



Hermes in the Realms of Poseidon

An odyssey pursuing an equitable framework addressing high seas bioprospecting

By Ann Jessica Lien

Candidate no. 9

Small Master's Thesis
Masters of Laws in Law of the Sea
UiT The Arctic University of Norway
Faculty of Law
Fall 2013

Table of Contents

Acronyms	iv
<hr/>	
Chapter 1 - Introduction	1
1.1 Thematic Outline	1
1.2 The Legal Context	3
1.3 Sources and Methodology	4
1.4 Exodus Regulative Doldrums?	5
<hr/>	
Chapter 2 – Contemporary Law	7
2.1 Living Marine Resources	7
2.2 Bioprospecting	8
2.3 Areas Beyond National Jurisdiction	9
2.4 The Legal Status of Bioprospecting in the Commons	10
2.4.1 A High Seas Activity	11
2.4.2 Marine Scientific Research	12
2.4.3 An Unprecedented Concept?	21
2.5 The Legal Status of Genetic Resources in the Commons	22
2.5.1 The Continental Shelf	23
2.5.2 Abyssal Resources	24
2.5.3 Intellectual Property Rights	26
2.5.4 Appropriation in Areas Beyond National Jurisdiction	29
2.5.5 Environmental obligations	31

Chapter 3 – Access and Equitable Sharing of Benefits	34
3.1 The Concept	34
3.2 The Convention on Biological Diversity	35
3.2.1 The Nagoya Protocol	37
3.3 The FAO Treaty	38
3.4 Regulative Options	41
3.5 An International Agreement Under Siege?	44
Chapter 4 - Conclusions	47
Bibliography	50

Acronyms

ABNJ	Areas beyond national jurisdiction
ABS	Access and benefit-sharing
CBD	Convention on Biological Diversity
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
COP	Conference of the parties
EEZ	Exclusive economic zone
FAO	Food and Agriculture Organization of the United Nations
FAO Treaty	International Treaty on Plant Genetic Resources for Food and Agriculture
ISA	International Seabed Authority
LOSC	United Nations Convention on the Law of the Sea
MTA	Marine Transfer Agreement
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UNTS	United Nations Treaty Series
VCLT	Vienna Convention on the Law of Treaties

Chapter 1 - Introduction

1.1 Background

The ocean hosts an unprecedented wealth of biodiversity. Deep sea habitats are alone estimated to contain between 500,000 and 10 million species, and even though oceans constitute about 95 % the biosphere, vast parts are yet to be explored.¹ Technological development is facilitating exploration in more remote and extreme spheres, including areas beyond national jurisdiction. Deep sea exploration started in the 1970s, but merely 5 % of the saline hydrosphere is thus far scrutinized by oceanographers.² Hence, we especially lack sufficient understanding of the biota in extreme domains of perpetual darkness, low temperatures and high pressure.³ These pristine areas appear to be particularly interesting to explore because organisms living under extreme conditions often embody distinctive survival systems. Over the last decades there has been an increasing interest in commercial opportunities relating to exploration and exploitation of marine biological material.

The Organisation for Economic Cooperation and Development (OECD) nations are diversifying their economies and are thus highlighting marine bioprospecting as a prioritized area with significant commercial potential.⁴ Because the ratio of compounds with practical pharmaceutical potential to compounds screened is higher in marine materials, there is a greater probability of commercial success compared to terrestrial resources.⁵ During the initial phase of bioprospecting, the main goal is to find ingredients, chemical compounds or genes that can be applied in products. From an industrial perspective, relevant interests relate to medicine, nutrition, cosmetics and process industries, including oil, gas and biofuel. For example, marine organisms native to oil wells can potentially be used to explore and produce

¹ J. F. Grassle and N. J. Maciolek, 'Deep-sea species richness: regional and local diversity estimates from quantitative bottom samples' [1992] *The American Naturalist* 313; Secretariat on the Convention on Biological Diversity, Marine and Coastal biodiversity, available at <<http://www.cbd.int/undb/media/factsheets/undb-factsheet-marine-en.pdf>> accessed 16 May 2013.

² National Oceanic and Atmospheric Administration (NOAA), available at <<http://www.noaa.gov/ocean.html>> accessed 18 May 2013.

³ D.K. Leary, 'Bioprospecting and the Genetic Resources of Hydrothermal Vents on the High Seas: What is the Existing Legal Position, Where Are we Heading and What are our Options?' [2004] *Macquarie Journal of International and Comparative Environmental Law* 137.

⁴ OECD, Global Forum on Biotechnology: Marine Biotechnology – Potential and Challenges, available at <<http://www.oecd.org/sti/biotech/oecdglobalforumonbiotechnologymarinebiotechnologypotentialandchallenges.htm>> accessed 15 May 2013.

