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Marine Genetic Resources

Access and benefit-sharing in international law. The law of the sea in deep waters?

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Abbreviations

CBD	Convention on Biological Diversity
IPR	Intellectual Property Rights
LOSC	United Nations Convention on the Law of the Sea
MGRs	Marine genetic resources
MSR	Marine scientific research
NP	Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity
PCT	Patent Cooperation Treaty
TRIPS	Agreement on Trade Related Aspects of Intellectual Property Rights

1 Introduction

1.1 The subject and the research question

The subject of this thesis is the international legal regime applicable to the exploration and exploitation of marine genetic resources (MGRs).

The research question of this thesis is as follows:

> *Does the United Nations Convention on the Law of the Sea (LOSC),[1] read in relation to relevant public international law, grant access to and require benefit-sharing of MGRs?*

The LOSC regulates activities in the oceans. It has been characterised as a "constitution for the oceans" in the sense that it covers all ocean activities.[2] However, during the negotiations, it seems that the question of genetic resources were not addressed.[3] Hence, MGRs are not specifically regulated under the LOSC. This raises several legal questions on the status of MGRs under the LOSC.

The first global treaty to explicitly cover bioprospecting of genetic resources was the Convention on Biological Diversity (CBD).[4] The CBD established provisions for both accessing a state's genetic resources and sharing of potential benefits from their utilisation.

Access to MGRs relates mainly to the ability to collect interesting species samples from the ocean for the purpose of exploring their genetic material. Hence, the actors involved in bioprospecting want maximum access to ocean space for sample collecting with minimal restrictions.

Benefit-sharing can take many forms. If a MGR becomes part of a valuable product, there can be potential financial benefits. But other forms of benefit sharing are relevant as well. There

[1] The United Nations Convention on the Law of the Sea, Montego Bay 10th of December 1982.

[2] See Tommy T.B. Koh in Nordquist (1985-2012) Vol I, p. 1-16 and Rothwell (2016) p. 1.

[3] Scovazzi (2010) p. 316 and Glowka (1996) p. 177.

[4] The Convention on Biological Diversity, signed 5th of June 1992.

could, for example, be information or sample sharing, co-ownership of rights in the product, one-time payments for access and so on.[5]

1.2 Legal context

MGRs can be used in products as different as pharmaceuticals, biofuel, fish food and many more.[6] This process of acquiring these resources is often called bioprospecting. Bioprospecting can be described as the:

> "[P]art of a process in which commercially useful products are derived from living resources."[7]

The bioprospector, the person or entity conducting the bioprospecting, wants to retain the benefits that derive from using the resource because exploitation often requires substantial investments before a successful product is developed. On the other side are the actors wanting benefit sharing. This can be states and other stakeholders in the species, controlling the genetic resources that can become part of a product.

This divide is an important part of the background of the CBD. Discussions relating to this Convention often reflects a north-south divide: The south has states rich in biodiversity that are attractive for bioprospecting purposes,[8] and the north has technology-intensive industries seeking biodiversity for bioprospecting.[9] Hence, the different interests of the bioprospectors and the actors controlling the genetic resources often followed this north-south division.

The LOSC also embodies a set of compromises between a wide set of actors and interests. At the multilateral level, the main difference in interests is between coastal states and land-locked states. Coastal states have a natural interest in the resources surrounding their shore, while land-locked states want ocean resources to be free of access as much as possible.

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[5] See the Annex to the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity, Nagoya 29.10.2010.

[6] United Nations Secretary-General (2007) pp. 39–40, para. 127, Fedder (2013) pp. 5–16 and Leary (2007) p. 271 et. seq.

[7] Mossop (2015) p. 826.

[8] Dias (2013) p. XXXVII.

[9] Dias (2013) p. XXXVII.

The LOSC separates between zones where the coastal state is granted certain rights, and zones where the coastal state has no territorial no rights. These rights are linked to the jurisdiction of the coastal state, the legal competence to regulate the given activity, in the relevant zone. Thus, this can be characterised as areas under and beyond national jurisdiction.[10] Hence, for the regulation of bioprospecting, the difference in coastal state rights are of vital importance.

When genetic resources are beyond any state's territory, it may seem that those genetic resources are free of access. In relation to MGRs, we face the traditional law of the sea question of whether ocean resources are free of access or a common resource for the entire human race.[11] Developing countries certainly argue that such resources are common to all humankind and thus the benefits arising from them should be shared accordingly.[12]

Bioprospecting involves the use of modern science to develop valuable products based on the biological diversity of the oceans.[13] Because access and benefit-sharing regulations vary across different LOSC regimes, it must be considered which regimes apply to MGRs. Two regimes are relevant to consider in this thesis.

First, the LOSC regulates resource exploration and exploitation.[14] As bioprospecting involves the use of a genetic resource, one might argue that this regime applies.

Second, the LOSC regulates marine scientific research ("MSR") activities.[15] As bioprospecting involves the use of scientific methods, one might argue that this applies.

Hence, both of these two alternative regimes must be addressed to analyse the research question as both access and benefit-sharing relevant provisions might differ between the two regimes. Both regimes, however, rely and builds on the system of maritime zones in the LOSC.

[10] Tanaka (2015) p. 5.
[11] Rothwell (2016) p. 3.
[12] Vierros (2016) p. 33.
[13] de La Fayette (2009) p. 270.
[14] This wording is used in Articles 56(1)(a) and 77(1) of the LOSC.
[15] The LOSC Part XIII.

1.3 A closer look at bioprospecting

1.3.1 What is bioprospecting?

The term *bioprospecting* is used in neither the LOSC nor the CBD. The description provided here is not a legal one, but it tries to describe a real-world phenomenon.

The United Nations Secretary-General have suggested this definition of bioprospecting:

> "… [T]he term is generally understood, among researchers, as the search for biological compounds of actual or potential value to various applications, in particular commercial applications. This involves a series of value-adding processes, usually spanning several years, from biological inventories requiring accurate taxonomic identification of specimens, to the isolation and characterization of valuable active compounds."[16]

The Secretary-General emphasised the use of "biological compounds". The CBD uses the term "genetic resources".[17] There is no agreed-upon definition of genetic resources. The LOSC does not define the term, but the CBD defines "genetic resources" as "genetic material of actual or potential value".[18] It defines genetic material as "any material of plant, animal, microbial or other origin containing functional units of heredity".[19]

The term "heredity" is central. Britannica defines "heredity" as:

> "[T]the sum of all biological processes by which particular characteristics are transmitted from parents to their offspring. […] Both aspects of heredity can be explained by genes, the functional units of heritable material that are found within all living cells."[20]

[16] United Nations Secretary-General (2007) p. 46, para. 150.
[17] Article 2 of the CBD.
[18] Article 2 of the CBD.
[19] Article 2 of the CBD.
[20] Britannica (undated), sub verbo "heredity".

The use of genetic resources goes beyond the use of DNA sequences and may involve larger building blocks of life such as proteins, carbohydrates and other biological compounds.[21] However, the use of all these compounds is associated with their dependence on and connection to genetic information.[22]

Tvedt states that in "biotechnology, typically the value is mostly connected to the use of the genetic structure and information".[23] Returning to MGRs, a distinction can be made between using biological material for the material itself (e.g. in fishing) and exploiting the genetic resources of the material (i.e. using the genetic information that the material provides).

Because the focal point of this thesis is a real-world process, the central issue, therefore, is not the wording of the definition but what actually happens in the exploration and exploitation of MGRs.

Leary describes four different phases of bioprospecting.[24]

The first phase consists of sample collecting and refers to the physical collection of samples from the ocean. As the most interesting biodiversity for prospecting is located at great depths, this phase is costly.[25] In addition, the multi-disciplinary, technologically intensive character of the research adds to the cost. [26]

The second phase is the isolation and characterisation of the biological material.[27] In this phase, the bioprospector maps the biological material and it, therefore, constitutes the beginning of the process of turning the material into a commercial product. Jabour-Green and Nicol described the technical side of this phase in more detail:

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[21] Fedder (2013) p. 4.

[22] United Nations Secretary-General (2007) p. 41, para. 133.

[23] Tvedt (2016) p. 231, see also Fedder (2013) p. 40 with further references.

[24] Leary (2007) pp. 165–169 with further references.

[25] Leary (2007) p. 165 and pp. 187–188.

[26] Leary (2007) p. 188. It has been suggested that one day of sampling at sea costs 50,000 USD. See Hayes (2007) p. 686.

[27] Leary (2007) p. 167–169.

> "In the laboratory, researchers attempt to isolate and characterise microorganisms from the collected samples. If this is achieved, an attempt may be made to culture the microorganisms and, in some cases, sequence their DNA."[28]

According to the Britannica, DNA sequencing is used to determine "the blueprint that contains the instructions for building an organism".[29]

The third step is the screening phase,[30] which consists of looking for biological activity and, thus, the potential for a commercial use of the biological material.[31]

The fourth phase is more directly linked to the commercialisation of the product. This phase consists of developing the product, patenting potential products, and conducting sales and marketing operations.[32] Patenting may also happen during the third phase of the process.[33] This phase varies according to the potential use of the product. If the product is a pharmaceutical, it will be subject to extensive testing before it can be sold on the open market.

A principal element of bioprospecting is the importance of commercial involvement in the process. Bioprospecting is in general characterised public and private cooperation.[34]

In the second phase, commercial actors may be the ones to isolate and characterise the material. From this stage onwards, commercial actors may assume control over the biological material, possibly limiting other forms of research that might take place on the material.[35] The fact that commercial interest in biological material increases as the exploitation of the material progresses can be illustrated by the following "the drug development pipeline" for pharmaceutical products from natural products.[36]

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[28] Jabour-Green (2003) p. 86.
[29] Britannica (undated), sub verbo: "DNA Sequencing".
[30] Leary (2007) p. 169.
[31] Jabour-Green (2003) p. 86–87.
[32] Leary (2007) p. 169.
[33] Jabour-Green (2003) p. 87.
[34] Abrell (2010) p. 337.
[35] Jabour-Green (2003) p. 86.
[36] Juniper (2013) p. 19, with further references.

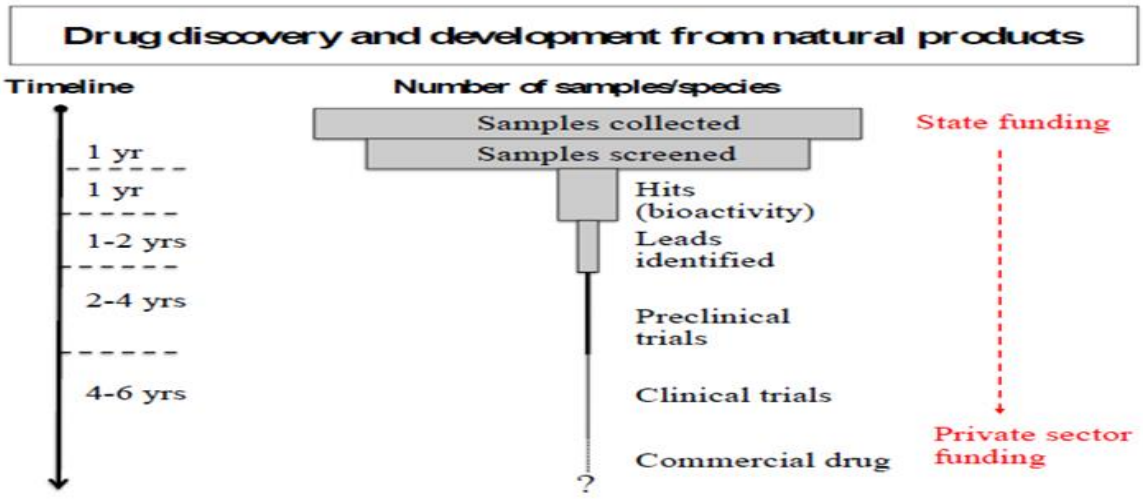

Figure 1: The drug development pipeline.[37]

Developing a drug based on a natural product can take from 15 to 20 years from sample collecting to market entry, with an average development cost of US $900 million.[38] There is also a low rate of success; only one sample in 250,000 produces a drug ready for clinical trials.[39]

It is difficult to quantify the economic value of the genetic resources from areas beyond national jurisdiction. One study from 2008 estimated that marine biotechnology had a commercial value of US $2.2 billion.[40] The use of MGRs was part of this estimation.

Intellectual property rights (IPRs), and in particular patents, play a crucial role in protecting inventions derived from MGRs.[41] In a study of patent databases, Oldham found 4162 marine species mentioned in patent data, from areas both under and beyond national jurisdiction.[42] In comparison, overall, Oldham found 95,303 species in 11 million patent documents.[43] Thus, although the vast majority of species mentioned in patenting is not related to marine species, the study shows that patenting on marine genetic resources is not unpractical.

[37] Juniper (2013) p. 19, with further references.
[38] Juniper (2013) p. 19, with further references.
[39] Broggiato (2014) p. 178, with further references.
[40] Fedder (2013) p. 4, with further references.
[41] Leary (2007) p. 168-169.
[42] Oldham (2013) p. 8.
[43] Oldham (2013) p. 9.

1.3.2 The biodiversity of the oceans

The oceans contain complex and varied biodiversity.[44] The biodiversity of the oceans is also largely undiscovered,[45] which makes them interesting spaces for bioprospecting.

Bioprospectors are mostly interested in microorganisms.[46] Microorganisms have been defined as "any organism that can be observed only with the aid of a microscope".[47] This includes "bacteria, archaea, fungi, yeasts, and viruses".[48] They are among the most "genetically diverse organisms" and are naturally of particular interest.[49]

The interest in microorganisms does not, however, exclude interest macroorganisms (e.g. fish and mammals), which can also be attractive to marine bioprospectors. One example used by the United Nations Secretary-General involved two shark-derived products, one of which was supposedly used in cancer treatment.[50]

Bioprospecting frequently focuses around "hot spots" for biological diversity.[51] Species inhabiting areas of extreme conditions often have interesting qualities for bioprospectors.[52] Hydrothermal vent systems have been areas of particular interest.[53] Hydrothermal vents are places where heated water rises from the ocean floor into the water column. Seawater seeps into openings in the tectonic plates, is heated, and mixes with minerals from the ocean floor. Then, the water rises to the ocean floor and rises as high as 10–15 meters above the ocean floor. The special conditions of hydrothermal vents have made the species living in them unique.[54] There is no sunlight at the depths where the vents are located, so the species living at these depths are completely dependent on the chemical energy from the hydrothermal vent plumes. The

[44] Fedder (2013) p. 3 with further references.

[45] Fedder (2013) p. 3 with further references, United Nations Secretary-General (2007) p. 41, para 134, and Leary (2007) p. 14.

[46] United Nations Secretary-General (2007) p. 52, para. 169.

[47] Oxford Dictionary of Biology (2015), sub verbo: "microorganism".

[48] United Nations Secretary-General (2007) p. 41, para. 132.

[49] United Nations Secretary-General (2007) p. 41, para. 132.

[50] United Nations Secretary-General (2007) p. 55, para. 178.

[51] United Nations Secretary-General (2007) p. 55, para. 179.

[52] United Nations Secretary-General (2007) p. 55, para 180.

[53] Description in this paragraph is based on Leary (2007) p. 17 et.seq.

[54] Leary (2007) p. 15.

unique living conditions at vent sites give the species living exceptional biological diversity; they can cope with extreme heat and changes in temperature.[55]

1.3.3 The negotiations on a new international legally binding instrument on areas beyond national jurisdiction under the law of the sea

In the Agenda 21 report from 1992, a follow up to the Brundtland Commission on Sustainable Development, the United Nations Conference on Environment and Development set their focus on the environmental problems of the high seas.[56] Discussions on this topic continued with the United Nations Secretary-General, who made several comments on the issue,[57] which led to a resolution in the UN General Assembly declaring the need to discuss the challenges to ocean areas beyond national jurisdiction.[58] In July 2017, a Preparatory Committee selected by the General Assembly delivered its report with suggestions of discussion topics for the subsequent negotiations. The General Assembly decided to act on these recommendations and set up four negotiating conferences, which will conclude in 2020.[59]

The report from the Preparatory Committee focused on three main topics.

The first topic was MGRs. The report suggested that the convention "would address" both access to and benefit-sharing of the genetic resources of areas beyond national jurisdiction. However, it did not suggest how these rules should be designed.[60] It also suggested that the new instrument "could set out the relationship between the instrument and IPRs".[61] There is an important conflict of interest between developing countries wanting a robust benefit-sharing mechanisms and developed countries wanting to avoid restrictions on access to MGRs in areas beyond national jurisdiction.[62]

[55] Leary (2007) pp. 16-17, United Nations Secretary-General (2007) p. 55, para. 180.

[56] United Nations Conference on Environment & Development (1992), para. 17.44–17.68.

[57] The United Nations Secretary-General (2004) p. 59 et seq., para. 229, et seq., and United Nations Secretary-General (2007) p. 39 et seq., para. 126 et seq.

[58] United Nations General Assembly Resolution 69/292 (2015).

[59] United Nations General Assembly Resolution 72/249 (2017).

[60] Report of the Preparatory Committee established by General Assembly Resolution 69/292 (2017), p. 11.

[61] Report of the Preparatory Committee established by General Assembly Resolution 69/292 (2017), p. 12.

[62] Vierros (2016) p. 33.

The second topic was environmental governance, which includes "area-based management tools, including marine protected areas" [63] and environmental impact assessments. [64] The inclusion of this topic was partly in response to the need for a "comprehensive global regime to better address the conservation and sustainable use of marine biological diversity". [65]

The third topic was capacity building and the transfer of marine technology. [66] The focus here was particularly on supporting the needs of developing countries. [67] The report focused on three types of capacity building and transfer of marine resources: scientific and technical assistance for MSR, education and training of human resources, and data and specialised knowledge.

With a new convention underway, one might ask why it is important to analyse the current legal situation. However, any useful discussion of a new legal regime requires a thorough understanding of the current one. Hence, an analysis of the *de lega lata* access and benefit-sharing regime of MGRs is useful in the light of the forthcoming negotiations. [68]

1.4 Relevant legal sources

1.4.1 Treaty interpretation

This thesis focuses on public international law. Thus, the statute of the International Court of Justice (ICJ) Article 38 list the main sources of law. [69] The central legal sources for this thesis are treaties and other international instruments. Therefore, the relevant methodology for interpretation is the method used for interpreting public international law. Articles 31–33 of the Vienna Convention on the Law of Treaties provide important guidance on interpreting relevant international instruments. [70] Accordingly, treaties and other instruments of international

[63] Report of the Preparatory Committee established by General Assembly Resolution 69/292 (2017), p. 4 et seq.
[64] Report of the Preparatory Committee established by General Assembly Resolution 69/292 (2017), p. 15 et seq.
[65] Report of the Preparatory Committee established by General Assembly Resolution 69/292 (2017), p. 8.
[66] Report of the Preparatory Committee established by General Assembly Resolution 69/292 (2017), p. 16.
[67] Report of the Preparatory Committee established by General Assembly Resolution 69/292 (2017), p. 16.
[68] Negotiations are due start September 2018, see United Nations General Assembly Resolution 72/249 (2017) para. 3.
[69] Statute of the International Court of Justice, 26th of June 1945, San Francisco.
[70] Vienna Convention on the Law of Treaties, 23rd of May 1969, Vienna.

law must be interpreted in "good faith" and in accordance with the ordinary meaning of their text.[71] The objectives of treaties or agreements may also be used as interpretive instruments.[72]

Of particular importance in this thesis is contextual interpretation. The justification for the need to use contextual interpretations is the lack of definitions of central concepts in the relevant instruments in this thesis. Examples from the LOSC are "sovereignty", "sovereign rights" and "marine scientific research". All of these terms warrant a closer definition or description, but the LOSC fails to do so. Hence one must look to other provisions in the treaty or other relevant sources of law for determining the meaning of the terms. For example, one can examine the LOSC provisions in Part XIII on MSR to analyse what is meant by that term.

