that article 133(a) of UNCLOS stipulated that for the purposes of Part XI, "'resources' means all solid, liquid or gaseous mineral resources in situ in the rea at or beneath the seabed, including polymetallic nodules".

On 19 June 2015 the United Nations General Assembly (UNGA) agreed to develop "... an international legally-binding instrument under the Convention [on the Law of the Sea] to deal with the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction..." (UNGA resolution 62/292). This resolution set in motion one of the most important negotiating processes currently underway within the United Nations system. In negotiating the proposed new legally-binding instrument, it would be important to consider a number of difficulties that arose in the development and implementation of the international regime for genetic resources under national jurisdiction, including some ambiguities in legal terms and the determination of the obligation to share benefits. The new process put in motion by UNGA resolution 62/292 creates an opportunity for overcoming some of those difficulties and developing a regime that provides sufficient legal certainty to all interested parties, while ensuring an equitable distribution of benefits between those who invest in bioprospecting and the international community.

Benefit-sharing may be realized on the basis of monetary and non-monetary benefits, such as the transfer of know-how, increased numbers/quality of scientific publications (including through co-publication), capacity building and infrastructure development, and biodiversity conservation. A true global mechanism that facilitates dissemination of the new information and knowledge obtained from marine genetic resources in the ABNJ would need to be created. An unrestricted access to discoveries, as well as upstream research results relating to marine genetic resources, may be critical for the advancement of science. Such resources are international public goods that, due to their very nature, should not be appropriated under private rights conferred by national governments. Whether or not marine genetic resources are characterized as part of the common heritage of mankind, it will be necessary to seek a regulation that prohibits the appropriation of such resources, as found in the ABNJ, via intellectual property rights.

I. INTRODUCTION

An international legal framework relating to the conservation, sustainable use, access to and sharing of the benefits arising from the exploitation of genetic resources, was established more than twenty years ago. The Convention on Biological Diversity (CBD)[1], adopted in 1992, set out the main principles and mechanisms to that end. The CBD objectives 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 (Article 1). With 196 contracting parties,[2] the CBD has become the main framework for action by the international community against the loss of biodiversity. Pursuant to the adoption of the Aichi Biodiversity Targets,[3] a set of strategic goals has been defined under the Strategic Plan for Biodiversity 2011-2020.[4]

Further steps were taken by the international community to apply such principles to plant genetic resources for food and agriculture with the adoption of the FAO Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA),[5] and to clarify and strengthen the CBD provisions on benefit-sharing through the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization ('the Nagoya Protocol').[6] Developing countries, as proponents of this Protocol, sought to strengthen the mechanism for benefit-sharing, in view of the limited income generated by such mechanism under the CBD (Ruiz Muller, 2015), among other things, due to the limitations of the CBD's regime regarding the commercial exploitation of derivatives from genetic resources (Nijar, 2011).

In addition to these binding international instruments[7], under the auspices of the World Health Organization (WHO), a Pandemic Influenza Preparedness (PIP) Framework was adopted in 2011 to implement a global approach to pandemic influenza preparedness and response. A central objective of this Framework was to improve the sharing of influenza viruses with human pandemic potential and to set up a regime for benefit-sharing while facilitating access by developing countries to vaccines and other pandemic related supplies.[8]

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[1] Available at https://www.cbd.int/convention/text/, accessed 14 October 2016.
[2] See https://www.cbd.int/information/parties.shtml, accessed 14 October 2016.
[3] See https://www.cbd.int/sp/targets/, accessed 14 October 2016.
[4] **Strategic Goal A**: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society; **Strategic Goal B**: Reduce the direct pressures on biodiversity and promote sustainable use; **Strategic Goal C**: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity; **Strategic Goal D**: Enhance the benefits to all from biodiversity and ecosystem services **Strategic Goal E**: Enhance implementation through participatory planning, knowledge management and capacity building. See https://www.cbd.int/sp/elements/, accessed 14 October 2016.
[5] Adopted in 2001 by Thirty-First Session of the Conference of the Food and Agriculture Organization of the United Nations. Available from http://www.fao.org/plant-treaty/overview/texts-treaty/en/, accessed 14 October 2016.
[6] The Nagoya Protocol is a supplementary agreement to the CBD. It was adopted in 2010 and entered into force on 12 October 2014.
[7] It should also be noted that a bracketed text in a draft developed within the Intergovernmental Committee on Genetic Resources, Traditional Knowledge and Folklore (IGC) of WIPO proposes to exclude marine biodiversity from areas beyond national jurisdiction from a regime to be adopted on genetic resources. See http://www.wipo.int/tk/en/genetic/, accessed 15 October 2016.
[8] See http://www.who.int/influenza/resources/pip_framework/en/, accessed 15 October 2016.

The CBD and the Nagoya Protocol[9] are wide in scope. They cover all kinds of genetic resources,[10] including those of marine origin. The ITPGRFA, in contrast, is a specialized agreement that only covers, as noted, plant genetic resources for food and agriculture. The specific characteristics of these resources (generated through breeding practices), the difficulty to determine the commercial worth of individual accessions, the monitoring costs of tracking gene flows (if possible at all to identify the respective countries of origin), the interdependence among countries in their use, and the importance of such resources for food security explained the need for a separate instrument (Laliberté et al, 2000), which includes a Multilateral System under which resources are available without the need to enter into bilateral transactions, as is the case under the CBD and the Nagoya Protocol (Frison et al, 2011).

[9] The Nagoya Protocol, however, recognized that "where a specialised international access and benefit-sharing instrument applies that is consistent with, and does not run counter to the objectives of the convention and this protocol, this protocol does not apply for the party or parties to the specialised instrument in respect of the specific genetic resource covered by and for the purpose of the specialised instrument" (article 4.4).

[10] With the exclusion of human genetic resources.

II. THE REGULATORY GAP

One pillar of the legal framework established by the three binding international treaties referred to above is the recognition of States' sovereign rights on the genetic resources that reside in their territories.[11] They apply to genetic resources that may be found and accessed **within national jurisdictions**. The Nagoya Protocol, however, also requires the contracting parties to consider the establishment of a "global multilateral benefit-sharing mechanism". Article 10 of the Protocol stipulates that:

> Parties shall 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 and traditional knowledge associated with genetic resources that occur in transboundary situations or for which it is not possible to grant or obtain prior informed consent. The benefits shared by users of genetic resources and traditional knowledge associated with genetic resources through this mechanism shall be used to support the conservation of biological diversity and the sustainable use of its components globally.