⁵ Food and Agriculture Organization of the United Nations, Report of the Workshop on Bioprospecting in the High Seas, 2003, available at <<http://www.fao.org/docrep/008/y5890e/y5890e0d.htm>> accessed 24 May 2013; United Nations, Summary of proceedings prepared by the Co-Chairs of the Working Group, I/A/10, available at <<http://www.un.org/depts/los/biodiversityworkinggroup/biodiversityworkinggroup.htm>> accessed 22 July 2013.

energy more effectively, while organisms in polar rivers can culture valued defense mechanisms. Specifically sedentary species which have developed chemical compounds that restrain competitors, parasites and predators are among the organisms of interest to pharmaceutical bioprospectors.⁶ In the same sector, several promising anti-cancer products derived from marine compounds are under development. A report compiled by the US Ocean Commission features multiple drugs derived from marine biological material, including ten anti-cancer drugs, medicines to combat HIV, dengue, malaria and tuberculosis.⁷ The biological diversity in areas beyond national jurisdiction can thus yield a broad variety of healthcare innovations. Hence, there is consensus amongst marine scientists and industrialists that the genetic resources found in deep sea habitats carry considerable commercial potential. There are currently multiple companies involved in research and exploitation of genetic resources in e.g. the Arctic, and an analogous amount of patent applications clearly indicates that this industry is well established.⁸

However, deep ocean expeditions are still notoriously costly and technically challenging, and this may thus far have restrained the ability to exploit and explore the ocean's common resources. The value of a new biotech solution or a company heavily invested in scientific endeavors can be difficult to estimate as one has to take into account intangibles such as the credibility of its scientists and its patent portfolio.⁹ Further, it takes between seven to nine years to launch a new drug to the market and the process usually involves hundreds of millions of dollars. Biotechnology entrepreneurs as a consequence often secure their investment by using patents, as routine earnings often are absent.¹⁰ If laboratory trials are successful, non-routine profits may be vast. Thus, bioprospecting often requires a long-term perspective, interdisciplinarity, business expertise, generous capital reserves as well as a corresponding risk

⁶ D. Farrier and L. Tucker, 'Access to Marine Bioresources: Hitching the Conservation Cart to the Bioprospecting Horse' [2001] *Ocean Development and International Law* 213.

⁷ US Commission on Ocean Policy, *Connecting the Oceans and Human Health, An Ocean Blueprint for the 21st Century*, 2004, available at <http://govinfo.library.unt.edu/oceancommission/documents/full_color_rpt/23_chapter23.pdf> accessed 26 June 2013; National Oceanic and Atmospheric Administration, *Medicines from the sea*, 2013, available at <http://www.noaa.gov/features/economic_0309/medicines.html> accessed 26 June 2013.

⁸ D. Leary, *UNU-IAS Report: Bioprospecting in the Arctic*, 2008, available at <http://www.ias.unu.edu/sub_page.aspx?catID=111&ddlID=674>

⁹ K. Allen, *Entrepreneurship for Scientists and Engineers* (Pearson 2010).

¹⁰ J. Hand and L Baruch, *Intangible Assets* (Oxford University Press 2003).

appetite.¹¹ Nonetheless, because of the high costs of these cruises, scientists in the public sector are also increasingly acquiring external funding and participating in joint ventures with industry.¹² Are these novel concepts and relationships accounted for in the current legislative framework? The next section will identify potential legislative gaps.

1.2. The Legal Context

The principal source of legislation is in this context the Law of the Sea (LOSC) as it intends to regulate “all uses of the oceans and their resources.”¹³ Further, the Convention on Biological Diversity (CBD) is a complementing legal source covering the biological material in question, in particular sustainable use of natural components and equitable sharing of benefits obtained from genetic resources.¹⁴ The zonal approach in the LOSC has codified state jurisdiction of their adjacent continental shelves and economic zones. However, parts of the ocean that are located beyond the scope of any nation’s jurisdiction traditionally have fewer restrictions than other zones closer to the coastal shore.

In the 1970 UN Declaration of Principles Governing the Seabed and Ocean Floor resources are described generally, which could imply that they cover living resources.¹⁵ The LOSC Part XI Art. 133 diverge from this definition by limiting the scope exclusively to minerals; this part does as a consequence not cover harvest of genetic resources in, on or under the Area. The LOSC does not specify which regime is applicable to marine genetic resources in areas beyond national jurisdiction nor do the LOSC and CBD refer to or define the concept of bioprospecting. Hence, consistent with the freedom of the high seas, there are no apparent restrictions on bioprospecting for marine genetic resources from organisms found on the ocean floor. Legislation effectively regulating commercial access to marine biological material is

¹¹ K. Allen, *Entrepreneurship for Scientists and Engineers* (Pearson 2010); Regjeringen, *Marin bioprospektering - en kilde til ny og bærekraftig verdiskaping*, available at <<http://www.regjeringen.no/en/dep/fkd/Documents/reports-and-plans/plans/planer-og-strategier-2009/marin-bioprospektering--en-kilde-til-ny-.html?id=575822>> accessed 13 May 2013.