As there are many texts on treaty interpretation and the Vienna Convention, there is no need to elaborate further on this topic.

All the legal instruments examined in this thesis are accepted by a vast number of states. As this thesis's purpose is to focus on international law in general and not the law applicable to a particular state, it will not address issues based on the fact that a state has accepted one treaty or agreement and not others.

1.4.2 The law of the sea

The central instrument on the law of the sea is the LOSC. There is no general framework regarding MGRs in the LOSC. However, the LOSC regulates activities at sea and contains general provisions that have importance to this thesis.[73]

The LOSC was signed in 1982. Treaties on the law of the sea, however, have existed long period before this Convention, and the law of the sea as a subject of legal relations between states has existed for even longer.[74]

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[71] Vienna Convention on the Law of Treaties, Article 31.

[72] Vienna Convention on the Law of Treaties, Article 31.

[73] See Tommy T.B. Koh in Nordquist (1985-2012) Vol I, p. 1-16 and Rothwell (2016) p. 1.

[74] Rothwell (2016) p. 2 and Churchill (1999) pp. 4–5. The multilateral effort to establish a global treaty on the law of the sea dates back to the 1930 Hague Conference, which did not result in a convention.[74] At the first United Nations Conference on the Law of the Sea (UNCLOS I in 1958), the parties adopted four Conventions: The Convention on the Territorial Sea and the Contiguous Zone, the Convention on the High Seas, The Convention on the Continental Shelf and the Convention on Fishing and Conservation of the

The current LOSC treaty was the result of the third United Nations Conference on the Law of the Sea (UNCLOS III). The negotiations started with the first session in 1973.[75] However, due to political changes in several countries,[76] the convention was not adopted by several countries. This fact led to discussions for a new implementation treaty to the LOSC establishing a mineral resource regime for areas beyond national jurisdiction. The goal was to agree upon changes to the Convention that would make important parties (e.g. the US) agree to the LOSC.[77] In 1994, the parties agreed to the Agreement on the Implementation of Part XI of the Convention, the "Implementation Agreement".[78] However, this is still not ratified by the US. This instrument is not, for the most part, relevant to the legal questions in this thesis.

1.4.3 International environmental law

The CBD is an important international instrument on biological diversity and the use of genetic resources.[79] The CBD was drafted as a response to threats of losing biodiversity and has three main objectives: "the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources".[80] As Leary puts it, the CBD is a "framework treaty," which means that it establishes "overall goals, policies and general obligations" but leaves the achievement of those goals to the state parties.[81]

Realising the benefit-sharing mechanism provided for within the framework of the CBD proved difficult.[82] Because of this deficiency, the Convention parties decided to adopt the Nagoya Protocol (NP).[83] The objective of the NP is the fair and equitable sharing of the bene-

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Living Resources of the High Seas. These Conventions now constitute the background material of the current LOSC and may shed light on what is meant in certain provisions.

[75] Churchill (1999) p. 14.

[76] First and foremost, the US. However, the US did not ratify neither the LOSC nor the final implementation treaty, see Rothwell (2016) p. 19.

[77] Churchill (1999) p. 19.

[78] Churchill (1999) p. 20. Agreement relating to the Implementation of the United Nations Convention on the Law of the Sea, United Nations 28th of July 1994.

[79] The Convention on Biological diversity, Rio de Janeiro, 5th June 1992.

[80] Sands (2012) p. 453-454.

[81] Leary (2007) p. 52.

[82] Dias (2013) p. XXXVII.

[83] The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity, Nagoya, 29.10.2010

fits arising from the utilisation of genetic resources.[84] To achieve this goal, it sets out more detailed regulations regarding the CBD's benefit-sharing mechanism.

Article 4(1) of the CBD states that it applies to "the components of biological diversity, in areas *within* the limits of national jurisdiction" (emphasis added). Hence, the scope of the CBD on MGRs must be read in relation to the provisions on jurisdiction in the LOSC. In contrast, for areas *beyond* national jurisdiction, Article 4(2) of the CBD states that it only applies to "processes and activities" under the state's control. Therefore, as the CBD does not contain provisions for access and benefit-sharing from own nationals in areas beyond national jurisdiction, it is not relevant for these areas in relation to MGRs. The NP have the same scope as the CBD.[85]

1.4.4 International intellectual property law

IPR has a long history in international law. This thesis will focus on international patent law because innovations derived from MGRs are often protected by patents.[86]

The origins of international patent law are strongly linked to the Industrial Revolution.[87] The first modern multilateral treaty on patents was the Paris Convention[88], which dealt with a range of matters characterised as "industrial property".[89] The Paris Convention established a duty for the parties to grant protection to a range of intellectual property types, including patents.[90] However, it does not cover substantive patent law. That is, the national requirements for when a patent shall be granted.[91]

The main global treaty on substantive patent law is the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS).[92] The TRIPS Agreement is a part of the World Trade Organization (WTO) regime and must be read in the light of its purpose. Hence, the primary

[84] Article 1 of the NP.
[85] Salpin (2013) p. 177.
[86] Leary (2007) p. 168-169.
[87] Waelde (2014) p. 367.
[88] Paris Convention for the Protection of Industrial Property, Paris 20th of March 1883.
[89] Waelde (2014) p. 367.
[90] Article 1(2) of the Paris Convention.
[91] Waelde (2014) p. 367.
[92] The Agreement on Trade-Related Aspects of Intellectual Property Rights, Marrakesh 15th of April 1994.

purpose of the Agreement is to reduce restrictions on trade between states by, among other things, introducing the most favoured nation principle in Article 4.[93] This principle establishes that every state must give every party to a treaty the same benefits as they give any other state.[94] The innovation in TRIPS is the establishment of substantive patent requirements in Section 5. These are more closely described in section 5.3 of this thesis. In addition, the Patent Cooperation Treaty (PCT) has an important practical function in that it makes patent applications across borders easier.[95]

1.5 Thesis delimitations

Several delimitations must be made to answer the thesis question within the scope of this thesis.

First, regional instruments are not covered in this thesis. This delimitation implies that the focus is on global international law, meaning that treaties or agreements with possible importance, such as the Antarctic Treaty,[96] are excluded. However, as they are regional, their scope restricts them to cover only the relevant region. The central focus of this thesis is to cover the relevant global treaties and instruments in depth, rather than several regional arrangements in a more superficial manner.

Second, this thesis does not cover treaties or instruments that are not primarily concerned with MGRs. One example is the International Treaty on Plant Genetic Resources for Food and Agriculture, which regulates the genetic resources of food and agriculture plants.[97]

Third, the genetic resources of the deep sea are often discussed in relation to environmental sustainability, and a significant aspect of the discussions on a new legally binding instrument on the areas beyond national jurisdiction is the sustainable use of these areas. Environmental regulation is, therefore, an important topic related to this thesis. In this thesis, however, the question of international environmental regulation will not be analysed.

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[93] TRIPS Preamble.

[94] Stenvik (2013) p. 35.

[95] The Patent Cooperation Treaty, Washington 19th of June 1970.

[96] The Antarctic Treaty, Washington 1st of December 1959.

[97] The International Treaty on Plant Genetic Resources for Food and Agriculture, Rome 3rd of November, see Article 3.

Finally, questions regarding coastal states' provisions on bioprospecting by their own nationals will not be addressed because they require an analysis of national law.

1.6 The way forward—how to answer the thesis question?

To answer the thesis question, I will first analyse bioprospecting as resource exploitation under the LOSC. This is done in chapter 2 and 3. In chapter 2 I will study access and benefit-sharing of MGRs under national jurisdiction. In chapter 3 I will study access and benefit-sharing of MGRs beyond national jurisdiction. In chapter 4 I will analyse access and benefit-sharing of MGRs as MSR under the LOSC. In chapter 5 I will discuss important questions on the relationship between IPR and access and benefit-sharing of MGRs. At last, In chapter 6 I will make some ending remarks.

2 Access and benefit-sharing of MGRs under national jurisdiction

2.1 Introduction

There are three main questions in this chapter. First, which MGRs are under national jurisdiction? Second, is there an obligation under current international law to grant other nations access to these resources? Third, does the current international legal regime prescribe benefit-sharing for MGRs under national jurisdiction?

In this chapter, I will discuss the question in light of two relevant actors, the bioprospector and the coastal state. The coastal state is the state where the collecting of genetic resources takes place. For the bioprospector, the interesting question is whether they have access to genetic resources and what possible restrictions and regulations there are on the access. The coastal state on the other hand, have an interest in controlling access, as they have general interest in vessels visiting their areas and have a responsibility to protect the same biodiversity. In addition, the coastal state have an interest in potential benefits, whether it is informational, financial or in other forms, deriving from the use of the genetic resources under their jurisdiction. Thus, there is a tension between somewhat conflicting interests.

The LOSC does not contain specific regulation on the MGRs under national jurisdiction. However, in this chapter I discuss the topic based on that bioprospecting can be viewed as resource exploitation or exploration under the LOSC and that the respective jurisdictional provisions apply to the process. As the LOSC does not contain more detailed regulation on the use of genetic resources, the CBD-regime must be conferred. The CBD applies to "components of biological diversity" in "areas within the limits of national jurisdiction", cf. the CBD art 4(a). Consequently, regarding MGRs it is the jurisdictional provisions of the LOSC that decides whether the CBD applies and "the extent of that jurisdiction".[98]

First, in this chapter, I will discuss what genetic resources falls under national jurisdiction. Then, I will discuss the legal regime for access and benefit-sharing in relation to these resources.

[98] Mossop (2015) p. 833.

2.2 Genetic resources under national jurisdiction

2.2.1 Introduction

The purpose of this section is to clarify what genetic resources falls under national jurisdiction of the coastal state.

The jurisdiction over living resources varies between the different maritime zones established by the LOSC. Consequently, the provisions on the specific zone of the LOSC must be conferred to determine whether the coastal have rights in the relevant genetic resource.

2.2.2 Genetic resources in areas under national sovereignty

According to the Article 2(1) of the LOSC, the coastal states have "sovereignty" over their *internal waters* and *territorial sea*, including the seabed of these areas. These zones refers to the waters on the landward side of the baselines[99] and within 12 nautical miles on the seaward side of the baselines, respectively.[100] This "sovereignty applies to both the water column and the seabed.

Sovereignty refers to the principle that states are autonomous and thus not subject to the will of any others. They are not under the legal authority of any other state or organisation if they do not chose it themselves.[101] Sovereignty implies that the state have jurisdiction, i.e. competence, to regulate certain questions under their sovereignty.[102] Jurisdiction concerns the coastal state "right to regulate conduct or the consequences of events",[103] and describes both the rights to and limits "to make, apply, and enforce rules of conduct upon persons".[104]

The sovereignty over the internal waters and territorial sea implies that the state has the same competence to decide on access and benefit-sharing in these areas as they do on their land territory.

However, the coastal states' jurisdiction over their maritime zones can be restricted by customary international law and treaties.

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[99] The term "baselines" in the LOSC serves to "establish from what points on the coast the outer limits of [a coastal State's territorial sea and other maritime Zones] are to be measured", see Churchill (1999) p. 31.

[100] See the LOSC Article 2(1).

[101] Ruud (2011) p. 21 and Crawford (2012) p. 12.

[102] Cassese (2005) p. 49.

[103] Jennings (1992) p. 456.

[104] Staker (2014) p. 309.

So recourse must be had to the provisions of the LOSC when deciding on the extent of the jurisdiction of the coastal state in these zones. The LOSC is a treaty which lays down provisions restricting coastal States' jurisdiction over the territorial sea by granting other states' right to innocent passage through the territorial sea, subject to certain conditions laid down in Part II. According to Article 8(2) of the LOSC, there is no right of innocent passage in the internal waters of coastal State.[105]

The right of innocent passage is a right to proceed through the territorial sea in accordance with the LOSC Articles 18 and 19. These provisions does not specify whether bioprospecting can be done pursuant to the provisions. However, when the coastal state have the rights equivalent to the territory of the state, it is clear that it is up to the coastal state to regulate the use of genetic resources. Hence, the coastal state have full discretion to deny access. This conclusion is supported by the fact that, as seen under the next session, the coastal state have "sovereign rights" for the purpose of exploiting the living resources of the EEZ and the continental shelf, and the coastal state rights in these areas are more limited than in the territorial sea.

Thus, law of the sea gives the coastal state the exclusive right to regulate the MGRs in this area. This implies that the bioprospector cannot explore or exploit MGRs by invoking the right to innocent passage in the LOSC Article 17.

2.2.3 Genetic resources in the exclusive economic zone

Moving further out to sea from the shore, the LOSC establishes an exclusive economic zone (EEZ) that extends 200 nautical miles beyond the baselines, covering both the water column and the seabed.[106]

The LOSC states that the EEZ is a "specific legal regime".[107] In the EEZ, other states have the freedoms granted in Article 87 on the high seas. However, they must respect coastal state regulations pursuant to the LOSC provisions in Part V on the EEZ.

In relation to MGRs, Article 56(1)(a) of the LOSC establishes that the coastal state has the "sovereign rights for the purpose of exploring and exploiting" the "natural resources" of the EEZ.

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[105] Unless the limited exception in the Article 8(2) of the LOSC applies.

[106] See the Article 57 of the LOSC.

[107] The LOSC Article 55.

The term "sovereign rights" is not entirely clear but must be understood in relation to the other provisions on the natural resources of the EEZ and international law in general. In general, there is a distinction between "sovereignty" referred to in the LOSC Article 2(1) and "sovereign rights". The wording indicates that the latter term is more restricted.

Further on, it expresses that the coastal state have all the rights "necessary for and connected with" the exploration and exploitation of natural resources in this area.[108] This could for example include giving regulation on exploitation of the relevant resource.

The sovereignty is limited in the sense that it only applies to the exploration and exploitation of "natural resources".[109] Activities not related to "natural resources" also falls outside the coastal states' jurisdiction, given that there is no other provisions in the LOSC granting it.[110]

The term "natural resources" refers to both living and non-living resources.[111] Does MGRs fall under the scope of the living resources of the EEZ?

The LOSC uses several different terms for the living biological resources of the oceans. Examples are "marine life", "natural resources", "living resources" and "living organisms".[112] Several authors on the law of the sea use the term "marine living resources" as an umbrella term for these categories.[113] It is not clear what relationship there is between the different LOSC terms. Hence, interpretation of the treaty provisions must involve a concrete analysis of the provisions on the relevant area to decide whether a given resource falls within the scope of the provision.

The EEZ provisions refers to several practically important living resources:

- "Highly migratory species", in Article 64.
- "Marine mammals", in Article 65.

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[108] Churchill (1999) p. 151 with further reference.

[109] Tanaka (2015) 131.

[110] The provisions on marine scientific research might be an example of such provisions.

[111] Walker (2012) p. 254.

[112] Salpin (2013) p. 150, notes 6 through 9. For "marine life" see Articles 1(1)(4) and 194(5). For "natural resources" see Articles 56(1)(a), 77, 79(2), 145, 193, 194(3), 246(5) and 249(2). For "living resources" see the preamble and Articles 1(1)(4), 21(1), 56(1), 61, 62, 69, 70, 71, 72, 73, section II of Part VII, 123, 277 and 297(3). For "living organisms" see Article 77.

[113] See, for example Schofield (2014) p. 405 where the heading refers to "marine living resource concerns" and Matz-Lück (2015) p. 491.

- "Anadromous stocks", in Article 66.
- "Catadromous species", in Article 67.

The common denominator for these examples are that they refer to resources that are subject to fishing.

Hence, the LOSC resource regimes involve exploitation of a resource as a *commodity* such as fish for food consumption, minerals for industrial uses or oil for energy supply. The exploitation of MGRs, in contrast, involves using the *information* found in a given species[114] with no need for mass extraction of the resource from the oceans. This fact suggests that it is a completely different form of resource exploitation. The value-adding process happens on land and in research institutions and the research and development departments of private enterprises.[115] In addition, bioprospecting requires different techniques and equipment than is used in fishing.[116]

This could indicate that the living resources of the EEZ is restricted to species suitable for fishing, however, bioprospecting is not fishing.

That the EEZ fails to give specific regulation on the genetic resources of this zone, could also support the conclusion that bioprospecting is not under the jurisdiction of the coastal state in the EEZ.

However, this omission is only natural as the use of MGRs were not addressed during the LOSC negotiations.[117] The wording of Article 56(1)(b) the LOSC is wide, it relates to "natural resources" in general. There is no restriction on the wording in relation to activities that cannot be considered as fishing. Bioprospecting refers to the use of biological material, and thus it involves the use the nature's resources.

Consequently, the use the MGRs of the EEZ constitutes use of natural resources.[118]

The rights of the coastal state in relation to the living resources of the EEZ is not unrestricted.

[114] Tvedt (2016) p. 231.
[115] United Nations Secretary-General (2007) p. 46, para. 150.
[116] Korn (2003) p. 43.
[117] Scovazzi (2010) p. 316 and Glowka (1996) p. 177
[118] Proelss (2017) pp. 426–427, para. 14.

In relation to the living resources of the EEZ, one relevant restriction is Article 62 of the LOSC. According to paragraph 2 of the Article, the coastal state is required to allow other states to exploit the living resources of the EEZ if the coastal state does not have the capacity to harvest the allowable catch. The provision must be read in relation to Article 61(1) of the LOSC, requiring the coastal state to determine the amount of allowable catch. If this amount is not subject to fishing by the coastal state, the state is obligated to grant access to excess catch to other states.

For bioprospecting purposes, one might argue that the coastal is required to allow bioprospectors access if they do not themselves conduct bioprospecting in a given area or on a given resource.

However, this provision relates to fishing as it mentions the allowable "catch". As seen above, bioprospecting is not fishing. It would not be possible to determine a total "allowable catch" for bioprospecting. Hence, this exception to the sovereign rights granted to the coastal state does not apply to bioprospecting. Hence, the LOSC does not require the state to allow bioprospecting on the living resources within it EEZ.

Consequently, it is entitled to deny bioprospecting in its EEZ from other states.

In addition, the Article 68 of the LOSC states that the EEZ does not cover sedentary species. These species are under the regime of the continental shelf in the LOSC part VI.

2.2.4 Genetic resources on the continental shelf

The continental shelf regime of the LOSC part VI applies to the seabed beyond the territorial sea. The geographical scope of the continental shelf is established by the criteria in Article 76 of the LOSC. The criteria implies that the continental shelf is normally 200 nautical miles from the baselines, but it that can be longer if the more detailed criteria in paragraph 4-6 is fulfilled.[119] Where the continental shelf extends beyond the EEZ, or the coastal state have not claimed an EEZ, the MGRs of water column is beyond national jurisdiction. In both situations, the question of what MGRs belongs to continental shelf becomes critical.

On the continental shelf Article 77(1) of the LOSC gives the coastal state "sovereign rights" for the "purpose of exploring it and exploiting its natural resources". The term "sovereign

[119] These are of such a technical character that it is not useful to describe them here.

rights" has the same meaning as under Article 62 on the EEZ, which means that other provisions of the LOSC might restrict the coastal state's ability to manage and control the living resources of the continental shelf.

Paragraph four in Article 77 defines natural resources as "the mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to sedentary species". In cases where the coastal state has not claimed an EEZ or where the continental shelf extends beyond the EEZ this provision implies that the coastal state has sovereign rights over the sedentary species, but not over other species. Thus, species not belonging to the "sedentary species" in these two situations are not under national jurisdiction. Hence, the definition is decisive when separating between MGRs under national jurisdiction, and the resources beyond national jurisdiction.