The wording "or for which it is not possible to grant or obtain prior informed consent" has been interpreted as implying that the global multilateral mechanism might be applicable to marine genetic resources in areas beyond national jurisdiction (ABNJ) (Ruiz Müller, 2015). However, the Preamble of the Protocol reaffirms "the sovereign rights of States over their natural resources and according to the provisions of the Convention". Hence, it would seem difficult to consider that the Protocol is outside the boundaries set out by the CBD, which is firmly rooted in national jurisdictions (Fedder, 2013, p. 51).

The geographical coverage of the CBD and the Nagoya Protocol leaves a noticeable gap in the international regime regarding marine genetic resources in ABNJ. It seems an obvious observation that policies for the conservation and sustainable use of these resources are not less important than those relating to resources under national jurisdiction. Many of such resources exist both in maritime areas subject to costal states' jurisdiction – as defined in accordance with the United Nations Convention on the Law of the Sea (UNCLOS) – and outside such jurisdiction, while some may only exist beyond those national maritime areas.[12]

Several studies and reports have noted the immense[13] and still vastly untapped value of marine genetic resources in the deep seabed and the high seas for a range of industries including pharmaceuticals, food and beverage, cosmetics, agriculture and industrial

[11] See article 3 of the CBD; article 6.1 of the Nagoya Protocol; Preamble of the ITPGRFA. The PIP Framework also recognizes "the sovereign right of States over their biological resources and the importance of collective action to mitigate public health risks" (Preamble, para. 11).

[12] In accordance with one source, "[t]here has been virtually no example of the industrial application of MGRs [marine genetic resources] in the ABNJ. Since two-thirds of the world oceans are under the ABNJ, ABS issues could emerge when development of science and technology reaches to the ABNJ in the future" (National Institute of Genetics, p. 41).

[13] In accordance with one source, the current sales volume of medicinal drugs originated from marine biological resources would reach about U$S 2.4 billion (National Institute of Genetics, 2015, p. 29). Another source estimates that, although only a small number of products derived from marine organisms have reached the commercialization phase, the global market for marine biotechnology products may reach US$ 4 900 million by 2018 (Wynberg, 2015, p. 397).

biotechnology (Wynberg, 2015, p. 397).[14] Those resources are considered today to be more valuable than the mineral resources found in the seabed or terrestrial genetic resources (Centre for International Law, 2016, p. 10). It has been observed that deep seabed mining remains uncompetitive compared to land based mining (Scovazzi 2010, p. 6), and that, the "deepest of ironies" in the context of the UNCLOS is that while the exploitation of mineral resources in the seabed has not yet became economically attractive, bioprospecting and the commercial use of marine genetic resources already opens promising opportunities (Glowka, 1995). It has also been argued that:

> There is a strong difference between the yields of marine biodiversity versus terrestrial biodiversity. If a marine species is isolated, there is a greater chance to derive a biotechnological application from it than it if was a terrestrial species (Centre for International Law, 2016, p. 37).

Marine bioprospecting in areas within and beyond national jurisdiction is taking place. There is particular interest in marine species that live in "extreme environments, such as hydrothermal vents, seamounts, cold seeps and submarine trenches ('extremophiles'), which trigger organisms to adopt new biosynthetic pathways that generate interesting compounds" (Wynberg 2015, p. 398). However, there is a deep asymmetry in the capacity of developed and developing countries to undertake those activities, given the financial resources and complex technologies and equipment needed to explore the deep seabed. Thus, the daily cost of renting an oceanography vessel for commercial research may range between US$ 40,000 to US$ 100,000. This investment is only affordable to few governments and private companies (Centre for International Law, 2016, p. 49), particularly in view of the high risks of sampling in the deep sea, the low chances of success and the regulatory hurdles for product marketing approval.[15] A workshop report noted in this regard that:

> Five countries including Japan, U.S.A., France, Russia and China possess manned research submersibles able to dive under 4,000 metres below sea level in 2012. And United Kingdom, Germany and Korea aggressively conduct marine survey. [The] [c]urrent situation indicates that limited countries can access to BBNJ [Biodiversity Beyond National Jurisdiction]. This causes that a first-come-first-served rule under the principle of freedom in the high sea is criticized by other countries. (National Institute of Genetics, 2015, p. 29).

But while most marine bioprospecting has been undertaken by developed countries, the sampling is often conducted in developing, tropical countries (Wynberg, 2015, p. 399). Moreover, currently "there at present few if any restrictions on access to marine genetic resources in areas beyond national jurisdiction or substantive controls as to how the acquisition of marine genetic resources is to be undertaken" (Directorate General for Internal Policies, 2014, p. 47).

[14] The PharmaSea project, for instance, financed by the European Union, aims at collecting samples from some of the hottest, deepest and coldest places that will be screened to discover marine microbes and new bioactive compounds to evaluate their potential as novel drug leads, antibiotics or ingredients for nutrition or cosmetic applications (See http://www.pharma-sea.eu/, accessed 27 February 2017).

[15] Wynberg (2015, pp. 398-399) notes that "it took more than three decades for Prialt®, the first pharmaceutical based on a marine source – the poison released by a tropical marine cone snail to paralyze its prey – to be approved in the United States as a treatment for chronic pain".

The scientific and economic value of marine genetic resources has been widely recognized by the international community. Thus, the United Nations General Assembly (UNGA) noted in Resolution 65/37 (Oceans and the law of the sea, 2010) "the abundance and diversity of marine genetic resources and their value in terms of the benefits, goods and services they can provide" (para. 168) as well as "the importance of research on marine genetic resources for the purpose of enhancing the scientific understanding, potential use and application, and enhanced management of marine ecosystems" (para. 169).[16] The Rio+20 Conference outcome document, *The Future We Want*,[17] further recognized "the importance of the conservation and sustainable use of marine biodiversity beyond areas of national jurisdiction" and made a commitment "to address, on an urgent basis, the issue of the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, including by taking a decision on the development of an international instrument under the Convention on the Law of the Sea" (para. 162).