¹² S. A. Shane, *Academic Entrepreneurship: University Spinoffs And Wealth Creation* (Edward Elgar Publishing 2004).

¹³ UN Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1996) 1833 UNTS 3; UN Convention on the Law of the Sea of 10 December 1982, Overview and full text, available at <http://www.un.org/depts/los/convention_agreements/convention_overview_convention.htm> accessed 10 May 2013.

¹⁴ Convention on Biological Diversity 1760 UNTS 79 (adopted on 5 June 1992, entered into force 29 December 1993).

¹⁵ UNGA Res 2749 (12 December 12 1970).

thus absent. The LOSC contains rights and obligations on similar activities; “marine scientific research” is for example a comparable concept mentioned as one of the high seas freedoms, but there are significant differences between bioprospecting and marine scientific research. In the LOSC, marine scientific research requires publication and dissemination of research results, while bioprospectors rather on the contrary tend to regularly protect scientific solutions through patents to secure their investment. Not only may intellectual property rights conflict with the LOSC provisions that prescribe actively promoting and communicating research results, they also contribute to inequalities as salient information is unevenly distributed among nations. Advanced states host more resourceful institutions and have better access to technological equipment required in high seas operations. Of the patents deposited on marine genes, there are ten countries who own 90 % of these rights, and 70 % are affiliated with the top three, which are USA, Germany and Japan.¹⁶ As a response to this division in capacities to access and benefit from the ocean’s commons, several nations have through the United Nations General Assembly (UNGA) Ad Hoc Open-ended Informal Working Group (henceforth the Working Group) proposed to develop a more sustainable and equitable approach to high seas governance.

The legal gap relating to bioprospecting and genetic resources is problematic because it generates uncertainty and diverging practices, which in turn may neglect mechanisms supporting innovation and economic development where it is needed the most. The vacuum surrounding these biological resources are thus becoming a pressing issue for legislators. As marine biodiversity in areas beyond national jurisdiction is a highlighted topic in the international community, the UN prompts that establishing realistic regulative options is necessary.

¹⁶ S. Arnaud-Haond et al, Marine Biodiversity and Gene Patents, 2011, available at <http://www.imedea.uib-csic.es/~txetxu/Publications/Arnaud-Haond_2011_Marine.pdf> accessed 11 June 2013.

1.3 Sources and Methodology

The sources of law codified in article 38 of the Statute of the International Court of Justice are the rudimentary methodological approach throughout this thesis.¹⁷ The most sophisticated instrument addressing ocean regions beyond national jurisdiction, the LOSC, along with its now intrinsic high seas and continental shelf segments, shall constitute the primary convention source. To shed light on bioprospectors rights and obligations in connection with innovations based on marine biological resources, the WTO Agreement on trade-related aspects of Intellectual Property Rights (TRIPS) will provide the legislative material.¹⁸ The third section of Vienna Convention on the Law of the Treaties (VCLT) will be utilized for interpreting the essence of the legal provisions.¹⁹ Furthermore, literature from scholars within relevant scientific areas, from natural resources to politics, is used to reflect upon the contemporary debate. Judicial decisions are scant in this field and can thus not comprise a significant source when canvassing the bioprospecting theme.

In the examination of potential access and benefit-sharing regimes, the above-mentioned instruments and institutions are relevant. Nevertheless, since regulation of biotechnology is multi-sectoral, involving actors and dimensions from many distinct issue segments, such as technological development, food safety, agriculture and environmental protection, the legal focus will be largely on the CBD, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (Nagoya Protocol) and the FAO International Treaty on Plant Genetic Resources for Food and Agriculture (FAO Treaty).²⁰ In addition, the regulative indications made in the Working Group under the auspices of UNGA, the leading deliberative and policy-making unit of the UN, are interesting with regard to the current debate. On the other hand, it is important to note that the Working Group only holds a suggestive function. Still, this forum up is updated on the matters in question, and since these discussions may yield future legislation, the opinions expressed may

¹⁷ Statute of the International Court of Justice, United Nations, 26 June 1945, article 38.

¹⁸ Agreement on Trade-Related Aspects of Intellectual Property Rights (adopted 15 April 1994, entered into force 1 January 1995).

¹⁹ Vienna Convention on the Law of the Treaties (adopted 23 May 1969, entered into force 27 January 1980) 1155 UNTS 331.

²⁰ International Treaty on Plant Genetic Resources for Food and Agriculture (adopted on 3 November 2001, entered into force 29 June 2004) 2400 UNTS 303; 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 (adopted 29 October 2010, not yet in force).

constitute essential supplements when assessing the contemporary debate. In general, these bodies are selected because related issue areas have been addressed therein.