Article 77(4) of the LOSC defines "sedentary species" as:

> "[O]rganisms which, at the harvestable stage, either are immobile on or under the sea-bed or are unable to move except in constant physical contact with the sea-bed or the subsoil."

The provision in paragraph four consists of two steps to determine whether the relevant species is a sedentary species.[120] The first step is to decide the species' "harvestable stage". The second step is to decide whether the species "are immobile on or under the seabed or are unable to move except in constant physical contact with the sea-bed or the subsoil".

The wording of the provision is the same as the one in the 1958 Convention on the Continental shelf.[121]

The definition is not based on a scientific biological definition of the word "sedentary",[122] making it difficult to decide on the scope of the definition. The word "sedentary" is not listed in the Oxford Dictionary of Biology, but is mentioned in the definition of "sessile": "Describ-

[120] Allen (2001) p. 623.

[121] Article 2(4) of the 1958 Convention on the Continental shelf.

[122] Allen (2001) p. 621, personal correspondence with Prof. Em. of Biology Bjørn Gulliksen.

ing animals that live permanently attached to a surface, i.e. sedentary animals."[123] The word originates from Latin and means "not migratory".[124]

Although both of these definitions have associations with the sedentary definition in Article 77(4) of the LOSC, there are important differences between them. First, the LOSC definition does not require that the species is permanently attached to the surface, as it also covers species that can move "in constant physical contact with the sea-bed". Second, there is no reference to the "harvestable stage" in the biological definition. A general misunderstanding would therefore be to interpret the LOSC definition in accordance with the scientific or etymological definition of the word.

There are some species that is agreed upon falls under the definition. Examples are "chanks, clams, oysters, mussels, scallops, sponges, corals, and crusteances such as shrimps, prawns, lobsters and crabs."[125] However, these examples relates to macroorganisms, while the main focus of bioprospecting is microorganisms.[126]

The first of the sedentary definition's two steps is to determine the species' "harvestable stage". The treaty does not define this term. The wording refers to the stage of the species' lifespan where it is harvestable, implying when it is possible to harvest the species for fishing purposes.

The challenge with the resources relevant for bioprospecting is that they are not subject to fishing, therefore, there is no "harvestable stage".[127] One suggestion is that the term refers to "that stage of life which the resources are harvestable".[128] However, this does not provide any more guidance than the definition in the LOSC.

[123] Oxford Dictionary of Biology (2015), sub verbo: "Sessile".
[124] English Oxford Living Dictionaries (undated), sub verbo: "Sedentary".
[125] Maggio (2017) p. 613, para 25 with further reference.
[126] United Nations Secretary-General (2007) p. 52, para. 169.
[127] Allen (2001) p. 623.
[128] Allen (2001) p. 623.

As the species must be immobile or unable to move except in physical contact with the seabed at the time of the "harvestable stage", the practical problem concerns species that undergo some kind of transformation, changing their ability to move during their life span.[129]

Two different interpretations of the term "harvestable stage" might be applied to these species.[130]

First, one might ask if the species is immobile or unable to move at the time of collection. One might argue that when exploring the seabed for valuable genetic resources the "harvestable stage" is at the time of its collection from the seabed since the bioprospectors does not need to collect the species at a given point in its life span.[131] On the other hand a strong argument against this alternative is that it will often be random at what stage in the species life span the bioprospectors collects it. Therefore, this criteria does not seem to be suitable for separating between sedentary species and other species. In addition, the wording refers to the type "harvestable stage" of the species in general, and not the stage of the example collected.

Second, one might ask if the species is immobile or unable to move at *any* point in its life span. One might argue that if the species is at any point in its life span able to move independently of the seabed, the species is not immobile or unable to move except in physical contact with the seabed at its "harvestable stage". However, this interpretation is not in accordance with the text of Article 77(4) as it moves the focal point of the definition from the "harvestable stage" to the entire life span of the species. One could argue that for the species that are not subject to harvesting, there is no "harvestable stage" and so they fall outside the scope of the term.

So the "harvestable stage" criterion is difficult to apply and creates practical problems when determining the jurisdiction over a given species. However, it is more in line with the text of the LOSC Article 77(4) to define the "harvestable stage" as the time of the collection of the resource when collecting the species for bioprospecting purposes.

[129] Allen (2001) p. 623.
[130] Allen (2001) p. 623 – 624.
[131] Allen (2001) p. 624.

The second step of the "sedentary species" definition in Article 77 is to determine whether the species "are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil".[132] The treaty text does not provide any additional information about the meaning of this phrase. The definition covers at least those species attached to the seabed.

In relation to microorganisms, an important question is whether "the only 'mobility' relevant to legal classification is movement generated by the organism itself, or if it includes motion caused by outside forces, such as water current or even transport by a host carrier."[133] It seems natural to restrict the criteria to the former view.[134] The wording refers to species that are "unable to move", and thus points to the species' abilities, and not if the species is moved by external forces. There continue to be further disagreements on the classification of different species in accordance with this criteria.[135]

Hence, also this criterion is unclear in relation to species in the focus of bioprospectors.

2.2.5 Hydrothermal vent species and the immobility criteria

Hydrothermal vent microorganisms are of particular interest to the bioprospectors.[136] There are additional problems regarding the "immobility" criteria in relation to the species inhabiting them.

Regarding hydrothermal vent species, there is limited knowledge of their habitat.[137] This makes it difficult to establish their dependency on the seabed and their ability to move during their life-span.[138]

However, some main types of hydrothermal vents microorganisms have been described:[139]

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[132] Allen (2001) p. 624.
[133] Allen (2001) p. 624.
[134] Allen (2001) p. 624.
[135] Allen (2001) p. 625 – 626.
[136] See section currently 1.3.2 of this thesis.
[137] Korn (2003) p. 39.
[138] Allen (2001) p. 626.
[139] Allen (2001) p. 626, with further reference, and Korn (2003) p. 39.

- "[T]he free-living microbial[140] populations associated with the discharged vent fluids. These microbes presumably grow and reproduce within the subseabed system."
- "[M]icrobes suspended within the hydrothermal vent water plumes. Those microbes may be free-living or attached to suspended particles."
- "[T]he free-living microbial 'mats' that grow on rock, chimney, sediment, or biotic surfaces that are exposed to vent water."
- "[T]he symbiotic microbes associated with vent macrofauna, such as the tubeworms, clams, and polychaetes."

If one were to follow the wording of the provision, especially category two above might be considered as not belonging to sedentary species. Strictly speaking, some of the other categories of species are able to move without being in "constant physical contact" with the "seabed" or "the subsoil", cf. Article 77(4). However, as Allen argues, such a primitive ability to move that microorganisms inhabit were probably not on the LOSC parties minds when deciding on the phrasing of Article 77. One might therefore argue that the mentioned species fulfil the "immobility" criteria of the sedentary definition.

2.2.6 Conclusions on the genetic resources of the continental shelf

In summary, the challenges of applying the "sedentary species" definition to bioprospecting creates an unclear legal situation. The challenges refers to both parts of the definition, making it difficult to draw any safe conclusions. On the other hand, for the species that have been traditionally classified as sedentary species, there is no reason for changing this classification just because the activity now changes from harvesting to collection for bioprospecting purposes.

There is substantial doubt as to whether important hydrothermal vent organisms belong the sedentary species category established by the LOSC Article 77(4). For some of the categories of species it is safe to conclude that they do not belong to sedentary species. For the species found in the water column, the rule on sedentary species do not apply.[141]

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[140] The terms "microbial" / "microbe" / "microbes" have the same meaning as the term "microorganism", see Oxford Dictionary of Biology (2015), sub verbo "microorganism".

[141] Allen (2001) p. 626.

Although the legal situation is unclear, it is nonetheless apparent that there must be made an individual assessment of the species involved when determining the question of jurisdiction. Ignoring the sedentary species definition in the LOSC just because it is difficult to apply to many of the species relevant for bioprospecting is incorrect. When the bioprospector finds that the species fulfils the requirements of the "sedentary species" definition, the bioprospector must respect the jurisdiction of the coastal state.

2.3 International law on biodiversity

2.3.1 Introduction

The question in this part is the role of the CBD and the NP for the MGRs under national jurisdiction.

The LOSC does not contain specific provisions on the utilisation of MGRs under national jurisdiction. Other sources of law must therefore be analysed to establish rights to and duties regarding the utilisation of genetic resources under the national jurisdiction of a coastal state.

2.3.2 International biodiversity law on genetic resources

A main objective of the CBD is "the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources."[142]

Article 15(1) of the CBD establishes the principle that every state has "sovereign rights over their natural resources". This implies that it us up to the coastal state to exclusively regulate access to and benefit-sharing of genetic resources under its jurisdiction. This provision reflects the concern among developing countries that their national genetic resources might be exploited "without the consent of provider countries and without committing to share any benefits deriving from the access to and any utilisation of those resources."[143]

[142] Sands (2012) pp. 453-454.

[143] Sands (2012) p. 457.

The NP aims to operationalise the object of the CBD to establish a system of fair and equitable sharing of genetic resources.[144] Consequently, it contains more detailed provisions on access and benefit sharing than the CBD.[145]

2.3.3 The relationship between the LOSC and the CBD-regime

If there are inconsistencies regarding MGRs between the LOSC and the CBD this must be solved in accordance with the instruments. A starting point would be to see if there is an interpretation that is consistent with both treaties.[146] This is emphasised by Article 22(2) of the CBD in relation to the LOSC. The provision states that the "Contracting Parties shall implement this Convention with respect to the marine environment consistently with the rights and obligations of States under the law of the sea." This is also expressed by the LOSC Article 311 that states that the "Convention shall not alter the rights and obligations of States Parties which arise from other agreements compatible with this Convention".

However, if there is a conflict between the two treaties, the CBD Article 22(1) makes it clear that the provisions of the CBD shall not "affect the rights and obligations" of "any existing international agreement". Thus, it is clear that the LOSC will prevail where there are inconsistencies between the two instruments.[147] The same conclusion follows from the LOSC Article 311(2).

The NP establishes a more detailed access and benefit-sharing regulation on genetic resources. Article 4(1) of the Protocol contains the same language as the CBD Article 22(1) on the relationship with other international treaties. Accordingly, this agreement on the genetic resources under national jurisdiction must also be implemented in accordance with the LOSC.

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[144] Oberthür (2014) p. 1-2 and Morgera (2013) p. 7. The Nagoya Protocol and the CBD is supplemented by the 2002 "Bonn Guidelines on Access to Genetic Resources and Equitable Sharing of the Benefits Arising out of their Utilization". The aim of the guidelines is according to the introduction to at assist parties to the CBD with the implementation of the convention. I have not found the guidelines useful for the analysis in this thesis, as the Nagoya Protocol covers the same main questions.

[145] Morgera (2013) p. 1.

[146] Tanaka (2015) p. 13.

[147] Mossop (2015) p. 831.

2.4 Access and benefit-sharing of MGRs in the CBD and the NP

2.4.1 Access to MGRs

The CBD Article 15(1) establishes that it is up to the state to "determine access" to genetic resources and that access requirements is subject to national legislation. Hence, the exploration of MGRs under the coastal state's jurisdiction requires the consent of the state.

The access requirement is emphasised by the CBD and the NP that states that access is granted only after *prior informed consent* from the coastal state.[148] The concept is "an expression of the principle of national sovereignty over natural resources".[149] The prior informed consent concept is the key regulation designed to protect the state providing genetic resources. The NP does not set out the contents of the information the bioprospector is obligated to provide in detail. This means that it is up to the coastal state to establish the requirements on what the bioprospector must disclose before access is granted. However, for the consent to be "informed", the bioprospector must at least give information "in detail" concerning the researching mission.[150] The information given is meant to give the competent national authority sufficient information to decide on whether to grant access to national genetic resources or not.[151]

As a part of the prior informed consent, the coastal state shall establish rules and procedures for establishing access on *mutually agreed terms* pursuant to the NP Art 6(3)(g). The lack of guidelines in this provision implies that is it up to the coastal to decide on the contents of the mutually agreed terms framework in their national legislation.[152] The Protocol only establishes that the coastal state terms *may* include the following:

> "(i) A dispute settlement clause;
> (ii) Terms on benefit-sharing, including in relation to intellectual property rights;
> (iii) Terms on subsequent third-party use, if any; and
> (iv) Terms on changes of intent, where applicable."

[148] The CBD Article 15(5) and the Nagoya Protocol Article 6(3)(a).
[149] Morgera (2015) p. 144.
[150] Morgera (2015) p. 144.
[151] Morgera (2015) p. 144.
[152] Morgera (2015) p. 167.

As Morgera, Buck and Tsioumani observed, the NP is a "light-touch" regime regarding the mutually agreed terms for accessing the genetic resources of a coastal state.[153]

The provisions of the NP and the CBD, therefore, leaves a lot of discretion to the coastal state to regulate bioprospecting under national law.[154] Normally, the prior informed consent regulation is established by national legislation where there are regulations about who shall negotiate the mutually agreed terms by the coastal state.[155] This authority might be delegated to non-state actors, such as research centres with collections of biological material.[156] The national legislation could set out general benefit-sharing guidelines, for example lump sum payments, or they can state the terms must be negotiated on a case-by-case basis.[157]

This right to control access to genetic resources is also reflected in the LOSC, living resources are under the "sovereignty" of the coastal state in the territorial sea and under the "sovereign rights" of the coastal state in the EEZ and the continental shelf.

2.4.2 Benefit-sharing of MGRs under national jurisdiction

This section will examine the benefit-sharing provisions relevant to MGRs under national jurisdiction.

The LOSC does not have any specific provisions on obligations to share benefits from MGRs under national jurisdiction.

The question must therefore be solved in accordance with the CBD.

Article 15 of the CBD gives some general guidelines. According to para. 7 of the Article, each contracting party shall take "legislative, administrative or policy measures, as appropriate" with the aim of:

[153] Morgera (2015) p. 168.
[154] Morgera (2015) p. 15.
[155] Morgera (2015) p. 15.
[156] Morgera (2015) p. 15.
[157] Morgera (2015) p. 15.

> "[S]haring in a fair and equitable way the results of research and development and the benefits arising from commercial and other utilization of genetic resources with the Contracting party providing such resources."

The provisions of the CBD are regarded as allowing "possible claims to a share of any profits arising from the exploitation and development of genetic resources by companies and institutions."[158] They CBD requires "consideration of benefit-sharing arrangements before access to genetic resources is granted."[159]

Neither the rest of the CBD nor the NP has more detailed on provisions on the sharing of benefits arising from the exploitation of the coastal state's genetic resources. The obligation is emphasised in Articles 5(1) and 5(2) and 6(3)(g) of the NP.

The primary objective of these provisions is to make sure that users of genetic resources share the benefits deriving from these resources in a fair and equitable manner, and thus prohibits the misappropriation of genetic resources, often called "biopiracy".[160] From the other point of view, the provisions also serves as a limit on the potential sharing requirements the coastal state may establish, as the coastal state cannot require sharing beyond what is "fair" and "equitable". However, when the wording is of such an open character, what is "fair" and "equitable" will be left for the coastal state to decide.[161] Thus, the coastal state have a wide discretion in relation to this because the coastal have the competence to deny access.

The term "benefits" is given a wide interpretation. It is up to the coastal state to decide on the form of the benefit-sharing. The Annex to the NP lists up some examples:

> "1. Monetary benefits may include, but not be limited to:
>
> (a) Access fees/fee per sample collected or otherwise acquired;
>
> (b) Up-front payments;
>
> (c) Milestone payments;

[158] Sands (2012) p. 458.
[159] Sands (2012) p. 458.
[160] Oberthür (2014) p. 6.
[161] Morgera (2015) p. 132.

(d) Payment of royalties;

[…]

2. Non-monetary benefits may include, but not be limited to:
   (a) Sharing of research and development results;
   (b) Collaboration, cooperation and contribution in scientific research and development programmes, particularly biotechnological research activities, where possible in the provider country;
   (c) Participation in product development;
   (d) Collaboration, cooperation and contribution in education and training;

[…]"[162]

These examples show the wide discretion the coastal state have to set the terms for access to genetic resources when it comes potential forms of benefits sharing.

National legislation on benefit-sharing may set out general guidelines or provide for a case-by-case solution.[163] The latter implies the possibility to differentiate between different forms of use of the genetic resources. One could, for example, require a larger portion of the benefits when there is a commercial purpose for the bioprospecting and a smaller portion when there is a purely scientific objective.

This means that the coastal state have the discretion to treat bioprospectors differently when it comes to the benefit-sharing requirements. However, as required by both the CBD and the Protocol, the requirements must be "fair". In addition, according to Article 6(3)(b) of the NP, the coastal state must provide for "non-arbitrary rules and procedures" on accessing genetic resources. This obligation is emphasized by the LOSC Article 56(3) in relation to the EEZ that states that the coastal state shall have due regard of the rights of other states.

[162] The Nagoya Protocol uses the term "provider state" for the state where the genetic resources are collected, in this case the coastal state.

[163] Morgera, (2015) p. 132.

There is a clear link between the access-requirements and benefit-sharing obligations, as these are often established as a part of the access-requirements. This means that NP Article 6(3)(b) requires the coastal state to not treat the bioprospector in an arbitrary manner. One example of this could be to treat pharmaceutical companies wanting access to the same genetic resources different. Then again, as the obligations on benefit-sharing can be set out in individually negotiated contracts it is natural for there to be some differences in the contracts' benefit-sharing clauses.

2.4.3 A global benefit-sharing mechanism?

The parties to the NP also saw the need to develop a global benefit-sharing mechanism. However, the parties were not able to agree on this issue and the text of Article 10 of the Protocol states that the parties "shall consider the need" for such a mechanism. The purpose of the global benefit-sharing mechanism is to create a multilateral mechanism to apply to situations where the sovereignty over the genetic resources is unclear.[164]

Hence, the provision could serve a purpose where the jurisdiction over the MGRs is unclear under the LOSC. This could for instance be the situation if there is doubt if the given species is a sedentary species or not. Another example is if the collection of the genetic resources happened in an area where there are unresolved delimitation questions.

The CBD conference of the parties started to discuss the Article in 2012.[165] The parties have not been able to agree on the way forward for establishing such a mechanism, but they it is on the agenda as a point of discussion in preparatory process towards the third Conference of the Parties serving as the meeting of the Parties to the NP (COP-MOP 3).[166]

2.4.4 Change of intent

It is not unpractical that the material was collected with the purpose of increasing the scientific knowledge of the biodiversity of the oceans and then later on undertaken further research with the view to finding commercially valuable genes. This raises the question whether the obligations under the NP on benefit-sharing still exist.

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[164] Morgera (2015) p. 197.

[165] Morgera (2015) p. 197.

[166] The third Conference of the Parties serving as the meeting of the Parties to the NP (COP-MOP 3). See item 19 of the COP-MOP 3 process, with meetings due to end on this subject in the end of September 2018.

This situation is only partially regulated in the NP. In Article 6(3)(g)(iv), the NP states that the state may establish terms regarding "changes of intent". Based on this lack of regulation in the NP it is up to the coastal state to regulate this question in further detail in their national legislation.

2.5 Conclusions

In this chapter, I discussed three main questions in relation to bioprospecting as resource exploitation.

The first was the question of national jurisdiction over genetic resources. The LOSC system of maritime zones serves to separate between the resources under, and those beyond national jurisdiction. However, in terms of the continental shelf, the "sedentary species" definition is not adapted to the use of genetic resources. This makes an unclear legal situation.[167] On the continental shelf, we thus find a LOSC adapted to the utilisation of living species for fishing purposes, not for the utilisation of genetic resources.