Soon after the Rio+20 Conference an important decision was made by UNGA on the subject. On 19 June 2015 it agreed to develop "... an international legally-binding instrument under the Convention [on the Law of the Sea] to deal with the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction ...".[18] This resolution set in motion one of the most important negotiating processes currently underway within the United Nations system.

The negotiations on the proposed "international legally-binding instrument" should address the topics identified in the so-called BBNJ Working Group's "2011 package", namely the conservation and sustainable use of marine biological diversity in the ABNJ, including questions regarding the sharing of the benefits arising from the exploitation of such marine genetic resources.

[16] Available from https://documents-dds-ny.un.org/doc/UNDOC/GEN/N10/514/76/PDF/N1051476.pdf?OpenElement, accessed 16 October 2016.

[17] UNGA Resolution A/RES/66/288, 27 July 2012, available from http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=E, accessed 16 October 2016.

[18] General Assembly Resolution 69/292: Development of an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, available from http://www.un.org/depts/los/biodiversity/prepcom.htm, accessed 18 October 2016.

III. DESIGNING A LEGALLY-BINDING INSTRUMENT

Importantly, the UNGA resolution 69/292 mandated United Nations Members to negotiate "under the Convention [on the Law of the Sea]". This means that the resulting agreement, if adopted, should be consistent with UNCLOS and eventually fill its gaps in relation to genetic resources found in ABNJ. Therefore, a starting point of the negotiating exercise will necessarily be the interpretation of the UNCLOS in relation to the issues that need to be addressed.

A key interpretative issue in this regard is which regime under UNCLOS is applicable to marine genetic resources in the ABNJ. The positions held around this issue reflect the asymmetry mentioned above regarding the capacity to explore and benefit from such resources and the products derived therefrom.

In accordance with one view, marine genetic resources and their derivatives should be deemed to be subject to the principle of "**Freedom of the High Seas**". If this principle were accepted, there would be free access to genetic resources in the ABNJ, freedom to undertake not only scientific research but also bioprospecting activities for commercial purposes, without any obligation to ensure the public availability of the information obtained or to share benefits with States not involved in those activities (Centre for International Law, 2016, p. 5). While fishing is a freedom of the high seas recognized under UNCLOS (article 87.1(e)), there is no reference in this Convention to bioprospecting. This is understandable, as UNCLOS did not allude to genetic resources as such. Although article 87.1 does not contain an exhaustive list of "freedoms" (as the chapeau refers to "*inter alia*"), this is not sufficient to support the interpretation that bioprospecting of genetic resources is subject to the same regime as fishing. Bioprospecting, unlike fishing, involves obtaining samples of biological materials – new compounds can now be identified from mere micrograms of source material[19] – that contain genetic information of actual or potential value, rather than capturing large volumes of specimens. Despite the small quantities needed, sampling may have adverse effects on the environments where it is conducted; however, so far the International Seabed Authority (ISA) has only issued "Regulations on prospecting and exploration for polymetallic nodules in the Area" (ISA/6/A/18), while the Legal and Technical Commission adopted "Recommendations for the guidance of the contractors for the assessment of the possible environmental impacts arising from exploration for polymetallic nodules in the Area" *(*ISA/7/LTC/1/Rev.1, 10 July 2002).

If "Freedom of the High Seas" was the accepted premise of the forthcoming negotiations pursuant to UNGA Resolution 69/292, the asymmetry generated by the differences in capacity to undertake bioprospecting would remain unsolved. That principle, however, is not absolute (Scovazzi, 2010, p. 1). The adoption of a new binding instrument regarding bioprospecting of genetic resources would have to hence limit some of the currently existing rights in the high seas by providing for some exceptions to the "freedoms" recognized under the UNCLOS[20] and introducing obligations on bioprospectors, notably regarding benefit-sharing.

[19] As a result of advances in analytical technologies, such as nuclear magnetic spectroscopy and mass spectrometry (Wynberg, 2015, p. 400).

[20] They include (a) freedom of navigation; (b) freedom of overflight; (c) freedom to lay submarine cables and pipelines, subject to Part VI; (d) freedom to construct artificial islands and other installations permitted under

A different view is that all the resources of the ABNJ, including marine genetic resources, should be deemed to be the "common heritage of the mankind" (article 136, UNCLOS) and, consequently, all activities (including bioprospecting) should "be carried out for the benefit of mankind as a whole" (article 140.1, UNCLOS) subject to "the equitable sharing of financial and other economic benefits" (article 140.2, UNCLOS). These and other provisions in Part XI of UNCLOS aim at ensuring that all States have open and free access to such resources, and that a principle of equitable sharing of financial and other economic benefits is applied, taking particularly into account the interests and needs of developing States (article 140.1). The fundamental character of the principle of "common heritage of the mankind" in the context of the UNCLOS was confirmed by its article 311.6 according to which:

> States Parties agree that there shall be no amendments to the basic principle relating to the common heritage of mankind set forth in article 136 and that they shall not be party to any agreement in derogation thereof.

An important limitation to this view is that article 133(a) of UNCLOS stipulates that for the purposes of Part XI, "'resources' means all solid, liquid or gaseous mineral resources in situ in the rea at or beneath the seabed, including polymetallic nodules". This means that Part XI applies to mineral resources of the seabed.[21]

The legal implications of the absence of any reference in Part XI to genetic resources is debatable. When UNCLOS was negotiated it was thought that, with the absence of light at the bottom of the sea, no living organisms could be found there; today it is known that a wide variety of organisms live at or near the seafloor of the Area (Centre for International Law, 2016, p. 8). In addition, Resolution 25/2749 (1970)[22] of the UNGA, which declared that the Area and its resources were the common heritage of mankind and provided the basis for Part XI of the UNCLOS, was not limited to minerals.[23]

Whatever the reason for the exclusion, a reading of the UNCLOS in accordance with the interpretative principles codified in article 31 of the Vienna Convention on the Law of the Treaties, would make it difficult to assert that marine genetic resources are effectively covered under Part XI of UNCLOS. Nothing would prevent, however, an extension of its provisions, through a new binding instrument to be developed pursuant to the UNGA mandate, to marine genetic resources in the ABNJ. The fact that marine genetic resources are renewable, while the mineral resources are not (Centre for International Law, 2016, p. 8) is clearly insufficient to support the view that the principle of "Freedom of the High Seas" rather than the "Common Heritage of Mankind" must apply to marine genetic resources in the

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international law, subject to Part VI; (e) freedom of fishing, subject to the conditions laid down in section 2; (f) freedom of scientific research, subject to Parts VI and XIII (article 87.1 UNCLOS).