1.4 Exodus Regulative Doldrums?

By the end of the 69th UNGA session, states have consented to discuss conservation and sustainable use of the ocean, which also encompass considering an international instrument implemented under the LOSC.²¹ The Working Group is thus far established as the main forum to research and discuss matters relevant to areas outside national jurisdiction. This venue is interesting because it may comprise a potentially normative function. Henceforth, “marine genetic resources, including questions on the sharing of benefits, measures such as area-based management tools, including [...] capacity-building and the transfer of marine technology” – are set to be debated.²² Access to marine biological material and the equitable sharing of their benefits is a pivotal yet controversial concept in contemporary international law. The problem of translating socioeconomic fairness and sustainable development into substantive arrangements has generated a significant governance challenge. The European Union (EU), representing a substantial part of the world economy, states that status quo is not acceptable and has therefore suggested that the existing FAO Treaty could serve as a reference point for an agreement regarding areas outside national jurisdiction. In this approach, balancing access and benefit-sharing is regarded as vital. Regarding the outline, a brief structural guide follows. In the forthcoming chapter, the legal status of bioprospecting and genetic resources in areas beyond national jurisdiction will be investigated. Herein, the potential conflict between intellectual property rights and the duty to publicize scientific research will be assessed. In the third chapter, feasible access and benefit-sharing mechanism will be analyzed and regulative alternatives concerning benefits derived from commercial exploration of marine biota are examined. Due course, the question of whether and how regulation should expand, and if so, where the supervisory mandate could be placed will be addressed. Finally, the options for complementing and strengthening the current framework will be featured.

²¹ UN, Opening dates of forthcoming regular sessions of the General Assembly and of the general debate, available at <http://www.un.org/ga/search/view_doc.asp?symbol=A/INF/67/1> accessed 11 June 2013; United Nations General Assembly, Res 66/288 (27 July 2012) UN Doc A/Res/66/288.

²² United Nations, Letter dated 30 June 2011 from the Co-chairs of the Ad Hoc Open-ended Informal Working Group to the President of the General Assembly, available at <<http://www.un.org/depts/los/biodiversityworkinggroup/biodiversityworkinggroup.htm>> accessed 23 June 2013.

Chapter 2 - Contemporary law

2.1 Living marine resources

The term “genetic resources” is not located in the LOSC, and has as a consequence been debated throughout the decades following its conclusion.²³ At the time of the LOSC drafting, knowledge of marine genetic resources were scarce due to inadequate exploration equipment and hence high research and development costs crippled the feasibility of commercial activities.²⁴ The meaning of biological resources shall thus *inter alia* be established by interpreting its object and purpose, pursuant to article 31 (1) of the 1966 VCLT, which states that “a treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose.” Consistent with the Preamble of the LOSC, it is natural to assume that genetic resources are included in the provisions covering living resources.²⁵ Furthermore, the Conventions capacity to adapt to change corresponds with the theory of evolutionary interpretation.

In order to more substantively assert the meaning marine genetic resources, the definitions in Article 2 of the CBD may clarify. The LOSC has multiple times been endorsed by the COP of the CBD as a legislative framework concerning marine areas beyond national jurisdiction.²⁶ According to the provisions of CBD, biological resources comprises of “genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity.” Genetic material contains “any material of plant, animal, microbial or other origin containing functional units of heredity,” while genetic resources equals “genetic material of actual or potential values.” Since there is no universally accepted definition of marine genetic resources, this may be the most precise wording in this

²³ National Jurisdiction at the 4th Global Conference on Oceans, Coasts, and Islands, April 7-11, 2008.

²⁴ L. Glowka, The Deepest of Ironies: Genetic Resources, Marine Scientific Research, and the Area (1996) *Ocean Yearbook* 154.

²⁵ LOSC, Preamble, para. 1.

²⁶ CBD, Conference of the Parties (COP), available at <<http://www.cbd.int/cop/>> accessed 22 June 2013; COP 7, Decision VII/5: Marine and coastal biological diversity, 31, available at <<http://www.cbd.int/decision/cop/default.shtml?id=7742>> accessed 23 June 2013; COP 8, Decision VIII/21: Marine and coastal biological diversity: conservation and sustainable use of deep seabed genetic resources beyond the limits of national jurisdiction, 6, available at <<http://www.cbd.int/decision/cop/default.shtml?id=11035>> accessed 23 June 2013; COP 9, Decision IX/20: Marine and coastal biological diversity, available at <<http://www.cbd.int/decision/cop/default.shtml?id=11663>> accessed 23 June 2013.

regard. From this one can confirm that genetic resources are a subsegment of biological resources. A broad definition of biological material is adopted in the following sections. The definition will thus be pursuant to the above-mentioned CBD description where; marine animals, plants, microorganisms and functional units thereof, including heredity of potential or actual value, is covered by “marine genetic resources”, “marine biological resources” and related terms naturally associated with living organisms.