The second and third question concerned access to and benefit sharing of marine genetic resource under national jurisdiction. As we saw, the relevant international instruments on genetic resource give the coastal wide discretions in determining both access and benefit-sharing of MGRs under national jurisdiction. Hence, other actors wanting access to the resources must do so in accordance with the requirements of the coastal state.

The LOSC establishes a distinct set of rules on MSR in Part XII. If bioprospecting constitutes marines scientific research, and not resource exploration, this could have implications for both access and benefit-sharing regulation. This is discussed in chapter 4 of the thesis.

[167] Mossop (2018) p. 447.

3 Access and benefit-sharing of MGRs beyond national jurisdiction

3.1 Introduction

In this chapter, I will analyse the legal regime applicable to the MGRs *beyond* national jurisdiction, with an aim to describe the current legal regime on access and benefit-sharing of these resources.

The CBD does not apply to the MGRs beyond national jurisdiction.[168] This raises the questions of whether any provisions in the LOSC governs access and benefit-sharing. A starting point is the relevant resource exploitation regime under the LOSC. However, for genetic resources this is not obvious. The seabed beyond national jurisdiction is under the Area regime, and many claim that the common heritage of mankind principle of the Area applies to the genetic resources.[169] The common heritage principle is closely linked to the benefit-sharing mechanism in Article 140(2) of the LOSC.[170] There is no relevant resource exploitation regime for the water column. This fact, however, does not mean that there are no relevant regulation of access and benefit-sharing, as mentioned earlier, an alternative regulation might be found in the LOSC provisions on MSR, which are discussed in the next chapter.

Next in this chapter, I will first give an overview of the relevant parts of the LOSC applying to areas beyond national jurisdiction. After this, in section 3.3, I will discuss the relationship between the genetic resources of the water column and the seabed. In section 3.4 and 3.5, I will go on to discuss the application of the relevant resource regime of the seabed to MGRs. At last, I will make some conclusions.

3.2 Regulation of living resources beyond national jurisdiction

The aim of this section is to give an overview of the regulation of MGRs in areas beyond national jurisdiction.

Beyond the EEZ and the continental shelf the LOSC sets up two legal regimes, the freedom of the high seas and the Area. According to the LOSC Article 86 the marine resources of the

[168] See this thesis section 1.4.3.

[169] Vierros (2016) p. 33.

[170] Tanaka (2015) p. 180-181.

water column beyond the EEZ are governed by the high seas regime in Part VII. The seabed, ocean floor and subsoil falls under the Area regime in Part XI, cf. the LOSC Article 1(1)(1).

This raises the question of the relationship between the high seas regime and area regime.

The provisions on the high seas are established in the LOSC Part VII. The LOSC Article 87 (1) states that the freedom of the high seas is "exercised under the conditions laid down by this Convention".

In relation to bioprospecting of living resources in the water column, Part VII of the LOSC does not contain any special provisions about this activity. Article 87(1) uses the words "inter alia" implying that the list is not restricted to the freedoms mentioned in the letters (a) through (f) in the first paragraph. Thus, the freedom of the high seas is the "default-option" in the lack of a relevant bioprospecting regime in the LOSC.[171] Consequently, bioprospecting of resources in the water column in areas beyond national jurisdiction is free of access and can be undertaken without any obligation to share potential benefits.

This wording points to the fact that the users of the high seas must respect the other provisions laid down in the LOSC. Therefore, activities that fall within the scope of the Area regime must be done in accordance with the provisions in that part.

Hence, it is necessary to answer the question of whether the Area regime applies to MGRs, and if so, what relation there must be between the genetic resource and the seabed for the Area regime to apply.

3.3 The Area and MGRs

Two interrelated questions are discussed here: First, does the Area regime in the LOSC Part XI apply to MGRs? Second, how to separate between the MGRs of the Area and the adjacent water column regime, the freedom of the high seas?

[171] Mallia (2013) p. 334.

3.3.1 Does the Area regime apply to genetic resources?

The first question is whether the Area applies to the MGRs of the seabed in areas beyond national jurisdiction. This question has been raised as the LOSC Article 133 on the Area states that:

> "For the purposes of this Part:
> (a) 'resources' means all solid, liquid or gaseous mineral resources in situ in the Area at or beneath the seabed, including polymetallic nodules."

Hence, based on this provision, one could argue that genetic resources entirely falls outside the scope of Part XI on the Area.

However, as the wording indicates when it states that resources "*means* all solid […]", the purpose of the provision is to define the word "resources" in Part XI of the LOSC. Whether the Part XI applies to MGRs depends on a wider interpretation of the relevant provisions in the LOSC.

The scope of LOSC Part XI on the area is according to Article 1(1)(1):

> "[T]he seabed and the ocean floor and subsoil thereof, beyond the limits of national jurisdiction."

The wording refers to the geographical scope and is not explicit regarding the status of living resources in Part XI. When the wording of the LOSC Part XI is not explicit with regards to the scope, recourse must be made to other provisions that can shed light on the current question.

Article 77(1) of the LOSC specifies that the natural resources of the continental shelf belong to the continental shelf regime and should be read in relation with paragraph 4 which states that the specified living resources belongs to the continental shelf. The fact that the LOSC specifies this in relation to Part VI but not in relation to Part XI, could indicate that the intention was to exclude all natural resources from falling under the Area regime.

One might also argue that the thoroughness of the LOSC Part XI indicates that the parties of the LOSC did not want the living resources of the seabed to fall within the Area regime. For instance, the parties found it necessary to emphasise that the archaeological and historical objects of the Area shall be preserved for the "benefit of mankind as a whole", cf. the LOSC Article 149. Because the parties thought it was reasonable to regulate these objects, one might argue that the lack of regulation on a more important resource indicates that MGRs are excluded from Part XI of the LOSC.

However, it is not the case that the living resources of the Area are neglected in Part XI. The LOSC Article 145 on the marine environment in the Area states that the International Seabed Authority (ISA) shall adopt "rules, regulations and procedures" for the "the protection and conservation of the natural resources" of the Area. In this instance, in contrast to the sedentary species' regime of the continental shelf, the term includes all living species.

In addition, in the current negotiations on the biodiversity of areas beyond national jurisdiction seem to presuppose that genetic resources fall within the scope of the Area in Part XI. Several overviews from the Chair of the Preparatory Committee refer to the genetic resources of the Area.[172] Even though the Chair's overview of the negotiations cannot be seen as an expression of the state practice on this point, it can be seen as a neutral summary of the negotiations. Thus, it indicates that the states sees the Area as applying to MGRs.

Therefore, one cannot conclude that the LOSC Part XI excludes MGRs as such.

3.3.2 The scope of the Area

As Part XI of the LOSC on the Area applies to genetic resources, the question now turns to what relationship there must exist between the living resource, i.e. the species, and the seabed for the species to fall within the scope of the Area.

The geographical scope of the Area follows from the mentioned provision in Article 1(1)(1) the LOSC. In relation to the adjacent water column, the wording of the provision limits the

[172] Chair's overview of the third session in the Preparatory Committee (2017) p. 4 where it is referred to the "[…] marine genetic resources of the Area and the freedom of the high seas" and the Chair's overview of the first session in the Preparatory Committee (2016) p. 7.

scope of the Area to the "seabed and the ocean floor". This delineation of the Area is emphasised by Article 135, which states that the provisions in Part XI on the Area does not affect the "legal status" of the waters superjacent to the Area.

Thus, the LOSC establishes a distinct separation between the seabed and the adjacent water column. Consequently MGRs from resources living in the seawater, does not fall under the Area regime.

However, the LOSC does not elaborate further on how to draw the distinction between these two different zones. The wording of the Articles 1 (1)(1) and 135 is not clear. The paragraph refers to "the seabed *and* the ocean floor" (emphasis added) indicating that there is a difference between these two terms, but it is not clear from the wording what this difference could imply in relation to the scope of the Area.

The Hydrographic Commission has suggested the following definition for the term "seabed":

> "The top of the surface layer of sand, rock, mud or other material lying at the bottom of the sea and immediately above the subsoil." [173]

The definition establishes that "material lying at the bottom of the sea" is a part of the seabed. This implies that also biological material lying at the seabed falls under the scope of the Area.

The term "ocean floor" in the LOSC Article 1(1)(1) is not defined elsewhere in the convention. Neither does the context of other provisions using this term give indication of what is meant by this term.[174] To me, it is difficult to see any useful distinction between the term "seabed" and "ocean floor" in relation to the scope of the Area over MGRs.

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[173] The Hydrographic Commission (2006), Appendix 1, Para. 84.

[174] The LOSC uses the term "ocean floor" in two additional places. The preamble states "[…] that the area of the seabed and *ocean floor* and the subsoil thereof, beyond the limits of national jurisdiction, as well as its resources, are the common heritage of mankind […]" (emphasis added). In addition the term is used in the LOSC Article 76 on the definition of the continental shelf: "It does not include the *deep ocean floor* with its oceanic ridges or the subsoil thereof." (emphasis added).

However, beyond this, there is no clear regulation of what living resources fall under the scope of the Area, the focus now turns to see if provisions or principles from other parts of the LOSC can be applied.

3.3.3 Does Article 77(4) of the LOSC on sedentary species apply to the Area?

A provision in the LOSC with the object of separating between the resources of the seabed an the adjacent water column is the LOSC Article 77(4) on sedentary species, addressed in section 2.2.4.

Based on the history of the LOSC Article 77(4), some authors have suggested that it must apply analogously to Part XI of the treaty.[175]

According to the supporters of this view, the decisive factor is the decision by the International Law Commission in 1935 when the Commission, contrary to earlier statements, determined that sedentary species belongs to the coastal states continental shelf.[176] From this point on, it is argued, the sedentary species belongs to the relevant seabed regime, regardless of whether within or beyond national jurisdiction.[177]

However, this position has no support in the wording of the LOSC. Hence, it is not necessary to analyse the statements of the Commission. The treaty parties restricted the scope of Article 77(4) to the natural resources "in this part", referring to Part VI regarding the continental shelf. Hence, this solution has replaced any possible customary law on this point. The limitation on Article 77(4) was a part of a political compromise between the interests of the coastal state and others. [178] Therefore, one must follow the wording of the Convention and not apply LOSC Article 77(4) to the Area.

In addition, the sedentary species concept seems unfit to separate between the genetic resources of the water column and the seabed. The most interesting biological material for bioprospecting is microorganisms. As seen in section 2.2.4, it is difficult to apply the definition

[175] Pfirter (2006) p. 21.
[176] Pfirter (2006) p. 21.
[177] Pfirter (2006) p. 21.
[178] Hayes (2007) p. 689. Scovazzi seems to agree with Hayes, see Scovazzi (2004) pp. 400-401.

in Article 77(4) to these species. Applying it to the Area regime for the purposes of distinguishing between the genetic resources of the seabed and the water column seems to create more questions of interpretation than it solves.

After this discussion, the conclusion is that the "sedentary species" definition does not apply analogously to the Area regime.

3.3.4 Applying principles on mineral resources to the MGRs of the Area

Bioprospecting is somewhat similar to mineral prospecting. Mineral prospecting can be defined as the "search for deposits […] in the Area, including estimation of the composition, sizes and distributions of deposits […] and their economic values".[179] In comparison, also bioprospecting involves the search for valuable material.

Based on this similarity, one could claim that the principles for distinguishing between the mineral resources of the Area and adjacent water column should be applied to genetic resources. Oude Elferink claims that there are two relevant criteria for separating the mineral resources of the seabed from the resources of the Area.[180]

The first criterion is their "location in relation to the seabed". This, however, is not entirely clear. Even though the criterion indicates that only resource that have some form of connection to the seabed falls within the application of Part XI of LOSC, the criteria does not say exactly what kind of relation the resource must be. Oude Elferink does not elaborate any further on this question.

The second criterion is "that they can be clearly distinguished from the surrounding waters".[181] This is especially relevant for hydrothermal vents and brine pools. Hydrothermal vents, like geysers, blow out heated water often full of minerals that turn solid when they encounter the surrounding cold waters, forming chimney-like structures called black or white

[179] See the International Seabed Authority (2012) "Regulations on Prospecting and Exploration for Cobalt-rich Ferromanganese Crusts in the Area" Regulation 1(3)(d), almost identical wording in ISA (2010) "Regulations on prospecting and exploration for polymetallic sulphides in the Area" Regulation 1(3)(e) and almost identical wording in ISA (2013) "Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area" Regulation 1(3)(e).

[180] Oude Elferink (2007) p. 148 and following.

[181] Oude Elferink (2007) p. 148 and following.

smokers. Brine pools are bodies of water that have higher degrees of salt than the surrounding waters and because of this, forms an "ocean in the ocean".[182]

The criterion therefore builds on the possibility to make a clear distinction between the waters coming from hydrothermal vents and brine pools, and the surrounding waters. In relation to the minerals in hydrothermal vent fluids, it has been argued that they fall within the scope of the Area in Part XI.[183] The argument is based on the premise that when the minerals originates from the seabed, it is natural that they fall under the regime in Part XI because they can be clearly separated from material not originating from the seabed.

The question is whether these principles should apply to the living resources of the Area as well. In relation to this question, one must make an independent interpretation of the LOSC based on the relevant resource. One cannot automatically apply this distinction between the two zones to the genetic resources of areas beyond national jurisdiction. I find that there are counter arguments against the two criteria. These arguments falls within two categories.

First, there is the weaknesses of the criteria itself. The two criteria does not follow from the text of the LOSC. As pointed out above, LOSC Article 1(1)(1) defines the Area as the "sea-bed and the ocean floor and subsoil thereof". There is no indication in this phrasing that the rules of the Area were meant to apply beyond the seabed. In addition, even though the criteria might be useful when distinguishing between the seabed and the adjacent water column, their vagueness will create additional problems when trying to separate the resources of these two zones.

Second, one must ask, even though this distinction is applicable to the mineral resources of the Area, can it be applied to the biological resources of areas beyond national jurisdiction? In other words, is the similarities between prospecting for mineral resources and genetic re-sources reason to apply the same principles?

Two arguments should carefully considered before drawing this analogy. The first is the dif-ference between these two kinds of resources. Minerals, unlike most of the biological materi-

[182] Arico (2005) p. 9.
[183] Burke (1996) p. 231.

al, cannot move by themselves, only with the help of underwater currents or streams. As such, they may be easier to separate from the adjacent water column than different forms of biological material. Biological material might move in and out of different zones. Therefore, this distinction seems to be a bit random for these resources.

The second argument is the mineral resource system of Part XI of the LOSC. In that respect, it is important to take notice of the detailed regulations in Part XI on mineral resources. Similar regulations do not exist in Part VII, which covers the adjacent water column. This difference in the regulations of the two zones makes it natural to extend the scope of the Area to at least cover the minerals in close proximity to the seabed. The relevant minerals originates from the seabed or subsoil of the seabed. For mineral resources, this seems necessary to make the mining regime of the Area effective. Thus, this interpretation serves to fulfil the objective of the LOSC Part XI.

In comparison, Part XI of the LOSC does not contain a similar set of rules on the genetic resources of the Area directly applicable to these resources. It therefore does not seem appropriate to apply the rules of the mineral resources of the Area to biological material living in relation to the seabed.

Based on these arguments, the most reasonable solution would be to not apply the two mentioned criteria to the genetic resources of the Area.

3.3.5 Conclusions on the relationship between the Area and the high seas

In summary, the conclusion is that when deciding if a genetic resource falls within the Area, one must follow the wording of Article 1(1)(1) of the LOSC. According to this Article, the resource falls within the Area if it is a part of the "seabed or ocean floor". This includes the material lying on the seabed. Thus, the LOSC Part XI applies when the material is found on the seabed or connected to seabed material – such as rocks. If not, the regime in the LOSC Part VII on the freedom of the high seas applies.

3.4 The common heritage of mankind and the genetic resources of the Area

According to the LOSC Article 136, the Area and its resources are the common heritage of mankind.

The Article raises two questions discussed in this section. First, does the Article apply to the MGRs of the Area? Second, if it applies, what would this imply for the use of the MGRs?

The *origin* of the Article dates back to a suggestion from the Maltese Ambassador, Arvid Pardo, to declare the seabed and the ocean floor beyond the limits of national jurisdiction the common heritage of mankind.[184] The suggestion was later adopted by the United Nations General Assembly.[185] Hence, it is of such importance that it has been characterised as a principle of the law of the sea.[186] The principle can be seen as the "antithesis" of the principle of sovereignty and freedom of the sea.[187] Two principles that in relation to seabed resources, could favour developed nations, with the resources and the equipment to use the resources of the Area.[188] Hence, the principle must be seen in the light of the LOSC objective to take into account the "interests and needs of developing countries".[189]

3.4.1 The scope of the common heritage of mankind principle

Article 136 states that "common heritage of mankind" applies to the Area and its "resources". At first glance the "resources" of the area might seem to include genetic resources. However, the term "resources" is defined in Article 133 (a) to mean all "solid, liquid or gaseous mineral resources […] including polymetallic nodules". As genetic resources does not fall into any of these categories, genetic resources are excluded from being a "resource" falling in under the wording of Article 136.

What is meant by the phrase "the Area *and*" (my italicizing) is more unclear. By using the word "and" the text implies that it must mean something more than just the resources of the Area, however, it is not that clear what else is implied. One interpretation is that it points to the ban on sovereignty claims in the Area, cf. Article 137 (1). Another interpretation is that it points to all kinds of activities in the Area and material in general retrieved from the seabed.

[184] Tanaka (2015) p. 179.
[185] United Nations General Assembly Resolution 25/2749 (1970).
[186] Tanaka (2015) p. 19.
[187] Tanaka (2015) p. 19.
[188] Tanaka (2015) p. 179.
[189] Preamble para. 6 of the LOSC.

In this regard, one might argue that a resource must be under the regime of the zone where the resource is situated.[190]

Article 136 must be read in relation to the other articles in the LOSC. No other provision of the LOSC Part XI seem to relate to the exploration and exploitation of the genetic resources of the Area. The only exception to this is Article 145(b) on the "protection of the marine environment" which contains a reference to the "natural resources of the Area". However, this provision seems only to reinforce the notion that the principle only applies to the mineral resources of the area. This is because the text explicitly mentions "natural resources" and does not restrict itself to only mentioning the "resources of the Area" as done in other Articles of the LOSC Part XI.

In addition, the preamble makes no reservation on the scope of the common heritage of mankind principle. Based on this, it has been argued that this must have implications for the interpretation of the principle.[191] The argument is based on that when the preamble does not state that the common heritage of mankind principle only applies to the mineral resources of the Area, then part XI of the LOSC cannot do so either.

Although it is true that the preamble paragraph 6 contains no reference to "mineral resources" and only mentions "resources" in general, the preamble must be read in the light of the provisions in the LOSC Part XI. As the text of the preamble states, the preamble declares a "desire" by the parties of the LOSC. The manifestation of this "desire" comes in the form of Part XI of the convention and it is in this part one must seek to find the rights and obligations of the state parties. Thus, one must follow the wording of Article 136 and Article 133(a), which restrict the resources under the scope of the common heritage of mankind principle to mineral resources.

To sum up, in my view the "common heritage of mankind" principle in Article 136 of the LOSC, does not apply to genetic resources.

[190] Mallia (2013) p. 342.

[191] Mallia (2013) p. 342, de La Fayette (2009) p. 269.

3.4.2 Duties under the common heritage of mankind principle

Even if one argues that the "common heritage of mankind" principle applies, one needs to ask the following question: What legal consequences does this imply? What it means that the resources of the Area is the "common heritage of mankind" is given no further explanation in LOSC. However, the term must be read in the light of the preamble, which states a desire for the "equitable" utilisation of the ocean resources in a "just and equitable international economic order which takes into account the interests and needs of mankind as a whole".