[21] In 1994 an Agreement relating to the implementation of Part XI was adopted to address certain concerns about the seabed mining provisions contained therein. The Agreement entered into force in 1996. See http://www.un.org/depts/los/convention_agreements/convention_overview_part_xi.htm, accessed 18 October 2016.

[22] Available from http://www.un-documents.net/a25r2749.htm, accessed 18 October 2016.

[23] The Resolution stated that "The sea-bed and ocean floor, and the subsoil thereof, beyond the limits of national jurisdiction (hereinafter referred to as the area), as well as the resources of the area, are the common heritage of mankind" (para. 1) and that "The exploration of the area and the exploitation of its resources shall be carried out for the benefit of mankind as a whole, irrespective of the geographical location of States, whether land-locked or coastal, and taking into particular consideration the interests and needs of the developing countries" (para. 7).

ABNJ.[24] Similarly, the argument that the concept of common heritage of mankind was intended to protect the Area against any attempt of appropriation by a State (Centre for International Law, 2016, p. 41), does not support the conclusion that it is not applicable to such resources. In fact, that same concept was incorporated in the International Undertaking on Plant Genetic Resources for Food and Agriculture adopted by the Food and Agriculture Organisation (FAO) in 1981 in order to counter the privatisation of genetic resources through intellectual property rights (GRAIN, 2001). The fact that the applicability of this concept in the area of plant genetic resources was later revisited with the adoption of the bilateral model of access and benefit-sharing under the CBD and of the Multilateral System created by the ITPGRFA (in relation to a number of listed crops), does not mean that it is not applicable to marine genetic resources in the ABNJ. The major difference is, of course that, as mentioned, the CBD (as well as the Nagoya Protocol) and the ITPGRFA are grounded on the principle of national sovereignty.

Under the UNCLOS, a distinction is made between "scientific research" and other activities that may eventually involve commercial purposes. This distinction has clear operative implications, as it determines the applicability of different legal rules. Given that the future legally-binding instrument on access and benefit-sharing for marine genetic resources in the ABNJ should be framed under the UNCLOS, the distinction made by the Convention in relation to different activities needs to be properly taken into account.

Scientific research is one of the freedoms that States enjoy under UNCLOS in the high seas (Article 87.1(f)). This freedom is not absolute, however, since any activity must be undertaken with due regard to the interests of other States (Article 87.2) and for peaceful purposes only (Article 88). In addition, in accordance with Article 256 of UNCLOS, "[a]ll States, irrespective of their geographical location, and competent international organizations have the right, in conformity with the provisions of Part XI, to conduct marine scientific research in the Area".

Part XIII of UNCLOS introduces a number of obligations in relation to the conduct of marine scientific research, including:

1) States and competent international organizations shall, in accordance with the principle of respect for sovereignty and jurisdiction and on the basis of mutual benefit, promote international cooperation in marine scientific research for peaceful purposes (Article 242.1 UNCLOS);
2) Information on proposed major marine scientific research programmes and their objectives shall be made available by publication and dissemination through appropriate channels (Article 244.1 UNCLOS);
3) The knowledge resulting from marine scientific research shall also be made available by publication and dissemination through appropriate channels (Article 244.1 UNCLOS);
4) States, both individually and in cooperation with other States and with competent international organizations, shall actively promote the flow of scientific data and information and the transfer of knowledge resulting from marine scientific research, especially to developing States (Article 244.2 UNCLOS); and

[24] This is the position held by many developing countries. See IISD, *Earth Negotiations Bulletin*, 10 April 2017, p. 2.

5) States, both individually and in cooperation with other States and with competent international organizations, shall actively promote the strengthening of the autonomous marine scientific research capabilities of developing States through, *inter alia*, programmes to provide adequate education and training of their technical and scientific personnel (Article 244.2).

In addition, the provisions of Part XI of the UNCLOS apply to marine scientific research undertaken in the Area (Article 256). This means, in particular, that such research as mentioned, must be carried out "exclusively for peaceful purposes and for the benefit of mankind as a whole, in accordance with Part XIII" (Article 143.1) and that international cooperation in marine scientific research in the Area must be promoted (Article 143.3).

One important question is whether the described framework for scientific research, which requires active cooperation and dissemination (sharing) of the outcomes of scientific research, is applicable to marine genetic resources. Importantly, under article 244 of UNCLOS, States "shall actively promote the flow of scientific data and information and the transfer of knowledge resulting from marine scientific research…".

The UNCLOS provisions on scientific research are broadly drafted. They are not circumscribed to specific subjects of research. Importantly, no reference is made in articles 143.1 and 143.3 to the "resources" in the Area, a reference that would have otherwise limited (given the definition of "resources" mentioned above) the applicability of those provisions to mineral resources. In the absence of such a reference, those provisions should be deemed equally applicable to scientific research conducted on marine genetic resources (Greiber, 2011, p. 14).[25]

Another relevant question is whether "bioprospecting" may be deemed to be part of "scientific research". A study prepared in the context of the CBD suggested that the former inherently encompasses a commercial intent and suggested that the UNCLOS provisions on scientific research were not applicable to bioprospecting (UNEP/CBD/SBSTTA, 2003, 11). [26] It has been argued, however, that despite the absence of any definition of "marine scientific research" this concept covers projects "of direct significance for the exploration and exploitation of natural resources, whether living or non-living" (UNCLOS, 246. 5(a)) and hence, it should be interpreted as encompassing bioprospecting (Scovazzi, 2010, p. 12-13). In any case, nothing would prevent the contracting parties to clarify the scope of "marine scientific research" or agree on the extension of such provisions to bioprospecting in the ABNJ.

[25] In fact, the ISA seems to have recognized that marine biodiversity is one of the areas of scientific research as defined under the UNCLOS. See Millicay, 2007.

[26] The study noted that "bioprospecting has been identified as 'the exploration of biodiversity for commercially valuable genetic and biochemical resources'" and further defined it as "the process of gathering information from the biosphere on the molecular composition of genetic resources for the development of new commercial products" (para. 49).