2.2 Bioprospecting

Bioprospecting is neither applied nor described in the LOSC nor the CBD. There is thus no legally binding definition of bioprospecting or international regime governing these activities in areas beyond national jurisdiction. As a consequence, the concept appears to encompass a broad spectrum of activities.²⁷ The International Expert Group convened by the Research Council of Norway describes bioprospecting as being “commercial purpose research and development, building on use of natural occurring compounds, all the way from first discovery, over patenting, benchmarking, improvement, development and commercialization.”²⁸ In the same manner, the CBD information paper asserts bioprospecting as commercially oriented, where bioprospecting is defined as “the process of gathering information from the biosphere on the molecular composition of genetic resources for the development of new commercial products.”²⁹ This understanding does not allow for purely scientific studies of genetic resources to be defined as bioprospecting. In this context, “pure” research is associated with academia and public research institutions where the main objective is to better understand fundamental aspects of nature, while “applied research” is motivated rather by solving practical problems and achieving commercial success. However, pure research may at later stages evolve into applied research, when compounds capable of solving practicalities are discovered.

²⁷ S. Arico and C. Salpin, C, UNU-IAS Report: Bioprospecting of Genetic Resources in the Deep Seabed: Scientific, Legal and Policy Aspect, 2005, available at <<http://www.ias.unu.edu/binaries2/DeepSeabed.pdf>> accessed 16 May 2013.

²⁸ The Research Council of Norway, Possibilities for a bioprospecting commitment in Norway 2008 — 2020: An assessment by an International Expert Group.

²⁹ CBD, Subsidiary Body on Scientific, Technical and Technological Advice, note by the Secretariat on Bioprospecting on the Deep-Seabed, 24 July 1996, available at <<http://www.iisd.ca/biodiv/sbstta/sb215.html>> accessed 20 June 2013; COP 5, Decision V/2: Progress Report on the Implementation of the Programme of Work on the Biological Diversity of Inland Water, available at <<http://www.cbd.int/decision/cop/default.shtml?id=7144>> accessed 20 June 2013.

The UN Secretary General further recognized the commercial aspects of bioprospecting and also noted the absence of a universally accepted definition of bioprospecting. He thus in parallel stipulated that bioprospecting is “generally understood, among researchers, as the search for biological compounds of actual or potential value to various applications, in particular commercial applications.”³⁰ The last emphasis indicates that both “pure” and “applied” research can be considered bioprospecting. As demonstrated, the concept is complex and definition of the term is hence disputed, but this thesis will nevertheless apply the broadest interpretation of bioprospecting, which includes commercial research which initially may have been purely academic. Moreover, a wide definition is applied so as to better reflect the problems arising from the lack of substantive content in an emerging concept, which also entails the equally challenging absence of adequate legislation that follows.

2.3 Areas Beyond National Jurisdiction

The LOSC applies a zonal approach, where each sphere contains varying degrees of rights and obligations. The Grotian concept of freedom of the high seas is echoed in the LOSC Article 87, and it follows that both coastal and landlocked states may take advantage of these areas of open access. Article 87 encloses a non-exhaustive list of freedoms, one of the later additions, made after the 1958 Convention, is the capacity to conduct scientific research.³¹ Bioprospecting is not among the freedoms explicitly listed in Article 87 (1). While some argue that this is because it’s a part of the freedom to conduct scientific research, others claim that it’s rather because the list of enumerated freedoms are incomplete, which is indicated by the preliminary use of “inter alia”. Marine usages that were not anticipated at the time of the LOSC drafting can accordingly be covered by this provision. Because biological resources are not a part of the Convention’s Part XI Area regime, genetic resources both in the water column beyond the EEZ boundary and the ocean floor beyond the limits of the continental shelf, are subject to high seas freedoms.³² These freedoms are to be exercised with due regard to other states’ interest in the LOSC Area, and in conformity with other corresponding parts of

³⁰ United Nations, A/62/66, para. 150, 12 March 2007.

³¹ D. R. Rothwell and T. Stephens, *The international Law of the Sea* (Hart Publishing 2010) 155.

³² A. Proelss, ABS in Relation to Marine Genetic Resources, in E.C. Kamau & G. Winter (eds.), *Genetic Resources, Traditional Knowledge and the Law* (Earthscan Publishers 2009) 63-64.

international legislation.³³ This freedom is thus not absolute. States may restrict the extent of the high seas bioprospecting activities by regulating watercrafts flying their flag, as well as the nation's corporations and individuals. However, the states capacity to regulate activities and resources on the high seas are equally limited by corresponding LOSC provisions. For example, states must make sure that national bioprospectors doesn't interfere with scientific research or licit mining operations conducted in the Area. Further, it's not possible to disregard the general duties to preserve and protect the environment.³⁴ The LOSC Articles 116 to 120, addressing management and conservation of living resources, contains obligations as well. These environmental measures are backed by CBD Article 7 (c) demanding identification and supervision of activities and processes that can damage biodiversity. Moreover, the biological material should not be used exclusively for military purposes.³⁵