The wording indicates that the resources of the Area are meant to benefit the entire human race, not just individual states, corporations or individuals. Beyond this, however, it is difficult to describe the contents of the principle in general terms. However, other Articles in the LOSC might shed light on the implications of the principle.[192]

The central part of the principle in relation to resource exploitation is the obligation to share potential benefits under the Article 140(2) of the LOSC.

The sharing of benefits from deep seabed mining under Article 140(2) of the LOSC is closely related to the management system of the International Seabed Authority (ISA). The management system of the ISA is restricted by the competence of the ISA. The competence follows from the LOSC Article 157(1) that states that:

> "The Authority is the organization through which States Parties shall, in accordance with this Part, organize and control activities in the Area, particularly with a view to administering the resources of the Area."[193]

According to the wording the main function of the ISA is to administer the Area's resources, i.e. mineral resources. However, it also states that it is "particularly with a view" to the resources of the Area, indicating that the ISA's authority goes beyond administering the Area's resources.

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[192] Rothwell (2016) p. 127 with further reference. Tanaka (2015) p. 180-181 focuses on three main elements: The non-appropriation of the Area, the equitable sharing of benefits derived from the mineral resources of the Area and the peaceful use of the Area.

[193] The same provision can be found in the 1994 Implementation Agreement, see Section 1(1) of the Annex.

However, this wording can be explained by the fact that the ISA is also given authority over other tasks, for example with a view to conserve the marine environment of the Area, cf. the LOSC Article 145.

This also implies that there is no institutional nor practical system for sharing the benefits of the genetic resources of the Area. Consequently, the utilization of genetic resources does not fall under the benefit-sharing regime established by the LOSC Article 140(2).

In the light of this, it is difficult to see what specific parts of the "common heritage of mankind" principle would lead to restrictions in accessing and exploiting the genetic resources of the seabed in the Area.

3.4.3 The common heritage of mankind principle – a dynamic norm?

A common statement about the LOSC is that it is a "constitution for the oceans", meaning that it has legal implications for all activities on the oceans.[194] If the LOSC is to preserve it status as an ocean constitution, this has implications for the interpretation of the convention. This means that it is natural to interpret the convention text "broad not narrow, flexible not rigid, and adaptive in orientation, not fixed on the past."[195] Given this purpose, one might ask if the common heritage of mankind principle has a broader meaning in the sense that it is a dynamic norm developing in the light of the development of society. As the advancements in biotechnology makes bioprospecting in the Area more common, this could lead to the principle also regulating this kind of activity.

Hence, sharing of benefits from MGRs could be a way to contribute to the realization of the purpose of the LOSC to contribute to a "just and equitable" utilisation of the ocean's natural resources.[196]

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[194] See Tommy T.B. Koh in Nordquist (1985-2012), p. 1-16, Vol. I, Burke (1996) p. 222 and Rothwell and Stephens (2016) p. 1.

[195] Burke (1996) p. 222.

[196] The LOSC preamble para. 5 and 6.

Dynamic interpretation could also be a plausible way out of what has been called the "deepest of ironies".[197] Namely, that the LOSC has failed to regulate the most valuable resources of the Area, and that if the state parties had been aware of the future value of the resources they would have made the common heritage of mankind principle apply to them.

However, the wording of Article 136 of the LOSC read in relation with the Article 133(a) clearly restricts the scope of the common heritage principle to mineral resources. Dynamic interpretation cannot be used as a way of circumventing the wording of the treaty. As Boyle states "interpretation is interpretation, not revision or rewriting of treaties. The result must remain faithful to the ordinary meaning and context of the treaty".[198]

However, even if the principle is applied to the genetic resources of the Area, it is not clear to see what more specific additional duties the bioprospector would have. As the treaty developments of the CBD and the NP illustrates, a benefit-sharing regime for genetic resources would require detailed regulation. There is no such thing in the LOSC. Thus, the principle is not of particular legal importance when it comes to bioprospecting in the Area.[199]

3.5 The prohibition against appropriating Area resources

The LOSC prohibits the appropriation of Area resources. The question in this section is whether the prohibition on appropriating Area resource in the LOSC Article 137 is also a ban utilising the genetic resources of the Area. The provision establishes that:

> "No State shall claim or exercise sovereignty or sovereign rights over any part of the Area or its resources, nor shall any State or natural or juridical person *appropriate any part thereof*. No such claim or exercise of sovereignty or sovereign rights nor such appropriation shall be recognized." (emphasis added)

Exploitation of genetic resources is not a claim on or the exercise of sovereignty or sovereign rights to the Area or its resources. However, the argument is that using the genetic resources of the Area, constitutes "appropriation" in violation of Article 137.

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[197] Glowka (1996).

[198] Boyle (2005) p. 568.

[199] Treves (2010) p. 17.

The prohibition in Article 137(1) has been characterised as a "principle of non-appropriation" of Area resources.[200] In the legal literature, Oude Elferink has argued that this provision places a ban on utilising the genetic resources of the Area.[201]

The LOSC does not define which acts that can constitute "appropriation". "Appropriation" is defined in the Oxford English Dictionary as "taking as one's own or to one's own use."[202] In relation to state acts, this clearly has similarities to the act of claiming sovereignty of the Area, but such acts are already banned by the first part of the sentence in the provision. Thus, the meaning must have been to address other forms of claims on the control of geographical parts, or unwanted use, of the Area.

This interpretation is supported by other similar provisions of the LOSC. In relation to the high seas, Article 89 only bans claims on "sovereignty". Also, in other similar international treaties, the prohibition is restricted to claims on "sovereignty". One example is the Moon Agreement[203] Article 11(2) that reads:

> "The moon is not subject to *national appropriation* by any claim of sovereignty, by means of use or occupation, or by any other means." (emphasis added)

Both of these provisions support the conclusion that by "appropriation" means something more than just sovereignty claims. As bioprospecting involves collecting samples from the Area, it does involve taking something as one's own, and hence constitutes "appropriation" as used the LOSC.

However, for the bioprospecting to be inconsistent with Article 137(1) of the LOSC it is not sufficient that it constitutes "appropriation". The "appropriation" must relate to "any part thereof".

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[200] Oude Elferink (2007) p. 155.

[201] Oude Elferink (2007) p. 155.

[202] Oxford English Dictionary (undated), sub verbo "appropriation".

[203] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, New York 5th of December 1979.

The wording, "any part thereof", could imply that it only relates to a geographical part of the Area. It is not clear from the wording in the English version whether this ban also relates to Area resources. However, if one refers the other authentic language versions in accordance with Article 33(1) of the Vienna Convention on the Law of Treaties, such as the French,[204] it is clear that the wording relates to both the parts of the Area and its resources.[205] The French wording reads: "[…] ne peut s'approprier une partie quelconque *de la Zone ou de ses ressources*" (emphasis added).

However, Article 137(1) is also in Part XI on the Area, and hence, the term "resources" must be interpreted according to the definition in the LOSC Art 133(1), which restricts the term to mineral resources. The use of genetic resources, therefore, does not constitute an appropriation of Area resources.

Nor would it be reasonable to state that a sample collection of species from the Area would constitute an appropriation of a "part" of the Area. The term "part" relates to the geographical scope, i.e. an area, of the Area.

The objective and purpose of the provision supports these interpretations of the wording. Article 137(1) must be read in relation to the common heritage of mankind of the Area's mineral resources. Thus, the purpose is to support the mineral exploitation regime of the Area, and to ensure that the mineral resources are exploited for the benefit of mankind in accordance with the LOSC Article 140. The provision in the LOSC Article 137(1) serves to prohibit all mineral exploitation, by states or private entities, not in accordance with this regime.

With this background, it can be concluded that the provision does not place a prohibition on the utilisation of the Area's MGRs.

3.6 Conclusions and remarks on this chapter

In this chapter, I tried to answer two main questions.

[204] Cf. the LOSC Article 320.

[205] Oude Elferink (2007) p. 155, note 43.

The first was the relationship between the Area regime and the genetic resources of the seabed. The most reasonable conclusion is that the MGRs on the seabed and subsoil falls within the scope of the Area.

The second main question was what obligations bioprospectors beyond national jurisdiction is under, focusing on obligations relevant for access and benefit-sharing. On this question, it is most reasonable to conclude that the common heritage of mankind principle does not apply to these resources. Consequently, there is no relevant resource exploitation regime of MGRs beyond national jurisdiction.

Even though neither the Area-regime, nor the freedom of the high seas-regime contains provisions designed for the genetic resources beyond national jurisdiction, this does not mean that the LOSC is irrelevant. A set of rules, relevant to both areas, are the LOSC rules on MSR. This is the topic for the next chapter of this thesis, chapter 4.

4 Access and benefit-sharing under the LOSC provisions on MSR

4.1 Introduction

Exploration and exploitation of MGRs require the use of scientific methods and technology, which raises the question of whether the LOSC provisions on MSR apply to bioprospecting activities. And if so, whether these provisions grant access to and require benefit-sharing from these resources.

Again, bioprospectors and coastal states have somewhat different interests. Bioprospectors want access to MGRs, preferably without benefit sharing requirements. Coastal states want to control access to and have an interest in the benefits arising from the use of MGRs under national jurisdiction. In areas beyond national jurisdiction, the public has an interest in the results deriving from MSR.

Part XIII of the LOSC is dedicated to MSR. It builds on the system that jurisdiction over MSR activities is, in principle, regulated by the provisions on this activity. However, these provisions build on the general zonal system of the LOSC. Hence, the principally important divide between areas under national jurisdiction and areas beyond national jurisdiction, is still relevant in this section.

As seen in chapter 2, MGRs within national jurisdiction fall under the scope of the CBD and the NP. Here, the MSR provisions of the LOSC must be read in relation to those instruments. Beyond national jurisdiction, however, neither the CBD nor the NP applies to MGRs, implying that the MSR provisions in the LOSC are decisive for access and benefit-sharing in these areas.

Next in this chapter, I will analyse whether the MSR provisions of the LOSC apply to bioprospecting. Then, in section 4.3, I will analyse the relevant law that applies to areas under national jurisdiction and the connection between the relevant LOSC provisions and the CBD and the NP. Then, in section 4.4, I will examine areas beyond national jurisdiction. In section 4.5 and 4.6, I will discuss some general obligations related to benefit sharing of MSR results.

4.2 Is bioprospecting MSR according to the LOSC?

This section will discuss whether the LOSC provisions on MSR apply to bioprospecting.

4.2.1 MSR in the LOSC

Even though Part XIII of the LOSC is dedicated to MSR, there is no general definition of the term in the LOSC. Several definitions were discussed during the negotiations, but the parties were unable to agree on a general definition of the term.[206] To give a general definition of the term is obviously quite difficult because it requires a description of scientific research.

A textual interpretation of the term is not sufficient to decide what kinds of activities fall within the term. First, it is clear that when the LOSC refers to "marine" research, there must be some connection to the oceans where the LOSC applies. Second, when the LOSC refers to "scientific research", it suggests that the term focuses on activities that include the use of a scientific method. As such, it could be said to include all scientific investigations of the marine environment.[207] However, distinguishing such methods from other similar ones—for example analysing the seabed for geological purposes with the intention of finding oil—is not easy.

In the absence of a meaningful definition, one might take inspiration from the provisions on MSR and try to describe some of its key characteristics. The LOSC Part XIII states that MSR must be:

- "[C]onducted with appropriate scientific methods" according to Article 240(b) of the LOSC.
- "[C]onducted exclusively for peaceful purposes" according to Article 240(a) of the LOSC.
- Characterised by transparency and make information, knowledge and research results publicly available according to Article 244 of the LOSC.

Using these characteristics to decide whether bioprospecting falls within the definition does not seem useful. It is beyond doubt that bioprospecting is conducted with appropriate scientific methods and for peaceful purposes.

[206] Walker (2012) p. 243.
[207] Soons (1982) p. 6.

However, this does not however seem to be sufficient to establish bioprospecting as MSR. Bioprospecting is often carried out as "public-private-partnerships" and there is often a desire to discover material that might be a part of commercial products.[208] Hence, the focal point of the discussion is whether a commercial aspect implies that bioprospecting falls outside the category of MSR.

Instead of giving a general definition of the term, Lyle Glowka has suggested that the activity has some central characteristics that does not include research with an economic intent:

> "Marine scientific research represents a continuum of activities that originate at sea and continue on land. Physical, chemical, and biological oceanography; marine biology; and marine geology are the formal basis of marine scientific research. […] Marine scientific research involves information, data, or sample collecting. It is not undertaken with the primary intent of economic gain, even though data and research results generated may be commercially valuable."[209]

Fedder elaborates on this definition and states the following:

> "[M]arine scientific research involves the collection of information, data or samples, and is characterized by transparency, the availability of knowledge and data and dissemination and publication of research results".[210]

Both authors conclude that there is a distinction between exploitation for economic purposes and MSR. This distinction is in line with the conclusion in a study by the CBD Secretariat, whose authors summarised their discussion by stating the following:

> "In the absence of a formal definition, marine scientific research could be defined as an activity that involves collection and analysis of information, data or samples aimed

[208] Abrell (2010) p. 337.
[209] Glowka (1996) p. 172.
[210] Fedder (2013) p. 44.

> at increasing mankind's knowledge of the environment, and is not under-taken with the intent of economic gain." [211]

However, this conclusion is far from obvious. Looking at the regulation of MSR in the LOSC, it is clear that the LOSC acknowledges that MSR can be done with an economic purpose. This follows from an interpretation of Article 246 on coastal state jurisdiction over MSR in the EEZ and the continental shelf. Paragraph 5 states that a coastal state can deny MSR in the EEZ if the project to be conducted there "is of direct significance for the exploration, and exploitation of natural resources, whether living or non-living". It is interesting that the parties to the Convention found it necessary to regulate this kind of scientific application, and if Part XIII on MSR did not cover this kind of activity, the provision would be obsolete.[212]

Thus, based on the provisions in the LOSC, one could argue that bioprospecting falls under the MSR provisions. However, the question calls for a more detailed analysis of the LOSC and other relevant sources of law.

4.2.2 The historical background of the provisions on MSR

The distinction between exploring the oceans for economic purposes and for the purpose of increasing knowledge of the oceans was a central aspect of the discussions on a definition for the term. To illustrate, one of the definition suggestions was as follows:

> "(a) Marine scientific research is any study or investigation of the marine environment and experiments related thereto;
> (b) Marine scientific research is of such a nature as to preclude any clear or precise distinction between pure scientific research and industrial or other research conducted with a view to commercial exploitation or military use."[213]

This definition was suggested as part of the treaty text where states had to request permission to do research in areas beyond national jurisdiction. It must be read bearing in mind the fact

[211] Subsidiary Body on Scientific, Technical and Technological Advice (2003), page 13, para. 47 and United Nations Secretary-General (2007) p. 46, para. 151.

[212] Matz-Lück (2017a) p. 1610, para 16.

[213] Nordquist (1985-2012) p. 444, Vol. IV.

that states had no right to conduct MSR in the Area under this suggestion. However, when the text states that MSR is of such a nature as to preclude any clear distinction between pure research and research conducted with a view to commercial exploitation, it implicitly states that there is no reason to deny research access just because the research has a commercial purpose.

For comparison, other suggestions for a definition of MSR explicitly excluded research conducted with a commercial purpose. In a sub-committee in the negotiations of the LOSC the following definition of MSR was discussed:

> "[A]ny study and related experimental work, excluding industrial exploration and other activities aimed at the direct exploitation of marine resources, designed to increase mankind's scientific knowledge of the marine environment and conducted for peaceful purposes."[214]

Obviously, this definition distinguishes between MSR and research conducted with a commercial purpose. Neither definition gives a clear solution on how to distinguish between the two kinds of research activities. The problem with the former definition is that it requires a consideration of the aim of the researcher, which would be no easy task to perform. In addition, it might be difficult to control the researcher's actual aim. The difficulty in differentiating between the two forms of research "influenced the decision not to include a definition of MSR in the Convention".[215]

The historical background of the LOSC's provisions on MSR therefore provide little assistance when trying to interpret these provisions. The parties to the Convention were simply not able to agree on a definition. One must, therefore, look to other sources of law when trying to determine the meaning of these provisions.

[214] Nordquist (1985-2012) p. 442, Vol. IV.
[215] Nordquist (1985-2012) p. 444, Vol. IV.

4.2.3 The Antarctic Whaling case — MSR in the Whaling Convention

In the Antarctic Whaling case, the International Court of Justice (ICJ) made comments about the term "for purposes of […] marine scientific research" found in Article VIII of the 1946 International Convention for the Regulation of Whaling (the Whaling Convention).[216]

The question for the ICJ was whether the Japanese practice of whaling complied with the Whaling Convention's provision allowing whaling for scientific purposes. In accordance with the provisions in the convention, the International Whaling Commission established a ban on commercial whaling in general. However, the Whaling Convention contains limited exceptions to this ban, one being whaling for scientific purposes. Although the case was about the Whaling Convention, it is relevant for the purpose of interpreting the same term in the LOSC.[217]

Because the ICJ declined to define MSR,[218] the decision is only of limited value when trying to give a general definition of this term. However, the decisive question was whether the *mixed* purpose, part scientific and part commercial, was consistent with the provision's requirement that whaling be conducted "for purposes of scientific research". When analysing the term "for purposes of" the Court stated that:

> "[A] State often seeks to accomplish more than one goal when it pursues a particular policy. Moreover, an objective test of whether a programme is for purposes of scientific research does not turn on the intentions of individual government officials, but rather on whether the design and implementation of a programme are reasonable in relation to achieving the stated research objectives. Accordingly, the Court considers that whether particular government officials may have motivations that go beyond scientific research does not preclude a conclusion that a programme is for purposes of scientific research within the meaning of Article VIII." [219]

[216] Australia v. Japan (2014).
[217] Rothwell (2016) p. 347.
[218] Para. 86 of the Court's decision.
[219] Para. 97 of the Court's decision.

To understand the background of this statement, it is important to keep in mind that the question for the Court was whether Japanese research vessels caught more whales than necessary to fulfil their research purposes. According to the plaintiff, the purported scientific purpose of the whaling was merely a cover to avoid the ban set forth by the Whaling Convention.

Two implications relevant to the question of whether bioprospecting is MSR in the LOSC can be drawn from this judgement.

First, regardless of what the stated Japanese intention for the whaling was, it is notable that the Court stated that even if "government officials" have "motivations that go beyond scientific research", such motivations do not preclude a conclusion that "a programme is for purposes of scientific research". Applying this statement to bioprospecting, one could say that the commercial potential of bioprospecting does not preclude it from being considered MSR according to the LOSC.

Second, focusing on the *purpose* of the bioprospecting complicates the legal situation further. As shown in section 1.3.1, bioprospecting is characterised by a mix of scientific and commercial interests. The collecting phase of bioprospecting is often performed by public research institutions, while the commercial aspects are of greater importance in the later phases of the process. In general, it is increasingly difficult to differentiate between commercial and non-commercial research in modern science.[220] As the Court pointed out, the consideration must not be based on the "intentions of individual government officials". Given this situation, focusing on the purpose of the bioprospecting is difficult to implement because one must try to discern the different purposes of the bioprospecting.

Hence, in my view, these are two strong arguments for considering bioprospecting MSR under the LOSC, even if it is conducted with commercial intent.

4.2.4 The system and objectives of the LOSC

Several authors have argued that the system of the LOSC implies that bioprospecting falls outside the scope of the MSR provisions.[221] They argue that the LOSC generally distinguishes

[220] Abrell (2010) pp. 337–338.

[221] Fedder (2013) p. 44 and Mossop (2015) p. 833.

between resource exploitation and MSR. In their opinion the commercial aspect of bioprospecting makes it a resource exploration activity. As such, it would fall under the relevant resource exploitation regime. For areas beyond national jurisdiction, this would be the mineral resources regime in Part XI.