IV. LESSONS FROM THE CURRENT INTERNATIONAL REGIME

In negotiating the new proposed legally-binding instrument, it would be important to consider a number of difficulties that arose in the development and implementation of the international regime for genetic resources under national jurisdiction. The new process put in motion by UNGA resolution 62/292 opens an opportunity for overcoming some of those difficulties and developing a regime that provides sufficient legal certainty to all interested parties while ensuring an equitable distribution of benefits between those who invest in bioprospecting and the international community.

IV.1. Definitions

Some of the difficulties referred to emerged from definitional problems. Thus, the distinction between "genetic" and "biological" resources under the CBD has led to different interpretations: while for some they are synonymous (Cabrera Medaglia et al, 2007, p. 29), for others the former can only be deemed a subset of the latter (Fedder, 2013, p. 34). The lack of a clear distinction between these two concepts has brought about confusion in the national implementation of the CBD provisions.

Further, "genetic resources" are defined under that Convention as "materials". The CBD and the other instruments on genetic resources referred to above have been conceived to deal with access to **materials** that consist of or contain genetic information. This characterization overlooks the **intangible** nature of the information, which is the object of actual interest for biotechnological developments (Ruiz Müller, 2015, p. 4). Developments in genetic science have allowed researchers to obtain workable information from data bases. The **dematerialization** of genetic resources through "digital bioprospecting" means that access to physical samples is not required to obtain complete and usable information.

The dematerialization of genetic information poses a new challenge to the access and benefit-sharing system built up on the basis of the international instruments referred to above, particularly if the relevant information is freely accessible through genome databases.[27] It is indeed crucial to determine whether the use of genetic information would constitute an "access" to material or not and the implications of the utilization of synthetic biology (National Institute of Genetics, p. 37).[28] The design of a new instrument on marine genetic resources in the ABNJ opens the possibility of exploring a system that clearly encompasses both the utilization of materials as well as genetic information obtainable without getting access to a physical sample of the relevant biological material.

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[27] This issue has been addressed in the context of PIP Advisory Group's on the sharing of influenza genetic sequence data. See, e.g., Pandemic Influenza Preparedness (PIP) Framework Advisory Group Technical Working Group (TWG) on the sharing of influenza genetic sequence data, Optimal Characteristics of an Influenza Genetic Sequence Data Sharing System under the PIP Framework, 6 April 2016, available from http://www.who.int/influenza/pip/advisory_group/gsd/en/, accessed 20 October 2016.
It has also been considered in the CBD Conference of the Parties held in Cancun on 2-17 December 2017. See "Digital sequence information on genetic resources," CBD/COP/DEC/XIII/16, available from https://www.cbd.int/conferences/2016/cop-13/documents, accessed 20 October 2016.

[28] In the case of the referred to drug Prialt®, the polypeptide was "obtained through standard pharmaceutical manufacturing processes and exploitation of the natural source of this compound was never considered for supplying sufficient material for development" (Wynberg, 2015, p. 399).

Another problem with the CBD has been the lack of a definition of what is meant by the "utilization of genetic resources" for the purposes of access and benefit-sharing legislation. Grey areas have included, for instance, taxonomic studies (Cabrera Medaglia et al, 2007, p. 30) where no commercial utilization of the genetic resources or their components is made.

The Nagoya Protocol incorporated a definition of "utilization of genetic resources" that has helped to clarify the scope of the obligations of the contracting parties:

> "Utilization of genetic resources" means to conduct research and development on the genetic and/or biochemical composition of genetic resources, including through the application of biotechnology as defined in Article 2 of the Convention (article 2(c)).

This definition confirms that research and development on the "biochemical composition" of genetic resources is a form of utilization of genetic resources. This clarification was needed and is useful. Although the concept of "research and development" is widely used[29] and generally well understood (Greiber et al, 2010, p. 65), some differences in interpretation may remain regarding which activities are effectively covered. An illustrative list of such activities would help to give more certainty to providers and users of genetic resources. In this regard, the Group of Legal and Technical Experts on Concepts, Terms, Working Definitions and Sectoral Approaches, established under the CBD, have suggested a non-exhaustive list of uses of genetic resources:

- genetic modification;
- biosynthesis (use of genetic material as a "factory" to produce organic compounds);
- breeding and selection;
- propagation and cultivation in the form received;
- conservation;
- characterization and evaluation; and
- production of compounds naturally occurring in genetic material (i.e., extraction of metabolites, synthesis of DNA segments, and production of copies).[30]

In addressing benefit-sharing, a differentiation between commercial and non-commercial activities may be made under the CBD. This differentiation is specifically articulated in the Nagoya Protocol,[31] but is difficult to operationalize. Activities that may be planned and initiated as non-commercial, may end up with the development of commercial products. In relation to the PharmaSea project it has been noted, for instance, that:

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[29] The Oxford Dictionary's definition of research is "the systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions".

[30] Group of Legal and Technical Experts on Concepts, Terms, Working Definitions and Sectoral Approaches, UNEP/CBD/WG-ABS/7/2, 12 December 2008, available from https://www.cbd.int/doc/meetings/abs/abswg-07/official/abswg-07-02-en.pdf, accessed 20 October 2016.

[31] In accordance with the Nagoya Protocol, in 'the development and implementation of its access and benefit-sharing legislation or regulatory requirements, each Party shall:
(a) Create conditions to promote and encourage research which contributes to the conservation and sustainable use of biological diversity, particularly in developing countries, including through simplified measures on access for non-commercial research purposes, taking into account the need to address a change of intent for such research (article 8(a)).

> The PharmaSea Project is non-commercial work at the beginning but is clear commercial work and there is also a lot of third-party transfer. The PharmaSea project is therefore a very complicated example for considering ABS. We really have to track every movement of samples very carefully and have to make a lot of agreements not only in terms of access, PIC and MAT, but also in terms of material transfer between academic and commercial partners (National Institute of Genetics, 2015, p. 33).

A fragmented set of rules based on the commercial or non-commercial purpose of research and development may, given their blurred contours, be problematic and deepen the asymmetries between countries with and without financial and other resources to undertake research on marine genetic resources in the ABNJ, and create inequalities in sharing the benefits arising from their exploitation.