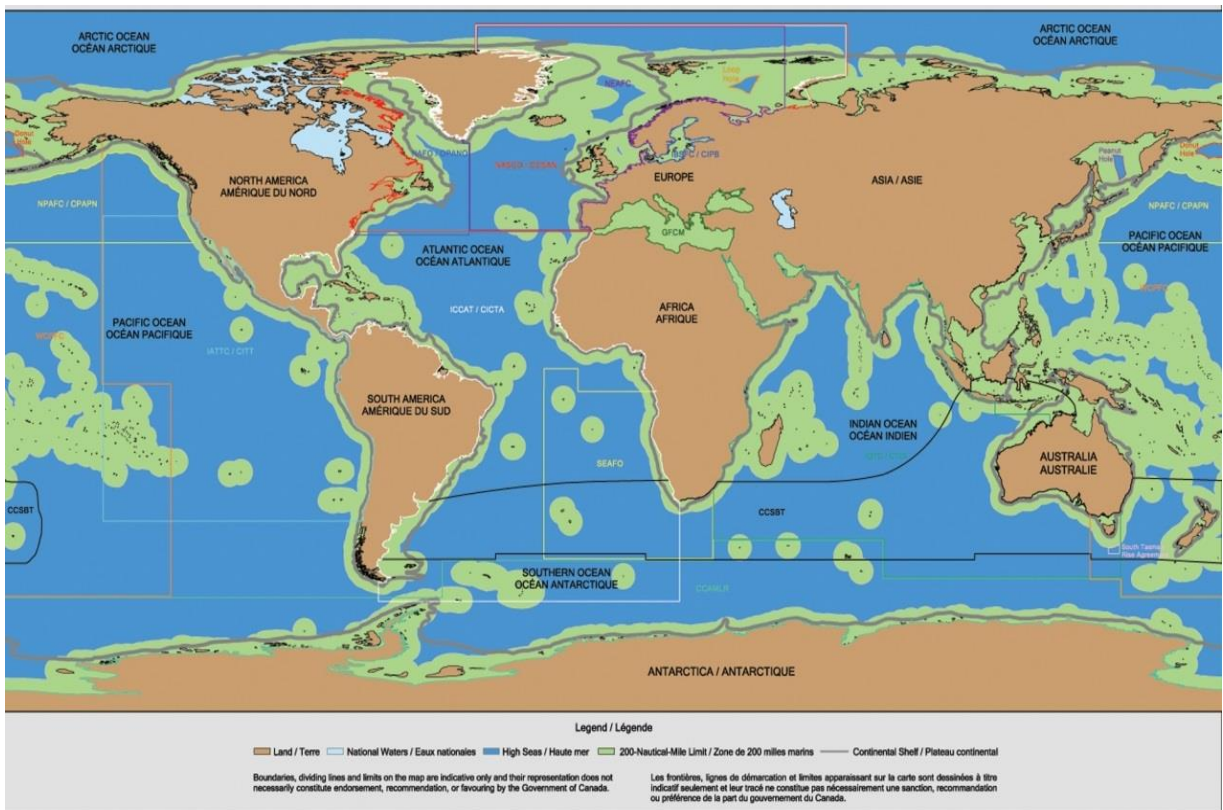


Figure 1. Areas beyond national jurisdiction in blue.

³³ LOSC, art. 87 (3).

³⁴ *ibid*, art 192, 194 to 196; 204.

³⁵ *ibid*, art 88 and 141.

2.4 The Legal Status of Bioprospecting in the Commons

It is clear that the current international system is insufficiently crafted with regard to bioprospecting. This section will feature an analysis focusing on bioprospecting as an activity, to further shed light on how it is regulated under the LOSC and related instruments. It will detect legal grounds that may cover bioprospecting and examine different conditions that follow from the existing legal backdrop. The second section will be resource-oriented, which will enable identifying the legality of bioprospecting natural resources.

The LOSC Part VII announces that the high seas are equally open to all. If bioprospecting is subject to this part, then biological resources are open for all and bound by the obligations that ensue. A central question is thus how the freedoms of the high seas relate to bioprospecting. Article 87 lists activities that are subject to such a freedom: navigation, fishing and scientific research. But the non-exhaustive nature of this catalog leaves room for different interpretations, and a closer look at the relationships between the listed activities and bioprospecting is further needed to resolve essential features of its legal status.

2.4.1 A High Seas Activity

The flag state has exclusive jurisdiction on the high seas, and the connection between the vessel and the state shall accordingly be qualified by a genuine link.³⁶ Sampling biological material involves supplementary activities and generating earnings from more than mere transportation. The diverging objectives of the activities indicate that navigation provides inadequate coverage for bioprospecting. One also has to take into account the different levels of stringency in the distinctive zones of the LOSC. Related activities carried out in the EEZ and on the continental shelf, such as marine scientific research, are subject to the consent of the coastal state, while exploring and exploiting resources is dependent on the coastal state's sovereign rights.³⁷ Further, conducting scientific research in the territorial waters of another state may be deemed non-innocent and can thus be regulated by the coastal state.³⁸ Yet, this doesn't mean that high seas navigation necessarily is exposed to the same rights and duties as

³⁶ LOSC, art 92; 91.