However, as seen under chapter 3, beyond national jurisdiction there is no relevant resource exploitation regime. Consequently, if the provisions on MSR does not apply, there is no relevant regulation on this resource. As a bioprospecting regime, MSR would grant the bioprospector rights, but also place obligations on the bioprospector.

Under national jurisdiction, the situation is less problematic as the CBD and NP-regime on access and benefit-sharing applies. These must be supplemented by the LOSC provisions on jurisdiction. The resource-exploitation regime of the EEZ and the continental shelf applies when the activity constitutes "exploring or exploiting" the "natural resources" of the mentioned areas, see Article 56(1)(a) and 77(1) of the LOSC respectively. Particularly the concept of "exploring" natural resources proves difficult to distinguish from MSR. MSR is often a prerequisite for finding the valuable resources, or in relation to fishing, establish the allowable catch. Hence, there is a fine line between MSR with a "direct significance for the exploration or exploitation of natural resources" and exploration on the same resources. However, also in these areas the resource exploitation regime on living resource relates to fishing, and bioprospecting is not fishing.[222]

Ignoring the intent of the bioprospector, in relation to the activities taking place at sea, it is not possible to distinguish between bioprospecting for commercial purposes and bioprospecting for scientific purposes.[223] Thus, making the intention of the prospector the decisive factor for the classification of the activity under the LOSC, would imply an unclear legal situation to apply in practice.

Therefore, because the LOSC does not have a relevant resource exploitation regime for genetic resources, it is more accurate to conclude that bioprospecting is MSR under the LOSC. If

[222] Korn (2003) p. 43.
[223] de La Fayette (2009) p. 270.

the LOSC is to be a "constitution for the oceans"[224] that regulates all oceanic activities, then it cannot be "silent" on an important ocean resource.

If the provisions on MSR do not apply to bioprospecting, then, in areas beyond national jurisdiction, it would simply be freedom of the high seas and, thus, a legal lacuna. Therefore, when the activity is strongly related to the use of scientific research equipment and scientific methods, in the absence of a definite resource regime on MGRs, the MSR regulations of the LOSC must be the "default option" for bioprospecting actitivities.

4.2.5 Conclusion

In summary, the most plausible conclusion is that bioprospecting does fall under the MSR provisions of the LOSC, even when done for commercial purposes.

4.3 MSR under national jurisdiction

4.3.1 Introduction

When bioprospecting takes place in areas under national jurisdiction, the access and benefit-sharing provisions of the CBD and the NP apply alongside the MSR provisions of the LOSC.

In this chapter, the questions are whether bioprospectors can require access to MGRs under national jurisdiction pursuant to the LOSC and what the relationship between the relevant MSR provisions and the CBD benefit-sharing regime is.

In the *internal waters* and the *territorial sea*, coastal states have sovereignty in accordance with the LOSC Article 2(1), which implies that they have full discretion in deciding on access to research on MGRs in accordance with Article 245. In accordance with Article 19(2)(j) of the LOSC, the right of innocent passage in accordance with Articles 17 and 18 does not include the right to conduct MSR in these areas.[225] This implies that the state is free to impose benefit-sharing requirements for the utilisation of the resources.

Hence, the interesting questions concerns the EEZ and the continental shelf.

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[224] See Tommy T.B. Koh in Nordquist (1985-2012), p. 1-16, Vol. I, and Rothwell (2016) p. 1.

[225] Tanaka (2015) p. 364.

4.3.2 Access to coastal states' MGRs under the LOSC in the EEZ and the continental shelf

This section will examine whether the access provisions of the CBD and the NP are consistent with the LOSC provisions on access to the EEZ and continental shelf for the purposes of conducting MSR.

A coastal state does not have complete discretion to decide whether or not applicants can perform research on the genetic resources of the EEZ or the continental shelf. According to Article 246(3) of the LOSC, under "normal circumstances", the coastal state shall accept the MSR application of the applicant. The coastal state is under a duty to make sure that the consent is not delayed or denied "unreasonably".

The term "normal circumstances" must be read in relation to the other provisions of Part XIII. In particular, Article 246(4) states that "normal circumstances may exist in spite of the absence of diplomatic relations between the coastal state and the researching state". Thus, the provisions show that the absence of diplomatic relations is not, in itself, sufficient to withhold consent to conduct MSR under the coastal state's jurisdiction. Huh and Nishimoto state that a "substantially hostile" relationship between the coastal state and the research state is probably a sufficient reason for denial under this provision. This term, therefore, is not particularly relevant here.

In addition, the coastal state can deny access if the MSR is not conducted for "the benefit of mankind". This term is more closely analysed in section 3.4 and 4.4.3. Concerning MSR, Huh and Nishimoto state that the term is of little practical consequence because MSR generally is in the interest of humankind. As it is difficult to envisage the practical consequences this provision has for access to MSR under a coastal state's jurisdiction, the implications of the term are limited to a reference to the duties of the researcher in Part XIII of the LOSC on MSR. These duties are discussed below under section 4.5.

For the purposes of research on MGRs, the limitation in Article 246(5)(a) of the LOSC is more relevant. This provision determines when a coastal state may deny access because the research on MGRs might be used in commercially valuable products. According to this provision, the coastal states may in their "discretion withhold their consent" when the MSR is of

"direct significance for the exploration and exploitation of natural resources, whether living or non-living".

It is generally accepted that this provision of the LOSC tries to distinguish between non-commercial – "pure" – scientific research and more commercial – "applied" – scientific research.[226] The LOSC does not describe the phase "direct significance for the exploration and exploitation of natural resources" in more detail. As pointed out by Huh and Nishimoto, MSR will often have "at least some significance for exploration and exploitation of natural resources", [227] and thus the term "direct" strikes "a balance by requiring that a project is of 'direct significance' for to coastal state to be able to withhold its consent".[228]

The wording of the provision indicates that there must be a strong link between the MSR activity and the exploration and exploitation of natural resources; it is not sufficient for the MSR to be of significance for exploration and exploitation, it must be of "direct" significance.[229] The term is meant to "limit the discretionary power of the coastal state".[230]

Giving a more general outline of what is meant by "direct significance" is difficult. The parties to the LOSC were well aware of this and therefore gave the provision in Article 251, which states that "States shall seek to promote through competent international organizations the establishment of general criteria and guidelines to assist States". However, the parties have failed to establish such general criteria,[231] leaving the interpreter to decide on the criteria in Article 246(5)(a).

However, according to Huh and Nishimoto, "it has been suggested that a MSR project not expecting a potential economic value from its subject of research would generally not be considered to be of direct significance for the exploration and exploitation of natural resources".[232]

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[226] Soon (1982) p. 6-7, Wegelein (2005) p. 82.
[227] Huh (2017a), p. 1662, para. 31
[228] Huh (2017a), p. 1662, para. 31
[229] Fedder (2013), p. 57 with reference to Soon (1982), p. 171 and Wegelein (2005) p. 87.
[230] Huh (2017a), p. 1662, para. 31.
[231] Huh (2017b) p. 1694, para. 1.
[232] Huh (2017a) p. 1662, para. 31, with reference to Wegelein (2005) p. 297.

When it comes to MGRs, there is usually public-private cooperation. The exploration phase is often done by public research institutions, while private partners enter the exploitation phases later in the process. As such, there is "potential economic gain" from the research carried out, even though the exact potential might be difficult to entangle before many years later. Hence, it is unclear to what extent the coastal can withhold consent pursuant to this provision.

Some authors have suggested that the LOSC might not comply with the CBD.[233] The CBD asserts "sovereign rights" over the natural resources, implying that it is up to the coastal state's discretion if it wants to grant access to genetic resources under its jurisdiction. This authority is emphasised by Article 6(1) of the NP and the relevant provisions on prior informed consent as a prerequisite for access, see section 2.4.1 in this thesis. Hence, the CBD regime is often stated as giving the state full discretion on the question of access to genetic resources.[234]

However, it is clear that the CBD and the LOSC are meant to be interpreted and implemented by coastal states in a mutually supportive manner.[235] This follows from the CBD text itself, see Article 22(2):

> "Contracting Parties shall implement this Convention with respect to the marine environment consistently with the rights and obligations of States under the law of the sea."

Even though the provisions refer to the "marine environment" and thus have their main focus on the environmental questions raised by the interrelationship of these two conventions, the provision shows the intent of the treaty parties to interpret these two treaty regimes in a mutually supportive manner.

Hence, the CBD reference to "sovereignty" over natural resources must be interpreted in relation to the LOSC provisions on MSR that place restrictions on this coastal state rights. In

[233] Fedder (2013) p. 58.
[234] Fedder (2013) p. 58.
[235] Mossop (2015) p. 835.

international law, states have the authority to limit their jurisdiction, and the MSR provisions would be such a restriction, albeit a small one as it leaves some room for interpretation to the coastal state. Therefore, the conclusion is that there is no conflict between the CBD, the NP and the LOSC on this point.

The coastal state must, therefore, undertake an objective consideration of the research programme and information given to the state pursuant to Article 248 of the LOSC. The research, where involving research on MGRs, will vary from pure taxonomical research to searches for genetic material that have economic potential. The coastal state must consider whether this is of "direct significance for the exploration and exploitation of natural resources" as stated in Article 246(5)(a) and accept the research request when the LOSC gives this right.

4.3.3 The benefit-sharing regime of the CBD and MGRs in the EEZ and the continental shelf

This section will address whether the benefit-sharing provisions of the CBD and NP regimes are consistent with the MSR provisions of the LOSC.

To begin, Articles 249(1) and (2) of the LOSC contain an exhaustive list of requirements that coastal states can place on the bioprospector. [236] The list does not mention benefit sharing, which raises the question whether benefit sharing is accepted under these provisions.

As stated in the second paragraph of Article 249, the exhaustive list in the first paragraph is "without prejudice" to a coastal state's right to withhold consent pursuant to the alternative that the research project is of "direct significance for the exploration and exploitation of natural resources" under Article 246. This exception has been interpreted as allowing the coastal state to impose conditions other than those in Article 249(1) if it can deny access pursuant to Article 246(5)(a).[237] The justification for this interpretation is based on the presumption that if the coastal state can deny access pursuant to the provision, then it must also have the ability to allow access while placing additional obligations on the researchers.

[236] Huh (2017c) p. 1681, para. 2.

[237] Huh (2017c) p. 1681, para. 3, with further reference.

In addition, the CBD, the NP and the LOSC must be interpreted in a mutually supportive manner. This should imply that the coastal state may require benefit-sharing in accordance with mutually agreed terms pursuant the NP. This is the case when the resource exploitation element of a research programme is of such a character that it is of "direct significance for the exploration and exploitation" of the coastal state's natural resources. Because bioprospecting involves the possibility to produce valuable products, one might argue that this requirement is fulfilled. The fact that the term "direct significance" in Article 246(5)(a) is vague and difficult to describe in general leaves the coastal state with discretion to decide when benefit sharing should be required.

Hence, there is no inconsistency between the obligations under the CBD, the NP and the LOSC in this case. These agreements must, be implemented in a manner that considers their relationship with each other. Thus, the coastal state cannot impose benefit-sharing requirements on pure scientific research on MGRs,[238] but it can subject commercial bioprospecting activities to benefit-sharing requirements.

4.3.4 MSR on the "outer" continental shelf

The section will discuss whether the specific provisions on MSR on the outer continental shelf imply that the coastal state must grant access and cannot require benefit sharing for the MGRs.

In relation to *access*, the coastal state must respect the jurisdictional provisions on MSR in the LOSC. According to Article 246(1) the jurisdiction of the coastal state only extends to MSR conducted "on the continental shelf". The wording does not mention or refer to the sedentary species of Article 77(4). These cannot be seen as a part of the continental shelf, in the sense that they fall under the wording of Article 246(1) of the LOSC. Hence, the jurisdiction of the coastal state in relation to MSR on the continental shelf beyond 200 nautical miles does not include sedentary species. What is included is the biological material that can be seen as a part of the seabed or the subsoil, i.e. material growing on the seabed or lying on the seabed. If the MSR is not conducted on this material, but is conducted on other species, then it is not under the coastal state's jurisdiction to deny access to it.

[238] One example might be pure taxonomical research, i.e. classification of living species in accordance with scientific criteria.

The question now turns to whether the coastal state can require *benefit-sharing* of this material.

According to Article 249(6) of the LOSC, when the continental shelf extends beyond 200 nautical miles, MSR still requires the consent of the coastal state. However, according to the text of the provision, the coastal state cannot withhold consent based on the "exploration" exception in paragraph 5. Therefore, the coastal state is required to accept explorative bioprospecting missions under this provision and cannot withhold consent. Thus, the coastal state cannot use this provision as a basis for requiring benefit-sharing, because then they must comply with the exhaustive list of possible requirements on the researcher according to Article 249(1). Benefit-sharing is not included in this list.

The CBD Article 15(1) emphasises the principle of "sovereign rights of States over their genetic resources". This could be interpreted as to indicate that the purpose of the CBD provision was to emphasise to coastal state right to regulate the sedentary species of Article 77 of the LOSC in which the coastal state have "sovereign rights". Therefore, prima facie, there could be an inconsistency between these two instruments on this point.

However, it is clear that the CBD only applies to the "areas within limits of national jurisidiction", cf. the CBD Article 4(1). Hence, the reference to jurisdiction in Article 4 and sovereign rights in Article 15 is merely a reference to the jurisdictional provisions of the LOSC. Hence, it is the LOSC that decides the limits to coastal jurisdiction over the biological resources of the continental shelf. Because the LOSC prohibits benefit-sharing requirements on MSR done on the continental shelf beyond 200 NM, the jurisdiction of the coastal state is limited. Therefore, there is no inconsistency between the LOSC and the CBD and NP on this point.

Even if the LOSC was inconsistent with the CBD and NP, the LOSC would prevail, see section 2.3.3.

In the light of this, the coastal cannot require benefit-sharing of MGRs from the outer continental shelf.

4.4 MSR beyond national jurisdiction

4.4.1 Introduction

This section will discuss whether the bioprospector has access to and is required to share benefits from MGRs in areas beyond national jurisdiction.

As noted in section 1.4.3, the legal situation in areas beyond national jurisdiction differs substantially from those under national jurisdiction because the CBD and the NP do not apply to genetic resources beyond national jurisdiction. Thus, the LOSC becomes the central treaty when answering the questions in this section.

4.4.2 Access to MGRs beyond national jurisdiction

The LOSC gives the bioprospector a right to conduct MSR in areas beyond national jurisdiction, i.e. the Area and the high seas beyond the EEZ. This fact is stated in general terms in Article 238, for the high seas in Articles 87(1)(f) and 257 and for the Area in Article 256. The wording in these provisions implies that states have the right to conduct bioprospecting in these maritime zones and, thus, have access to MGRs.

4.4.3 MSR for the benefit of humankind

Article 143(1) of the LOSC states that MSR in the Area shall be carried out for the "benefit of mankind". This provision thus establishes the same principle regarding MSR that applies to the mineral resources of the Area. This term is difficult to describe in general, but it implies an obligation to consider the interests of humankind when conducting research in the Area. As before, it refers to the interests of the entire humanity, and both current and future generations.

However, because MSR activities develop the knowledge of humankind, they are in general beneficial to humankind.[239] This is true for MSR with both a commercial intent and MSR without a commercial intent, as both leads to important knowledge on the biodiversity of the oceans. The phrase must, therefore, be interpreted as a reference to other relevant provisions on MSR, in particular Article 140 focusing on the interests of developing countries and co-operation in activities in the Area. Fedder seems to assume that this is the case because he

[239] Huh (2017a) p. 1659 para. 22, who discusses this in relation to the similar phrase in the LOSC Article 246.

discusses the provision in relation to the other relevant provisions in Part XI on the Area and Part XIII on MSR.[240]

However, it is difficult to see what independent obligations Article 143(1) imposes. The provision emphasises other relevant LOSC provisions on MSR. The next step, therefore, is to analyse them.

4.5 Benefit sharing of MSR results

4.5.1 Introduction

The question in this section is whether there is an obligation to share benefits or knowledge from MSR activity. These obligations apply in general, whether the MSR takes place under or beyond national jurisdiction.

Bioprospecting is not specifically mentioned in the LOSC provisions on MSR. Hence, there are no specific provisions requiring the sharing of benefits (e.g. financial benefits) from MGRs. However, there are several provisions applying to MSR in general, and these are analysed in the following section.

According to Article 87(2) of the LOSC, the freedom of MSR on the high seas must be "exercised" with "due regard for the interests of other States" and with "due regard for the rights under this Convention with respect to activities in the Area". When it comes to bioprospecting, this wording provides little guidance because it is difficult to see how bioprospecting can be done in the disinterest of other states. On the contrary, it can benefit humankind by expanding knowledge of oceanic biodiversity and enabling the development of new and useful products.

4.5.2 The non-recognition of MSR activities as the legal basis for claims

The LOSC prohibits MSR activities that constitute the legal basis for "claims"; see Article 241 of the LOSC:

> "Marine scientific research activities shall not constitute the legal basis for any claim to any part of the marine environment or its resources."

[240] Fedder (2013) p. 71.

This prohibition applies regardless of the maritime zone; that is, it applies both under and beyond national jurisdiction.

An important prerequisite for bioprospecting to be commercially viable is the ability to secure patent protection for products where genetic resources form a valuable part of the product.[241] An important question, therefore, is whether the Article 241 of the LOSC contains restrictions on patenting products that are based on genetic resources from areas beyond national jurisdiction. If it does, then the LOSC prohibits the exclusive rights afforded by a patent and, hence, requires the MSR to be freely available to interested users.

It is necessary to go deeper into international patent law to answer this question because the topic raises a more complex set of questions on patent law and the relationship between LOSC and international patent instruments. Therefore, in section 5.4 I will discuss these elements.

4.5.3 Publication and dissemination of information and knowledge stemming from MSR

Article 244(1) of the LOSC requires states to "make available by publication" and "dissemination", the "knowledge resulting from marine scientific research". The wording indicates that states must not only make MSR results publicly available but also ensure that the results are disseminated. As research results in themselves can be of potential value, this requirement constitutes a duty to share the benefits from MGRs.

Soons described the obligation in this provision as being of "fundamental importance".[242] According to Soons, its purpose is to ensure that:

> "[I]n principle every state will be able to benefit from the research conducted by other states, not only with a view to the possible practical applications of research results but also to the further scientific progress in general."[243]

[241] Leary (2007) p. 168-169.
[242] Soons (1982) p. 243.
[243] Soons (1982) p. 243.

The second paragraph of Article 244 emphasises this purpose. It states that states "shall actively promote the flow of scientific data and information and the transfer of knowledge resulting from MSR".

Hence, the LOSC places a strong obligation on states to make knowledge coming from MSR not only public (i.e. accessible to a person seeking the information) but also practically available. This requirement implies that states should also publish the information from research in relevant scientific fora, either through relevant international organisations or otherwise.[244] However, as this duty is not more closely described by the LOSC, states do have some discretion to decide on the relevant means of publication and what obligations on marine scientific researchers to place under national law.

Like the prohibition on claims based on MSR in Article 241 in the LOSC, the obligation to publicise and disseminate knowledge stemming from MSR raises questions regarding the patent system.[245] First, does patenting fulfil the publication requirement? Second, does the secrecy involved in the patent process violate the publication requirement? As these questions require background knowledge of international patent law, they will be discussed in section 5.5 and 5.6 of the next chapter.

4.6 Change of intent

This section will discuss if the LOSC provisions on MSR apply when the material was initially collected solely for MSR purposes but was used later in the development of a commercial product.