IV.2. Benefits

Under the CBD and the other international treaties on genetic resources mentioned above, benefits to be shared arising from the exploitation of such resources may be monetary or non-monetary. Even though the CBD entered into force in December 1993, the royalties and other payments directly obtained by providing countries acting under the Convention seem to have been quite limited (Ruiz Müller, 2015, p. 24). They are certainly disappointing in view of the expectations generated by the Convention upon its adoption as a source of new income for countries providing genetic resources, particularly those rich in biological diversity. It has been noted in this regard that:

> Global experience since the CBD in 1992 has proved that benefit-sharing, both as an incentive for conservation as well as royalties for access to traditional knowledge, is a proposition akin to fetching water in a sieve. Hardly any successful model of ABS that is a sustainable source of supplementary income for the rural communities is known (Prathapan et al, 2011, p. 290).[32]

The bilateral approach adopted by the CBD has not been successful in promoting responsible bioprospecting. According to one commentator:

> Over a period of more than two decades, relatively few bioprospecting projects exist where PIC [prior informed consent] and MAT [mutually agreed terms] correspond to the contours envisioned by the CBD and national ABS [access and benefit-sharing] frameworks (Ruiz Múller, 2015, p. 33).

Arguably, one of the problems that has contributed to the poor performance of access and benefit-sharing legislation adopted pursuant to the CBD framework has been the apparent limitation of the CBD to benefits arising from the exploitation of the genetic resources **as such**, that is, biological materials that contain functional units of heredity,[33] thereby excluding (or at least leaving in a nebulous situation) those obtainable from **derivatives** of such resources. This gap was specifically addressed by the Nagoya Protocol, which defines biotechnology as "any technological application that uses biological systems, living

[32] This mismatch in expectations may also occur in relation to marine bioprospecting. See, e.g., National Institute of Genetics, 2015, p. 38.
[33] See article 2 of the CBD.

organisms, or derivatives thereof, to make or modify products or processes for specific use", and defines "derivative" 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" (article 2(d) and (e).

The extent to which the Nagoya Protocol and, in particular, the introduction of the concept of "derivatives" may effectively enhance the implementation of the CBD bilateral approach is an open question. It is, at present, too early to assess the outcomes of the Protocol, which also includes an improved compliance regime (Articles 15 and 16).

The effectiveness of the ITPGRFA in generating monetary benefits has also been questioned, particularly by developing countries (López Noriega, Wambugu and Mejías, 2013). The lack of monetary flows generated under the Multilateral System established under the ITPGRFA has triggered proposals for amendment of the treaty and/or the Standard Material Agreement adopted by the Governing Body of the Treaty. Discussions are ongoing in the context of FAO to develop a "subscription system" with the aim of increasing the income available for benefit-sharing through user payments calculated on the sales of one or more crops (Tsioumani, 2015). Monetary payments are only provided for under the current Multilateral System in situations where a recipient who commercializes a product that is a plant genetic resource for food and agriculture and that incorporates material accessed from the Multilateral System, imposes a restriction on others from engaging in further research, breeding or training (Article 13.2(d)(ii)). In reality, it was not reasonable to expect that subject to these conditions, the system could have generated a significant flow of income.

Benefit-sharing may also be realized on the basis of non-monetary benefits, such as the transfer of know-how, increased numbers/quality of scientific publications (including through co-publication), capacity building and infrastructure development, and biodiversity conservation. Some of these benefits often reflect practices which are common within research communities (Ruiz Múller, 2015, p. 24). In some cases, such as the agreements for benefit-sharing entered into by Brazil, Colombia and the Philippines, the benefits obtained were, mainly or entirely, non-monetary, as no royalties were paid in exchange for the access granted to genetic resources (Prathapan et al, 2011, p. 291). This may also be the case in many cases of bioprospecting in the ABNJ (National Institute of Genetics, 2015, p. 36), particularly when research takes a long time and there are low chances of commercial success (Wynberg, 2015, p. 403).

The "Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of the Benefits Arising out of their Utilization" have listed possible non-monetary benefits to be derived from the exploitation of genetic resources.[34] The relative importance of such benefits as compared to monetary benefits would logically vary case by case and would strongly depend on the research entities' policies and the behaviour of the researchers involved. In implementing the PharmaSea project, for instance, it has been found that:

> it is extremely difficult to motivate the scientists on board to provide the information on where they are sampling, when they are going to sample, who they are going to send the samples to, and whether they have a material transfer agreement or not. It will take some more years before it will become common

[34] See Bonn Guidelines, available from https://www.cbd.int/abs/bonn/, accessed 20 December 2016.

> practice in the scientific community to take ABS seriously as one of the things scientists just do as part of their work (National Institute of Genetics, 2015, p. 33).

In the case of the ITPGRFA, the Multilateral System provides for a range of non-monetary benefits, including exchange of information, technology transfer and capacity building.[35] In addition, it is considered that the free access to germplasm under the Multilateral System, is *per se* a benefit that contracting parties can obtain through mere participation in the system.[36]

With regard to marine genetic resources in the ABNJ, both monetary and non-monetary benefits may be contemplated.[37] It has been argued that the most important benefits may be non-monetary,[38] and that most of the research done will be conducted on samples that come from national government-run cruises (Centre for International Law, 2016, p. 49). However, the potential of obtaining significant monetary benefits has also been mentioned. Thus, it has been noted that:

> …there are seven drugs from the marine environment in the clinic right now. The total benefits from that, if royalties were granted to the country of origin, would be between US$10 and US$50 million per annum. With a blockbuster drug grossing US$1 billion per year, royalties would likely amount to no more than 3 per cent, which would total US$30 million per year. If ten drugs were being developed, royalties may amount to hundreds of millions of dollars…(Centre for International Law, 2016, p. 49).[39]

The new legally-binding instrument to be developed in relation to genetic resources in the ABNJ should carefully define and balance the monetary and non-monetary benefits obtainable from bioprospecting in the ABNJ. While the experiences under the CBD and the

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[35] See article 13.2(a), (b) and (c) of the ITPGRFA.

[36] Article 13.1 of the ITPGRFA reads as follows: "The Contracting Parties recognize that facilitated access to plant genetic resources for food and agriculture which are included in the Multilateral System constitutes itself a major benefit of the Multilateral System…".