³⁷ *ibid.*, art 246; 56.

³⁸ *ibid.*, art 21.

other zones, but there are neither indication suggesting a broader interpretation for the high seas compared to the EEZ. Hence, the natural interpretation of navigation and bioprospecting, implies that bioprospecting is not a high seas freedom on the grounds of being associated with navigation. Likewise, navigation is a necessity and a prerequisite for bioprospectors on the high seas, and will thus be an integral part of the cruise. Bioprospectors therefore cannot ignore the basic provisions on navigation, but neither does it provide satisfactory coverage.

Fishing is another bordering high seas freedom enlisted in the LOSC Article 87. Can bioprospecting be considered to be “fishing” and thus be open to all states? The LOSC doesn’t define fishing, and fishing for commercial utilization will serve as a suitable reference in this regard. Like fishing, collecting living resources from the sea is an inherent part of bioprospecting, also, they exploit living resources for predominantly commercial purposes. Yet, these activities are not identical. Some legal instruments contain broad definitions of fish; e.g. non-sedentary molluscs and crustaceans found in the 1995 Fish Stocks Agreement, still bioprospectors amass a greater diversity of species compared to a merchant fishing vessels.³⁹ Further, it’s not customary to use “fishing” nor “harvesting” when sampling marine biological material, also high seas fishing intend to maximize yield by harvesting large quantities of the resource, while bioprospecting in contrast doesn’t profit from the volume, but instead detect material with commercial potential. Products derived from fish have a concentrated market, where it’s predominantly valued as a source of food. Genes gathered during bioprospecting activities are in comparison exposed to a fragmented market targeting diverging segments, and is therefore not only applicable to the food industry, but largely also in the health, alternative energy and cosmetic sectors. Altogether, use, objectives and collecting methods can differ substantially, and as a consequence the substantive content of the terms “fishing” and “bioprospecting” are not very compatible.

2.4.2 Marine Scientific Research

A number of compelling regime changes evolved during the LOSC law-making negotiations on marine scientific research. Both customs and convention were altered in the process.

³⁹ United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks (adopted on 4 December 1995, entered into force 11 December 2001) 2167 UNTS 88, art 1 (c)

Coastal state jurisdiction over marine scientific research expanded; the territorial sea was broadened, the 200 nm continental shelf and the new, equally broad exclusive economic zone (EEZ) manifested itself.⁴⁰ The jurisdictional scope was also extended in terms of ability to withhold consent to conduct marine scientific research in the EEZ and on the continental shelf.⁴¹ Part VI covering the continental shelf, restrains the conduct of marine scientific research on the seabed, since this territorial segment is subject to coastal state's sovereign rights. "Scientific research" is not defined in LOSC, which is also the case for the extended term, "marine scientific research", and LOSC does not clearly resolve whether these concepts are to be interpreted separately or as a consolidated unit.⁴² Article 87 explains that the freedom of scientific research is to be read in conformity with Parts VI and XIII, the latter specifically devoted to marine scientific research, which indicates interchangeability. Part XIII are to be applied when the scientific research is considered "marine", e.g. largely when research is directly involved with the saline hydrosphere. Data collected at sea intending to study non-maritime spheres, such as astronomical or atmospheric surveys, does not qualify as marine scientific research, and is thus not a part of the LOSC regime.⁴³ Scientific research conducted outside the subsoil, ocean floor, water column or surface of the marine environment is neither subject to LOSC.⁴⁴ Bioprospecting is in this context specifically involved in the marine realm when sampling genetic resources. In this regard, it's not unnatural for bioprospecting to relate to marine scientific research, but in order to find the regime compatibility; a comparison of the concepts will be sought. Marine scientific research covers academic research in *inter alia* biology, biotechnology, chemistry, and oceanography. The objectives may deviate, still, research data is essential in a prudent resource analysis, whether commercially oriented or purely scientific.⁴⁵ Transfer of technology from these activities, benefits the international community, and accordingly communicating scientific results and making them available to the public is an important element in this process.

⁴⁰ D. R. Rothwell and T. Stephens, *The International Law of the Sea* (Hart Publishing 2010) 324.

⁴¹ *ibid.*

⁴² P. Verlaan, "Marine Scientific Research: Its Potential Contribution to Achieving Responsible High Seas Governance" in D. Freestone (eds) *The 1982 Law of the Sea Convention at 30: Successes, Challenges and New Agendas* (Martinus Nijhoff Publishers 2013).

⁴³ D. R. Rothwell and T. Stephens, *The International Law of the Sea* (Hart Publishing 2010) 321.