Article 6(3)(g)(iv) of the NP establishes that that the coastal state may regulate situations involving "changes of intent". This term describes a situation where biological material was collected with the sole purpose of increasing knowledge about the relevant species but then

[244] The United Nations guide to the implementation of the relevant provisions of the United Nations Convention on the Law of the Sea on Marine Scientific Research gives the following examples: "[T]he Ocean Biogeographic Information System, Biocean, the databases of the Census of Marine Life, RIDGE Multibeam Synthesis, and Petrological Database of the Ocean Floor", in addition to scientific journals, see United Nations Division for Ocean Affairs and the Law of the Sea (2010), p. 32, para. 116.

[245] Salpin (2007) p. 20.

turns out to have valuable genetic features. A typical way for this to happen is that the genetic resources are collected and examined by a science institution, and then the information is stored in some form of collection. Later, a private enterprise or other institution finds this information in a search for genetic material in the development of a new product.

The scientific exploration of the material falls within the scope of MSR under the LOSC. When it comes to the commercial application of the material, one might ask if this part of the process also falls under the scope of the MSR provisions. If so, then the exploiter of the material must follow the obligations on scientific researchers given in Part XIII. The question, therefore, is when the MSR turns into something not covered by the LOSC.

First, the obligations under the LOSC do not cease to exist just because an activity takes place on shore. Such a conclusion would obviously imply that many of the LOSC provisions, including several of those on MSR, would become meaningless.

Second, concluding that a change of intent removes an activity from being considered MSR under the LOSC would allow the enterprise conducting the commercial research to avoid many of the obligations that the LOSC places on scientific researchers. The LOSC is built on a system where states have the right to perform MSR. In return, the researchers must comply with the obligations placed on them under LOSC, which include, amongst other things, making research results publicly available in accordance with Article 244.

However, when a researcher has already complied with the publication required by Article 244(1), nothing suggests that subsequent users must also publicise and disseminate their research results. At this point, other researchers or other persons in search of genetic material are free to use the research as they see fit without having to continue to publish their results. The obligations are linked to MSR activity taking place at sea, not on shore. Thus, change of intent situations are not regulated by the LOSC.

4.7 Conclusions

As this chapter shows, the exploration and exploitation of MGRs beyond national jurisdiction raise several difficult legal questions in relation to the MSR provisions in the LOSC. This, in itself, leads to the conclusion that there is an unfortunate lack of clarity in the LOSC.

However, the most plausible conclusion is that bioprospecting is MSR. Importantly, even though the CBD and NP do not apply to MGRs beyond national jurisdiction, the LOSC has its own provisions on access to and benefit sharing of these resources. However, when it comes to MGRs and the MSR provisions of the LOSC, there are important links to the global intellectual property system. This is the topic of the next chapter.

5 Global intellectual property law and the LOSC

5.1 Introduction

This section will examine the relationship between the LOSC obligations in relation to MSR and global intellectual property law.

Bioprospectors and the public may have conflicting interests regarding the protection of information based on MGRs. On the one hand, the bioprospector who wants to commercialise products deriving from MGRs has a strong interest in securing protection of the knowledge developed from these resources. There are huge costs and effort in developing, for example, a pharmaceutical product, as seen under section 1.3.1. The common method of protecting this knowledge is by using patent protection.[246] On the other hand, the public, as well as other researchers and bioprospectors, would like as much access to and useful information from genetic resources as possible.

This conflict of interest is also present between the LOSC and the global intellectual property system. As shown above, the LOSC is characterised by openness and access to MSR results, while the status of this purpose is more questionable in the global patent treaty system. As Leary puts it:

> "Increasingly the race to the bottom of the deep sea for new developments in biotechnology is also becoming a race to be the first to the patent office."[247]

I will discuss three questions on the relationship between the LOSC and global intellectual property law: First, can filing a patent application be considered a claim to part of the marine environment or its resources as prohibited by Article 241 of the LOSC?[248] Second, is patenting consistent with the obligation in Article 244(1) to publicise and disseminate research results?[249] Third, is patenting consistent with the requirement in Article 143 that research be conducted for the "benefit of mankind"?

[246] Leary (2007) p. 168-169.
[247] Leary (2007) p. 154.
[248] United Nations Secretary-General (2007), p. 67 para. 227.
[249] United Nations Secretary-General (2007), p. 67 para. 227.

First, in section 5.2 I will look at the general relationship between the LOSC and the TRIPS. In section 5.3 I will look at the framework of global intellectual property law because a general understanding of it is necessary to answer the questions raised in this section. In sections 5.4 to 5.7 I will analyse relevant legal sources to answer the mentioned questions. Finally, I will make a conclusion.

5.2 The relationship between obligations under The TRIPS Agreement and the LOSC

This section will discuss the relationship between the TRIPS and the LOSC.

Article 311(2) of the LOSC regulates the relationship between that Convention and other international agreements. It reads as follows:

> "This Convention shall not alter the rights and obligations of States Parties which arise from other agreements compatible with this Convention and which do not affect the enjoyment by other States Parties of their rights or the performance of their obligation under this Convention."

Hence, obligations under the LOSC will prevail if other agreements are inconsistent with them; then they would not be compatible with the LOSC. The TRIPS Agreement, in contrast, does have a general provision on its relationship with other instruments of international law.

In general, treaties and agreements must be interpreted with regard to each other, and, therefore, one must consider whether interpretation can be a way of reconciling prima facie incompatibility between the LOSC and TRIPS.[250]

If the incompatibility still exists after this interpretation exercise, TRIPS is silent on how to resolve these conflicting obligations.[251] Thus, the solution provided for by Article 311(2) of the LOSC solves the interpretation question in favour of the LOSC.[252]

[250] Van den Bossche (2008) p. 61.
[251] Boyle (2005) p. 581.
[252] See also Boyle (2005) p. 582.

5.3 Overview of the global patent system in the TRIPS Agreement and the PCT

The global patent system consists of several legal instruments that are relevant to the questions raised at the start of this chapter. As earlier in the thesis, the focus is on global agreements, not regional agreements or national legislation. Hence, the focus is on the WTO's TRIPS Agreement and the Patent Cooperation Treaty (PCT).

5.3.1 What is intellectual property, including patents?

There is no agreed-upon definition of intellectual property.[253] One author describes it as "the legal rights that result from intellectual activity in the artistic, literary, scientific or industrial fields".[254] Intellectual activity refers to some form of creativity. Building on this definition, Dutfield and Suthersanen summarise the debate on a general definition with the following:

> "In a rather simplistic sense, then, intellectual property law is the legal expression of people's recognized interests in valuable ideas." [255]

The focus in this thesis is on the patent system. The conventional justification of the patent system is that it is a:

> "[B]argain in which inventors are granted time-limited monopoly rights by the government on behalf of society in exchange for the disclosure of technical information that is presumed to advance scientific and technological development."[256]

This "bargain" can now be found in the global patent instruments.

5.3.2 Patenting on MGRs under TRIPS

The TRIPS Agreement is the central international instrument for patents. It places obligations on its members to put a system in place that recognises patents for inventions capable of industrial applications. TRIPS must be understood in the light of the WTO's general global free trade regime. According to the first paragraph of the preamble, TRIPS's purpose is to:

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[253] Dutfield (2008) p. 12.
[254] Van den Bossche (2008) p. 742.
[255] Dutfield (2008) p. 16.
[256] Dutfield (2008) p. 108.

> "[R]educe distortions and impediments to international trade, and taking into account the need to promote effective and adequate protection of intellectual property rights."

For this thesis, the patents rights in Section 5 of TRIPS are of interest.

Article 27(1) of TRIPS sets forth the minimum requirements of national patent law. According to this paragraph, the state party must make patents available for:

> "[A]ny inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application."

Thus, a product or solution must constitute an "invention" in order for the state to be required to grant it patent protection. The term "invention" is not defined in TRIPS. One definition is that it is "something that has never been made before, or the process of creating something that has never been made before".[257]

Several member states exclude "discoveries" from patent protection.[258] In these states, "inventions" must be differentiated from "discoveries". Because "invention" is not defined in the TRIPS Agreement, it is generally accepted that making this distinction complies with the Agreement.[259] The mere discovery of a genetic resource is generally not sufficient to warrant patent protection. The process of development needed for a genetic discovery to become an invention far exceeds the scope of this thesis. However, Dutfield and Suthersanen summed up the process needed for a genetic material to constitute an "invention", by emphasising that this can happen by: [260]

> "[A]dding something to it (such as a gene), subtracting something from it (that is, purifying it), mixing it with something else to create a new or synergistic effect, or struc-

[257] Cambridge Dictionary (undated), sub verbo "invention".
[258] Neef (2009) p. 479, para 30.
[259] Neef (2009) p. 479 para 30.
[260] Dutfield (2008) p. 301.

turally modifying it so that it differs in an identifiable manner from what it was before."

Patenting genetic material is, however, controversial.[261] There are several reasons for this position.[262] For this thesis, it is noteworthy that most developed countries do accept patents on products and processes using genetic resources in some form or another and that the parties to TRIPS must accept patents on microorganisms according to Article 27(3)(b).[263]

In addition, Article 27(1) of TRIPS requires that parties to the Agreement grant patents when an invention fulfils three requirements: it is new, it involves an inventive step and it is capable of industrial application.[264]

For an invention to be new, it must not be "already available to the technical knowledge of a person skilled in the art"[265] The purpose of this requirement is to prevent patents on inventions that are already generally known to a person skilled in the area of the invention.[266]

The purpose of the "inventive step" criterion is to make sure that the patented invention involves a minimum degree of progress (i.e. something non-obvious to an expert in the field).[267] However, as the TRIPS Agreement only establishes minimum requirements, parties are thus able to grant patent protection when this requirement is not fulfilled.

If a product developed from genetic material fulfils these criteria, then the state is obligated under the TRIPS Agreement to grant patent protection for at least 20 years.

The rights conferred on patents are articulated in TRIPS Article 28(1):

"A patent shall confer on its owner the following exclusive rights:

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[261] Dutfield (2008) p. 302.
[262] For a concentrated discussion on this, see Dutfield (2008) chapter 13, pages 299–326.
[263] Drankier (2012) p. 398.
[264] Van den Bossche (2008) p. 784.
[265] Neef (2009) p. 482 para 36.
[266] Neef (2009) p. 482 para 37.
[267] Neef (2009) p. 482 para 44.

(a) where the subject matter of a patent is a product, to prevent third parties not having the owner's consent from the acts of: making, using, offering for sale, selling, or importing for these purposes that product"

The value of a patent lies in these exclusive rights. The rights are negative,[268] in the sense that they do not grant the patent owner the right to a specific use, but instead grant the right to prevent others from most forms of use of the invention. This often implies that other persons' use is dependent on some form of permission from the patent owner, which would be a possible restriction on access to genetic resources.

5.3.3 The PCT

The PCT establishes a mechanism for filing international patent applications.[269] Its purpose is to enable patent applicants to file one application for protection in several states.[270] As stated by Article 1 of the PCT, to realise this purpose the parties established a:

> "Union for cooperation in the filing, searching, and examination, of applications for the protection of inventions, and for rendering special technical services."

The search is an important part of the consideration of the application and allows the patent office to gain knowledge of prior inventions and information regarding the invention in the patent. Hence, the PCT serves the important purpose of facilitating global searches of information. However, it is up to the state to decide whether to grant patent protection. After the international search report is finished, the application is sent to the relevant national patent office, cf. Article 20(1)(a).

For our purposes, it is important to note that patent applications are public in accordance with Article 20 of the PCT.

[268] Van den Bossche (2008) p. 743.
[269] World Intellectual Property Organization (undated).
[270] World Intellectual Property Organization (undated).

5.4 The prohibition of MSR-activities as the legal basis for claims

The focus now turns to the question of if there are such inconsistencies between the LOSC and TRIPS. Specifically, this section will explore whether the prohibition on claims based on MSR activities in Article 241 of the LOSC prohibits patent protection and thus is inconsistent with the patent regime of TRIPS.

The wording of Article 241 of the LOSC is as follows:

> "Marine scientific research activities shall not constitute the legal basis for any claim to any part of the marine environment or its resources."

Gorina-Ysern has suggested that this provision prohibits patents based on MSR.[271] If so, it would imply that there is an obligation to deny the patent exclusivity rights derived from Articles 28(1) of TRIPS.

5.4.1 The wording of Article 241 of the LOSC

The wording of the provision establishes a prohibition on "any claim" to "any part" of the "resources" of the marine environment. As patents relate to the protection of ideas, the wording does not support an argument based on the fact that patenting is a claim to a part of the marine environment or its resources.[272] A patent is a claim to an idea, and even though there is a link between the genetic material and the patent, this does not constitute a claim to that resource. For instance, if genetic material is subtracted from a fish, others can still freely appropriate the fish for food purposes. However, they would not be allowed to use the idea without the owner's consent.

Gorina-Ysern's assertion that Article 241 prohibits patents based on MSR rests on two arguments:[273] First, that the assertion is supported by a coastal state's right in Article 249(1) of the LOSC to require access to research results.[274] Second, that the background of the provision read together with the wording implies that there is such a ban.[275]

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[271] Gorina-Ysern (2003) p. 355 and (1998) p. 345.
[272] See also Wegelein (2005) p. 119.
[273] Gorina-Ysern (1998).
[274] Gorina-Ysern (1998), p. 345.
[275] Gorina-Ysern (1998), p. 344.

The first assertion, based on LOSC Article 249(1), is not compatible with a reasonable interpretation of that provision. The provision does not refer, directly or indirectly, to any kind of IPRs. Thus, Gorina-Ysern's assertion that this provision prohibits patents based on MSR is not supported by the wording of the Article. Gorina-Ysern does not elaborate further on this assertion.

In contrast, the second assertion requires a closer analysis of the background and context of Article 241 of the LOSC.

5.4.2 Background and history of Article 241 of the LOSC

As stated by Matz-Lück, Article 241 "reflects customary international law by stipulating that scientific research activities alone are not sufficient legal basis for territorial claims".[276] Thus, the main purpose of Article 241 is to prohibit territorial claims based on MSR activities. The prohibition in Article 241 must be interpreted with regard to the "historical custom in the age of discoveries" when it was common to "claim sovereignty over territory discovered" during scientific expeditions.[277]

During the LOSC negotiations, the parties to the negotiations did not suggest mentioning IPRs in the text of LOSC Article 241.[278] Several suggested treaty texts were discussed during the negotiations.[279] One suggestion, submitted by Canada, said that:

> "Marine scientific research as such shall not form the legal basis for any claims of exploration rights or any other rights in areas beyond the limits of national jurisdiction".

The wording in this proposed text is clearly more limited than the final adopted text of Article 241. First, the scope of Article 241 is not restricted to "areas beyond the limits of national jurisdiction" but applies to MSR in general, regardless of the geographic location of the re-

[276] Matz-Lück (2017b) p. 1626, para. 6.
[277] Matz-Lück (2017b) p. 1625, para 4, with further reference.
[278] Matz-Lück (2017b) p. 1629, para 14.
[279] Nordquist (1985-2012) p. 464–465, vol. IV.

search. Second, the proposed text refers to "exploration rights" or "any other rights *in* areas" (emphasis added). There is an important difference compared to the wording ultimately adopted in Article 241, which refers to "any claim *to* any part" (emphasis added) of the marine environment or its resources. A plausible interpretation of the proposed text, therefore, is that it only prohibits claims on sovereignty or resources located in the mentioned areas. The adopted text of Article 241, however, seems to have a wider scope, even though it does not make clear in what sense. Drawing conclusions based on historical background information is challenging, however, because it is difficult to know exactly why these changes were made to the text of Article 241. Matz-Lück, however, concludes that "the negotiations, as well as the provision's text, indicate that it pre-eminently refers to the exclusion of territorial and maritime claims".[280]

5.4.3 Contextual interpretation of the LOSC

Article 241 of the LOSC must be read with regard to its similar provisions in Articles 89(1) and 137(1), as they can shed light on the meaning of Article 241.

Article 89(1) applies to the high seas and, including its heading, it reads:

> "*Invalidity of claims of sovereignty over the high seas*
> No State may validly purport to subject any part of the high seas to its sovereignty."

For our question, it is interesting to note that the parties in this provision restricted the type of claims to "claims of sovereignty".

Article 137(1) of the LOSC on the Area reads:

> "No State shall *claim* or *exercise sovereignty* or *sovereign rights* over *any part* of the Area or its *resources*, nor shall any State or natural or juridical person *appropriate* any part thereof" (emphasis added).

[280] Matz-Lück (2017b) p. 1629, para. 15.

The wording of Article 137 provision is more complex than the previous provision. Some dimensions seem relevant to our question of interpretation. First, it places a ban on "claims" of sovereignty or sovereign rights over any part of the Area or its resources. Second, this prohibition is emphasised when it states that no one can "appropriate" any part of the Area or its resources.

Both these articles are interesting in the sense that the wording focuses on "sovereignty", "sovereignty claims" or "sovereign rights", while Article 241 refers to *all* types of claims, with no restriction on the wording. This distinction might mean that the intention was to give the Article 241 a wider scope than both Articles 137(1) and 87(1).

Hence, pursuant to Articles 137(1) and 87(1), claims to sovereignty on areas or claims to sovereign rights to resources in areas beyond national jurisdiction are effectively banned. They also prohibit claims on areas or natural resources belonging under the jurisdiction or sovereignty of another state.[281]

If this prohibition already follows from other provisions, what is the purpose of Article 241? To understand the purpose of Article 241, one must consider its historical background. Article 241 focuses on the functional side of these prohibitions on sovereignty, namely, on prohibiting MSR from being an *activity* that can constitute the legal basis for claims to natural resources or areas. This interpretation is consistent with the historical background of the provisions, as MSR expeditions often involved making claims to foreign areas in the "age of discovery".[282]

Therefore, bearing in mind the LOSC provisions that ban sovereignty claims, the context of the provision does not support the argument that Article 241 of the LOSC prohibits patents on MGRs.

[281] This is not stated directly by the LOSC but is a fundamental concept in the LOSC and can be said to follow from Article 2 of the LOSC, see also Gorina-Ysern (1998) pp. 343–344.

[282] Matz-Lück (2017b) p. 1625, para. 4.

5.4.4 Other similar provisions in international law

The provisions relating to MSR in the LOSC are not unique to that Convention. Similar phrases are found in other international treaty systems. Differences between the wording of these provisions and Article 241 of the LOSC may shed light on its interpretation.

The Antarctic Treaty contains a similar provision in Article IV(2). The Article states that:

> "No acts or activities taking place while the present Treaty is in force shall constitute a basis for asserting, supporting or denying a claim to territorial sovereignty in Antarctica or create any rights of sovereignty in Antarctica. No new claim, or enlargement of an existing claim, to territorial sovereignty in Antarctica shall be asserted while the present Treaty is in force."

Like the provisions of the LOSC, this provision relates to sovereignty claims to areas or resources.

Moving away from the law of the sea, the Moon Agreement also has similar provisions; its purpose is, among other things, to ensure that the moon remains in the hands of humankind as a whole, not single states. Article 11 paragraphs 1–3 in the Moon Agreement state the following:

> "1. The moon and its natural resources are the common heritage of mankind, which finds its expression in the provisions of this Agreement and in particular in paragraph 5 or this article.
>
> 2. The moon is not subject to national appropriation by any claim of sovereignty, by means of use or occupation, or by any other means.
>
> 3. Neither the surface nor the subsurface of the moon, nor any part thereof or natural resources in place, shall become property of any State."

These Article express a clear prohibition on claiming sovereignty to any area of the moon or its resources. Although resource exploitation is mentioned, the paragraphs fail to mention the

concept of IPRs, implying that they were not considered by the parties to the Moon Agreement.