[37] At the third session of the Preparatory Committee (PrepCom) on the elements of a draft text of an international legally binding instrument (ILBI) under the UN Convention on the Law of the Sea (UNCLOS) on the conservation and sustainable use of marine biodiversity of areas beyond national jurisdiction (BBNJ) (17 March-7 April 2017) (hereinafter PrepCom 3), the Federated States of Micronesia) "envisaged benefit-sharing upon sample collection, a fee to ensure exclusive access, and additional monetary benefit-sharing upon commercialization. Costa Rica supported advance fixed-amount payments or license fees, in addition to royalties" (IISD, *Earth Negotiations Bulletin*, 10 April 2017, p. 4).

[38] At the PrepCom 3, "China called for a pragmatic approach, prioritizing non-monetary benefit-sharing. The Russian Federation, the US, Canada, the EU, Switzerland and Japan called for focusing on non-monetary benefit-sharing, with the EU referring to readily available options for non-monetary benefit-sharing in UNCLOS provisions on MSR and marine technology. Canada clarified that focusing on the significance of non-monetary benefits does not mean excluding monetary ones from the discussion. The US, Japan and Norway cautioned that monetary benefit-sharing could be a disincentive to MSR, with Iceland noting that non-monetary benefit-sharing could encourage relevant investment. Norway and New Zealand noted that non-monetary benefits also have financial value. Australia proposed a functional, cost-effective benefit-sharing regime that encourages research, underscoring the importance of non-monetary benefits" (IISD, *Earth Negotiations Bulletin*, 10 April 2017, p. 4).

[39] An example of a successful drug development is 'Halaven', an anti-cancer drug obtained from Halichondrin molecules which has obtained marketing approval in more than 50 countries, including Japan, the United States and in Europe. Although it was discovered in Japan, sponges supplied from New Zealand permitted further preclinical testing and subsequent development of a synthetic analogue (about 300 mg of Halichondrin B were isolated from 1 ton of collected sponges). The product is currently synthesised but essentially derived from the natural marine product (National Institute of Genetics, 2015, p. 12 and 17). See also http://www.eisai.com/news/news201351.html, accessed 27 February 2017.

ITPGRFA may be taken into account, they should be understood in the particular normative contexts in which they were developed. Neither the sovereignty-based bilateral or multilateral mechanisms adopted under those treaties would be applicable; hence, a true global mechanism would need to be created that facilitates dissemination of the new information and knowledge obtained and that, while providing adequate incentives for publicly and privately funded research and development, ensures a reasonable sharing between all countries of the monetary and non-monetary benefits that might be generated.[40] Such a mechanism should also include effective monitoring and compliance measures. While clearance for marine scientific research may have been tightened in some jurisdictions, including requests on environmental impact and lists of equipment to be used (National Institute of Genetics, 2015, p. 28), non-compliance with access and benefit-sharing regulations may be significant. It has been observed in this regard that:

> It is highly probable that most cases of access and use to these [marine genetic] resources may have not been granted by national authorities when falling within the EEZ [exclusive economic zone], thus probably leaving the patent applicant as the sole collector of benefits (UNCTAD, 2014, p. 12).

IV.3. Intellectual Property

Finally, an important question is whether the new international regime to be developed would allow for the appropriation of innovations developed from such marine genetic resources in the ABNJ via patents or other intellectual property rights.[41]

While patents on genetic resources as found in nature may not be granted in some countries, other countries with more liberal approaches regarding patentability may permit isolated genes and other substances to be subject to patent protection. For instance, under the European Directive 98/44/EC on the legal protection of biotechnological inventions (1998), "biological material which is isolated from its natural environment or produced by means of a technical process may be the subject of an invention even if it previously occurred in nature" (article 3.2).

A study revealed that 677 international claims regarding marine genetic resources were deposited between 1991 and 2009, covering 8648 sequences from 520 species.[42] The number of patent applications relating to such resources is likely to be growing exponentially (Arnaud-Haond et al, 2011). Reflecting the asymmetries in national capacities to conduct marine bioprospecting, the study found that "claims associated with marine genes originate from only 31 of the 194 countries in the world. Patent holders from ten countries own 90 per cent of the patents deposited with marine genes, with 70 per cent belonging to the top three" (Arnaud-Haond et al, 2011).[43] Several deep seabed organisms have already been patented and

[40] For possible options for the way forward, see e.g., Greiber, 2011, pp. 44-51.

[41] Trade secret protection would be excluded if an obligation to effectively disseminate the outcomes of research were established.

[42] See http://concarneau.mnhn.fr/sites/concarneau.mnhn.fr/files/upload/arnaudhaond_rvcc_2015.pdf, accessed 21 December 2016.

[43] Another study of 460 patents suggested "the predominance of the pharmaceutical and bio-technology industries for a range of applications from anti-cancer drugs through to applications in the fields of ecotoxicology, bioremediation, anti-fouling and biofuel production. A significant focus includes microalgae for large-scale production of polyunsaturated fatty acids for inclusion in dietary supplements; a range of biomedical applications such as fluorescent proteins, bone fillers and bioceramic coatings; polysaccharides derived from

used for commercial applications, such as anti-cancer, anti-allergy and anti-coagulant agents and skin protection products (Smith et al, 2015).

Currently patent applicants are not subject in most countries to an obligation to disclose the geographical origin or source of the claimed genetic materials (Vivas-Eugui, 2012). It is often unknown, hence, whether the patented marine genetic resources were obtained within or beyond national jurisdictions (Chiarolla, 2013, p. 39). This might be solved if an international obligation to provide that information were incorporated into the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS Agreement), as formally requested by a large group of developing countries (Vivas Eugui, 2012, p. 17). Such an obligation might be reinforced, in the case of marine genetic resources, by a *juris tantum* presumption that they have been found in the ABNJ in case no information or inaccurate information is provided by the patent applicant (Millicay, 2007).[44]

Since the negotiation of the CBD, the possible impact of intellectual property rights on the implementation of the Convention has been a controversial issue. Article 16.5 of the CBD only establishes an obligation to cooperate and spells out as an objective of contracting parties' cooperation to ensure that intellectual property rights "are supportive of and do not run counter" to the CBD objectives.[45] While developing countries have generally expressed their fear that such rights could undermine or impede the implementation of the CBD, developed countries have argued that, on the contrary, they may support the realization of the Convention's objectives (Correa, 2015, p. 19).