Consequently, parallel provisions found in other international agreements does not contribute to the interpretation of Article 241 of the LOSC on this point.

5.4.5 State practice on granting patent protection to MGRs

State practice concerning Article 241 might give the meaning of the provision. There is no common application of this provision, but, interestingly, many states recognise patents deriving from MGRs.[283] In this regard, it is important to note that Article 241 covers MSR both under and beyond national jurisdiction, implying that patents arising from MSR done on MGRs within a county's jurisdiction would violate Article 241 if one were to conclude that this provision prohibits patents on MGRs.

On the basis that states accept patents on MGRs, one might conclude that this practice is decisive when interpreting Article 241. Alternatively, one might argue that even though states accept such patent rights, patent grants cannot be seen as an expression of *opinio juris*. In addition, this state practice does not seem to be universally exercised. There is only a small number of states have the resources to perform MSR expeditions beyond national jurisdiction with the purpose of performing research on MGRs.

If one were to follow the requirements of Article 38 in the Statute of the ICJ, there is a lack of generality in the state practice and thus a lack of *opinio juris*.[284] Therefore, customary state practice is insufficient to determine whether Article 241 covers patents on inventions utilising MGRs.

5.4.6 Conclusions on the relationship of the LOSC Article 241 and TRIPS

Therefore, even though the wording of Article 241 is broad, it does not seem reasonable to conclude that it cover patents on products or utilising MGRs. The deciding factor must be the wording of the provisions. As seen above, there is no reason to expand the meaning of the

[283] Drankier (2012) p. 398.

[284] Crawford (2012) pp. 23-28.

wording to include patents on MGRs. The most plausible conclusion, therefore, is that the TRIPS Agreement is consistent with Article 241.

5.5 The publication and dissemination requirements of the LOSC and TRIPS

As seen above under section 4.5.3, the LOSC establishes an obligation to publicise and disseminate knowledge deriving from MSR. Questions have been raised whether patenting products derived from MSR violates this obligation and, thus, that national patent law accepting such patent applications is not in compliance with obligations under the LOSC.

5.5.1 Is the purpose of the LOSC regulation on MSR different from the purpose of international patent law?

The purpose of Article 244(1) of the LOSC is to ensure that knowledge from MSR is available. The purpose must be interpreted from an international perspective because the provision is placed in Part XIII section 2 with the headline "International Cooperation". These obligations are emphasised in Article 244(2), which declares that states "shall actively promote the flow of scientific research data and information". Also, states shall "especially" focus on the flow of scientific knowledge to developing states. In summary, the LOSC requires openness about MSR, including results.

It has been argued that international patent law, in contrast, is dominated by secrecy. However, this is, at least at some level, incorrect. There is no obligation in the TRIPS Agreement or other global patent conventions requiring states to keep patent applications a secret. On the contrary, most states ensure patent applications are available and public for persons wanting to access them. This openness is because, traditionally, one of the main purposes of the patent system is to make sure the knowledge used in patents is available to the public.[285]

This is reflected in the international patent instruments. When a patent application is filed through the international patent system established by the PCT, Article 21(1) requires the publication of the application. This publication requirement is in line with the purpose of the PCT. According to its preamble, PCT parties desire to "facilitate and accelerate access by the public to the technical information contained in documents describing new inventions". The international character of the global patent recognition system and the associated global pub-

[285] Stenvik (2013) p. 25.

lication of patent documents have the same purpose as the international aspect on the development of knowledge emphasised in Article 244(1) of the LOSC.

The reason for this disclosure requirement is the *quid pro quo* character of the patent system; the holder of the patent gets (at least) the exclusive minimum rights prescribed in TRIPS Article 28, and in return, the public gets to freely use the invention after the patent expires. In addition, the public can build on the knowledge in the patent application as long as it does not infringe the patent rights.

From this perspective, there is no conflict between the purpose of the TRIPS Agreement and the LOSC provisions on MSR.

5.5.2 The reality of gene patenting: the tragedy of the anticommons?

This section will examine whether international patent systems produce a chilling effect on scientific research contrary to the purpose of the publication requirement in Article 244(1) of the LOSC.

In a 1998 paper published in the journal Science, Michael Heller and Rebecca Eisenberg describe an unfortunate effect of IPRs on research results they called "the tragedy of the anticommons".[286] The phrase relates to a Garett Hardin article in the same journal entitled, "The tragedy of the commons". Eisenberg and Heller stated that the tragedy of the commons refers to situations where a given resource is overused because too many have a "privilege to use a given resource and no one has the right to exclude another".[287] They went on to say that:

> "By contrast, a resource is prone to underuse in a 'tragedy of the anticommons' when multiple owners each have a right to exclude others from a scarce resource, and no one has an effective privilege of use." [288]

The authors explained that "foreseeable commercial products" deriving from biotechnological inventions using genetic material often require the use of "multiple fragments" of genetic ma-

[286] Heller (1998).
[287] Heller (1998) p. 698.
[288] Heller (1998) p. 698.

terial.[289] As the ownership of IPRs in these fragments may be diverse, using the different fragments to further innovation might involve transaction costs at such a level that the research becomes economically unviable. As the authors put it, every owner becomes a "toll-booth" on innovation.[290] These mechanisms could lead to a chilling effect on scientific research because research could depend on the availability of such material.

The arguments put forth by Heller and Eisenberg do not correspond with the purpose behind Article 244(1) of the LOSC, which is to make MSR results freely available. However, this does not imply that the current situation can be characterised as a violation of the LOSC.

First, even if the effects described by Heller and Eisenberg hamper the availability of MSR, the research results are still publicised if they are protected by IPRs such as patents. Therefore, as discussed above, there is no violation of the LOSC.

In addition, even if these combined effects, the "tollbooths on innovation", constitute a violation of the LOSC, it is debatable whether the theoretical effects described by Heller and Eisenberg actually occur. In a paper from 2015, Jonathan Barnett used empirical data to analyse the effect of IPRs on innovation in both current and historical markets.[291] He concluded that "[c]ontrary to standard assumptions, there is little evidence that these markets experienced reduced or delayed innovation […] despite intensive levels of patent issuance and litigation".[292] Thus, whether IPRs do create a form of "anticommons" in relation to biotechnology is questionable.

It is not the purpose of this thesis come to a conclusion on whether there is such an effect as described by Heller and Eisenberg. To do so would require a research method far removed from a doctrinal analysis of law and exceed the scope of this thesis. However, based on the background material, there is not sufficient evidence to support the assertion that IPRs in MGRs constitute a chilling effect on MSR that would be contrary to the purpose of Article 244(1) of the LOSC.

[289] Heller (1998) p. 699.
[290] Heller (1998) p. 699.
[291] Barnett (2015), abstract.
[292] Barnett (2015), abstract.

5.5.3 The balance of interests in the global patent system

This discussion resembles that of traditional patent law: What is the correct balance between establishing incentives for innovation and granting the public free access to facilitate innovation? However, regarding scientific research, TRIPS grants states some discretion in establishing this balance.

Article 30 of the TRIPS grants states the right to establish exceptions to the patent protections. The Article states that:

> "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."

As the text states this is not a *carte blanche* to the states to develop exceptions from patent rights. Reyes-Knoche states the purpose of the provision is to give the state some room to make exceptions from patent rights as "restrictions of the rights under the patent may serve to promote competition".[293]

The wording establishes three requirements for an exception to be lawful under TRIPS.[294] First, the exception must be "limited". Second, the exception must "not unreasonably conflict with a normal exploitation of the patent". Third, the exception must not "prejudice the legitimate interests of the patent owner, taking account of the legitimate interests of third parties".

It would go beyond the scope of this section to conduct a closer analysis of Article 30's requirements. It is sufficient here to say that the main exceptions found in national legislation have the purpose of enabling scientific research.[295] For example, the WTO dispute settlement body ("the Panel") stated the following:

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[293] Reyes-Knoche (2009) p. 535, para. 2.
[294] Reyes-Knoche (2009) p. 535, para. 2.
[295] Gervais (2012) p. 472, para. 2.396.

> "We may take as an illustration one of the most widely adopted Article 30-type exceptions in national patent laws–the exception under which use of the patented product for scientific experimentation, during the term of the patent and without consent, is not an infringement." [296]

The Panel's comments illustrate that there is some discretion for states to prioritise access to MSR results from MGRs under global patent law. This fact implies that states may adapt their patent systems in relation to obligations under Article 244(1) of the LOSC to publicise and disseminate MSR results.

5.5.4 Conclusions — publication and dissemination of research in relation to patenting

The results of the above analysis make it reasonable to conclude that the patenting regimes of the TRIPS Agreement and other global patent conventions do comply with the duty to publicise and disseminate knowledge and research results from MSR found in the LOSC.

However, there is potential for conflict between the LOSC's purpose of free access to scientific knowledge and free flow of that scientific knowledge into the international community for the benefit of all states and the patent protections obligations set out in the TRIPS treaty. Hence, states must balance these two purposes in a manner that reconciles both TRIPS and the LOSC's provisions on MSR. States must consider the unintended side effects of the patenting system to ensure that they do not hinder the flow of scientific knowledge unnecessarily.

5.6 Secrecy before the patent application is filed

The patent protection process often involves some level of secrecy before the application is filed, which raises the question of whether this secrecy breaches the LOSC's obligations relating to MSR, particularly the publication and dissemination requirements of Article 244.

The secrecy relates to the fact that patents are granted based on the premise that the applicant possesses new, unknown knowledge. If the contents of the patent are already known to the

[296] European Communities V. Canada (2000), Report by the Panel on Canada — Patent Protection of Pharmaceutical Products Panel, p. 164–165, para. 7.69 and Reyes-Knoche (2009) p. 547 para. 29.

public, there is no reason for patent protection. Therefore, TRIPS requires that the patent be an "invention" (i.e. something not previously known) in order for the applicant to warrant patent protection.

However, the wording of Article 244(1) of the LOSC does not require that the publication happen within a given period of time. Hence, the wording leaves it up to the researching state to decide on suitable, if any, requirements concerning a time requirement.

It is reasonable to conclude, therefore, that a period of secrecy regarding research results prior to the filing of the patent application does not violate Article 244(1).

5.7 MSR for the benefit of mankind and TRIPS

In addition to the above-stated obligations under the LOSC, when the MSR is conducted in the Area, Article 143(1) of the LOSC requires the MSR to be conducted for "the benefit of mankind".

Patenting involves exclusive rights for the patent holder, and thus implies that the patent holder can deny others using the idea in the patent or accepting use only under certain conditions. Hence, one might say that patenting involves a form of privatisation of the knowledge in the patent. This raises the question of whether patenting inventions related to MGRs can be said to be for "the benefit of mankind".

The term is discussed above under section 4.4.3.

Article 143(1) of the LOSC implies a duty to take into consideration the interests of the humanity as a whole. It is in general difficult to elaborate more in detail on the contents of the provision. However, it is clear that it must be read in the light of the more detailed provisions on MSR in the LOSC.

Hence, the provision serves to emphasise, among other things, the duty to publicise MSR results in accordance with the LOSC Article 244(1). Because the disclosure of patent applications involve the publication of the patent, it is difficult to see why patenting would not be in

the "benefit of mankind". Patenting is an essential part of modern science,[297] and thus seems to be a prerequisite for financing scientific research on the biodiversity of the oceans. Thus, it leads to both publication of knowledge stemming from the MGRs of the Area and financing research on MGRs.

Consequently, even though there are counter-arguments, the most reasonable conclusion is that patenting is not in violation of the "benefit of mankind" requirement in Article 143(1) of the LOSC.

5.8 Conclusions

This section investigated whether the duties under the LOSC and TRIPS conflict, and concluded that they do not. Instead, it is natural to say that the two agreements consistently balance the interest in open data with the interest in protecting intellectual property.

There is, however, some discretion as to implementation in both conventions that allows for exceptions to patent rights in instances where the user conducts scientific research. Thus, states should take notice of the purpose of openness about MSR in the LOSC and implement their TRIPS obligations accordingly. While a state may consider how it wants to strike the balance between these two interests, it must follow the minimum requirements of the LOSC regarding these questions.

[297] Abrell (2010) p. 337.

6 Conclusions and ending remarks

6.1 Conclusions on the research question

In this thesis the research question was:

> *Does the LOSC read in relation to relevant public international law, grant access to and require the benefit-sharing of MGRs?*

After the discussion above, we can conclude that the answer is far from obvious. The LOSC was not made and does not necessarily fit easily with the activity of bioprospecting.

In areas under national jurisdiction, the LOSC must be read in relation with the CBD and the NP. These two treaty system can be implemented consistently with each other as the purpose was with the establishment of the CBD and the NP.

In areas beyond national jurisdiction, there is no resource exploitation regime for MGRs. The CBD and the NP does not apply to the MGRs beyond national jurisdiction. There are substantial difficulties related to separating between seabed and water column MGRs. The mineral resources regimes is, as seen in section 3.4 not relevant to MGRs. This implies that the MGRs beyond national jurisdiction cannot be characterised as the common heritage of humankind. However, this does not imply that benefit-sharing can be established in the future.

If bioprospecting can be defined as MSR, as I have answered in the affirmative, then the LOSC contains both access and benefit-sharing provisions in areas beyond national jurisdiction. With regards to access, the LOSC grants wide access to rights to states wanting to explore MGRs beyond national jurisdiction. With regards to benefit-sharing, the LOSC does not establish sharing of financial benefits, but nonetheless requires the sharing of information deriving from research on these resources. This can be valuable to other states.

Contrary to what have been suggested in the literature, the most reasonable conclusion seems to be that the international patent treaty system studied in the thesis is consistent with the access and benefit-sharing provisions of the LOSC. However, there are pitfalls concerning secrecy related to patenting.

6.2 Remarks: Challenges for a new bioprospecting regime in areas beyond national jurisdiction

What does these conclusions imply for the discussions on a new legally binding instrument on the biodiversity of areas beyond national jurisdiction?

Even though the LOSC in its current form have many shortcomings, this analysis shows that it fulfils many of the purposes behind the sharing of genetic resources. If bioprospecting is considered as MSR, there is no legal "black hole". However, there are obvious legal lacunas.

There are some difficult challenges in current law that needs to be considered by the treaty parties.

6.2.1 The sedentary species problem

There are substantial difficulties when separating between MGRs under and beyond national jurisdiction where the continental shelf of the coastal state extends beyond the EEZ.[298] As seen under section 2.2.4 and 2.2.5, the sedentary species definition is difficult to apply on species relevant for MGRs.

A suggested solution to this problem is to replace the difficult sedentary species-definition with an ecosystem approach.[299] An ecosystem can be defined as a "unit of ecology which includes their plants and animals occurring together plus that part of their environment over which they have an influence."[300] The new instrument could for example establish that the ecosystems of the continental shelf is under national jurisdiction, while ecosystems of the adjacent water column beyond the EEZ would be under the scope of the new instrument.

This approach would have the benefit of building on a scientific method of separating between the living resources of the continental shelf and the water column. In addition, it would create a natural link between the exploitation and conservation of the biodiversity of the seabed. Conservation of particular species makes little sense; the ecosystem must be conserved

[298] Mossop (2018) p. 449.
[299] Mossop (2018) p. 448.
[300] Sands (2012) p. 13, with further reference.

as a whole, in an integrated manner.[301] However, due to the low knowledge on seabed species in general,[302] this approach is no quick fix as there still will be challenges of separating between different ecosystems.

6.2.2 The problem of separating between bioprospecting and MSR

Many states argue that the new legally binding instrument on areas beyond national jurisdiction should include a benefit-sharing regime for MGRs.[303] This is also mentioned in the Report of the Preparatory Committee, implying that this will be a subject for discussion in the upcoming negotiations.[304]

A separate regime on bioprospecting would require the new instrument to separate between bioprospecting and MSR.

However, this is easier said than done. The separation is becoming increasingly difficult to make as scientific research and economic activities are becoming more and more connected with each other. First, economic actors are becoming increasingly involved in the financing of researching activities.[305] This is particularly the case for utilization of genetic resources where pharmaceutical companies have important interests.[306] Second, researching institutions themselves, for example universities, are increasingly involved in the commercialization of the research results.[307] Hence, the commercialization of scientific research is happening at two fronts.

One suggested solution is to build on the intention of the researcher. Where there is no economic intent, the activity would constitute MSR, and not bioprospecting.

However, this solution does not solve the problem of intention changes. This could for example be the case where the researcher stores the genetic material and then later finds out it

[301] Sands (2012) p. 345.
[302] Korn (2003) p. 39.
[303] Vierros (2016) p. 33.
[304] Preparatory Committee (2017) p. 11-12.
[305] Abrell (2010) p. 337.
[306] Abrell (2010) p. 337.
[307] Abrell (2010) p. 337.

could have commercial uses, or where others with a commercial intent gets access to the product.

Another possible solution would be to apply the new benefit-sharing regime to all uses of genetic resources, either scientific or commercial. If this solution is implemented, this would be a limit to the right of conducting MSR in areas beyond national jurisdiction. Hence, the parties then face the risk of placing impediments on MSR in these areas. As the knowledge gained from MSR seems necessary to conserve ocean biodiversity, this could be unfortunate.

A side effect of implementing a benefit-sharing regime for genetic resources beyond national jurisdiction is that it seems to strengthen the perception of genetic resource use as "resource exploitation" under the LOSC.[308] This would have the effect that the coastal state have sovereign rights to the genetic resources of the sedentary species and can require benefit-sharing of the given resource.[309] In contrast, if bioprospecting is considered as MSR, the coastal state cannot require benefit sharing on the use of sedentary species as this would be in violation of the LOSC.[310] Hence, a benefit-sharing mechanism for the areas beyond national jurisdiction could lead to increased coastal state jurisdiction at the cost of others.

6.2.3 The "in-situ"-approach of the LOSC

Even though the LOSC effect not only oceans, but land areas as well, the main focus of the convention is on activities taking place at sea. In other words, the LOSC builds on an "in-situ" approach. In relation to exploitation of living resources the main focus is on fishing.

Contrary to this, the utilization of MGRs involves the use of information from the genetic resource.[311] The value adding process takes place on shore and consist of the use of human creativity. The process can also take a substantial amount of time.

All of these factors imply that the approach of the LOSC is insufficient to secure the sharing of benefits derived from genetic resources. The control of activities at sea is not sufficient to

[308] Cf. the LOSC Articles 56(1)(a) and 77(1).
[309] See this thesis section 2.2.4.
[310] See this thesis section 4.3.4.
[311] Tvedt (2016) p. 231.

secure the benefits from the use of MGRs. Some kind of enforcement mechanism seems necessary to ensure the effectiveness of a benefit-sharing mechanism. Enforcement would seem to apply the need for information on the use of the genetic resource.

The use of patents to protect ideas building on MGRs implies that a potential benefit-sharing mechanism must address the international patent system. This seems central to secure the benefits deriving from the use of MGRs. There must be an interrelationship between different legal regimes, on land and at sea. In relation to MGRs, the LOSC, international biodiversity instruments and international patent instruments must be seen in relation to each other to establish a successful regime on MGRs.

All of these elements, the problem of separating between the MGRs under and beyond national jurisdiction, the difficulty of separating between bioprospecting and MSR under the LOSC and the enforcement difficulties of the LOSC, seems to lead to the conclusion that a new bioprospecting regime should build on and enforce the current MSR-regime. This would imply that the jurisdiction over the activity builds on where the activity takes place, and not on the LOSC characterisation of different species. It also means that there is less need for separating between MSR activities and bioprospecting, as building on the current regime would imply a continuation of the right to conduct MSR activities. The new regime should also address the relationship between existing MSR obligations and IPR, to improve the balance of interests between these two systems and ensure that IPR do not impede development of knowledge on the marine environment.

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