In view that the TRIPS Agreement allows for, or requires (as is the case for microorganisms and plant varieties), the protection of genetic materials, the Council for TRIPS was mandated by the WTO Doha Ministerial Declaration (paragraphs 12 and 19) and by the Hong Kong Ministerial Declaration (paragraph 39), to examine the compatibility between the TRIPS Agreement and the CBD. One key concern of developing countries has been that the said Agreement does not contain any provisions to ensure that patent applicants have obtained prior informed consent from the countries of origin of the genetic resources and complied with national regimes on access and benefit-sharing. These countries submitted proposals to the Council for TRIPS for an amendment to the TRIPS Agreement aiming at incorporating an obligation to disclose the source of materials claimed in patent applications (Correa, 2015, p. 20). However, no action has been taken so far on these proposals.

In the context of the ITPGRFA, the issue of appropriation of genetic resources obtained from the Multilateral System was specifically addressed. In accordance with Article 12.3(d):

> Recipients shall not claim any intellectual property or other rights that limit the facilitated access to the plant genetic resources for food and agriculture, or their genetic parts or components, in the form received from the Multilateral System.

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algae for use in the food and health sectors; and use of "extrem-ozymes" in industrial applications (Wynberg, 2015, p. 399). See also Wright et al, 2016.

[44] At the PrepCom 3 Iran and Brazil, opposed by Canada, advocated for "establishing mandatory disclosure of the origin of MGRs in patent applications" (IISD, *Earth Negotiations Bulletin*, 10 April 2017, p. 4).

[45] Article 16.5: "The Contracting Parties, recognizing that patents and other intellectual property rights may have an influence on the implementation of this Convention, shall cooperate in this regard subject to national legislation and international law in order to ensure that such rights are supportive of and do not run counter to its objectives".

While the expression "in the form received" may be interpreted as allowing for the patenting of modified materials, it sets an interesting precedent for the negotiation of the legally-binding instrument to be developed under the UNCLOS.

The implications of the dematerialization referred to above for the protection of genetic resources under intellectual property rights are currently discussed in the context of the CBD.[46] One of the consequences of that development is that, once publicly available in a database, genetic sequences' information would not comply with the novelty requirement necessary to obtain a patent. However, such information may be redesigned and thereby escape the obstacle of lack of novelty. As noted by an expert:

> Gene information is everywhere. Everybody deposits genes online very quickly, and a marine genetic resource or its genetic information can be readily obtained and redesigned. The DNA can be redesigned so thoroughly that it would be very difficult to trace it back to its roots. Those genes could then be recombined from different sources into an organism, which could then be grown, resulting in a product in the end. It would be very hard to track that product to the marine genetic resource (MGR) it came from (Centre for International Law, 2016, p. 51).[47]

Importantly, Article 137.2 of UNCLOS provides that

> All rights in the resources of the Area are vested in mankind as a whole, on whose behalf the Authority shall act. These resources are not subject to alienation. The minerals recovered from the Area, however, may only be alienated in accordance with this Part and the rules, regulations and procedures of the Authority.

As noted above, the definition of "resources" is limited under the UNCLOS. However, it would be difficult to argue that a treatment different from that accorded to minerals – as a common heritage of mankind – should be applied to marine genetic resources in the ABNJ. Economic value can equally be derived from both types of resources. A commentator has argued in this regard that:

> 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… 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 (Heafey, 2014, pp. 508-509).

Whether or not marine genetic resources are characterized as part of the common heritage of mankind, it would be necessary to seek a regulation that prohibits the

[46] See the Decision by the CBD Conference of the Parties XIII/16 'Digital sequence information on genetic resources', CBD/COP/DEC/XIII/16, 16 December 2016, available from https://www.cbd.int/doc/decisions/cop-13/cop-13-dec-16-en.pdf, accessed 17 February 2017.

[47] Based on a statement by professor Jaspars.

appropriation of such resources, as found in the ABNJ, via intellectual property rights.[48] An unrestricted access to discoveries, as well as upstream research results relating to marine genetic resources, may be critical for the advancement of science (Chiarolla, 2013, p. 40). Such resources are international public goods that, due to their very nature, should not be subject to sovereign rights. Nor should they be appropriated under private rights conferred by national governments. The development of a new legally-binding instrument may offer a unique opportunity to explore new models to promote innovation that does not rely on exclusive rights (such as patents) but on cooperative actions and accessibility to the outcomes of innovation.[49] Such models should be based on a public domain approach; common pools of samples and related data could be shared through an international network of biorepositories and databases (National Institute of Genetics, p. 36). A pool of research funds may be envisaged to support, in particular, research in developing countries, without discrimination as to its commercial or non-commercial nature. A research programme may be agreed upon for the use of such funds, subject to the condition that any research results are contributed to the common pool (Department for Environment Food and Rural Affairs, 2014, p. 13-14).

[48] At PrepCom 3, however, Japan, Canada, the EU, Switzerland, Norway, Chile, Singapore and the US "cautioned against IPR-related provisions" in the instrument to be developed, "noting that they are addressed in other fora" (IISD, *Earth Negotiations Bulletin*, 10 April 2017, p. 4).

[49] An interesting discussion and set of proposals in this regard have been made in relation to medical technologies. See, e.g., *Research and Development to Meet Health Needs in Developing Countries: Strengthening Global Financing and Coordination. Report of the Consultative Expert Working Group on Research and Development: Financing and Coordination,* available from http://www.who.int/phi/cewg_report/en/, accessed 27 December 2016.

V. CONCLUSIONS

The development of a new legally-binding instrument on access and benefit-sharing derived from the exploitation of marine genetic resources found in the ABNJ offers the opportunity to fill an important gap in the UNCLOS. Such resources may give rise to new scientific discoveries, technologies and products, the benefits of which should be equitably shared within the international community. Some of the UNCLOS principles – notably the concept of Common Heritage of Mankind – and UNCLOS obligations regarding the sharing of and cooperation in scientific research, may be further developed in order to regulate access to and utilization of those resources as international public goods. The experience in the application of the CBD and other international instruments relating to genetic resources may be useful in designing this new instrument. However, in doing so, the problems discussed above in relation to these pre-existing instruments need to be adequately addressed and, as far as possible, avoided. New models to encourage research and development without relying on the granting of legal monopolies may be constructively explored.

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