⁴⁴ *ibid.*

⁴⁵ R. R. Churchill and A. A. Lowe, *The Law of the Sea* (3rd edn, Manchester University Press 1999) 400.

To clarify the activities in question, it's appropriate to further ascertain whether bioprospecting can be stowed under the marine scientific research umbrella. To explain these concepts, one must once again direct attention to the history of the LOSC. Even though marine scientific research was not addressed explicitly in the list of freedoms of the 1958 Convention of the High Seas, the Commission had acknowledged it as a freedom with roots in customary law.⁴⁶ A distinction between “pure” and “applied” science was introduced in the 1958 Convention on the Continental Shelf, which regulated the coastal state’s sovereign rights and the rights of third parties to perform marine scientific research on the continental shelf.⁴⁷ Generally, a coastal state should not withhold consent for research with “a view to pure scientific research into the physical or biological characteristics of the continental shelf.”⁴⁸ During the LOSC consultations, the debate about the distinction between pure and applied sciences reemerged, and disagreement about the necessity to detail the distinction between these two types of research, is referred to as one of the reasons why a definition is absent.⁴⁹ The ones objecting to more specific provisions argued that Part XIII provided sufficient coverage.⁵⁰ Although, the ongoing debate about the meaning of marine scientific research, may counter the notion of an adequate description being enclosed in the legislation. Yet, benefits can also be associated with the absent definition, because it may be easier to evolve with future scientific developments. The understanding of marine scientific research has thus developed along with expanding jurisdictions and the emergence of new concepts, such as the regions outside national jurisdiction and its related common heritage.

The phrasing of the LOSC Article 87 and Part XIII indicates that research related to commercial operations in the high sea areas can be classified as marine scientific research. Marine scientific research in areas beyond national jurisdiction was not explicitly included as commercially oriented research; neither did the states permit exclusion. Yet, the fact that the

⁴⁶ United Nations, Yearbook of the International Law Commission: Documents of the eighth session including the report of the Commission to the General Assembly, 1956, available at

⁴⁶ <[http://untreaty.un.org/ilc/publications/yearbooks/Ybkvolumes\(e\)/ILC_1956_v2_e.pdf](http://untreaty.un.org/ilc/publications/yearbooks/Ybkvolumes(e)/ILC_1956_v2_e.pdf)> accessed 17 June 2013; D. R. Rothwell and T. Stephens, *The International Law of the Sea* (Hart Publishing 2010) 321-22.

⁴⁷ Convention on the Continental Shelf (adopted 29 April 1958, entered into force 10 June 1964) 499 UNTS 311.

⁴⁸ United Nations, Marine Scientific Research. A revised guide to the implementation of the relevant provisions of the United Nations Convention on the Law of the Sea (United Nations Publication 2010), available at <http://www.un.org/depts/los/doalos_publications/publicationtexts/msr_guide%202010_final.pdf> accessed 22 June 2013.

⁴⁹ Virginia Commentaries, vol 4, 444-49.

⁵⁰ A. H. A. Soons, Marine Scientific Research Provisions in the Convention on the Law of the Sea: Issues of Interpretation (Law of the Sea Institute 1989) 365; 366.

proposed division between “applied” and “pure” research was actively rejected should be highlighted at this stage. This indicates that there are strong interests that oppose a distinction. Because of the absence of a codified distinction between pure and applied sciences on the high seas, it is the ordinary meaning without any clear distinction that prevails.

Although the LOSC does not separate pure and applied research in areas beyond national jurisdiction, there are in practice a distinction applied in the EEZ and on the continental shelf. Coastal states have the right to withhold consent to marine scientific research operations proposed by other states and organizations in their EEZ or continental shelf, when the operations initiated are of explicit “significance for the exploration and exploitation of natural resources”.⁵¹ However, when marine scientific research projects intend to expand mankind’s scientific knowledge of the marine sphere, proposals shall normally be granted.⁵² The former objective accordingly relates to commercial projects, while the latter represents pure scientific operations.

The Area similarly differs between “exploration and exploitation” or “prospecting” administered by the International Seabed Authority, and marine scientific research which, in conformity with Article 256, any state or international organization can more freely engage in for the benefit of mankind.⁵³ Because this discrepancy is applied in the Area in addition to the EEZ and the Continental Shelf, commercial research might not either effectively overlap with marine scientific research in the high seas.

To separate marine scientific research from commercial research, one has to detail the limits of these concepts further. A criterion has to be formulated in order to identify when a project is deemed fundamentally scientific or rather research catering to a broader array of uses. The UN Secretary General noted that “the difference between scientific research and bioprospecting therefore seems to lie in the use of knowledge and results of such activities, rather than the practical nature of the activities themselves.”⁵⁴ The end of a marine expedition cruise can thus

⁵¹ LOSC, art. 246 (5) (a).

⁵² *ibid* (3).

⁵³ *ibid*, art 1 (1) (3), 137, 153, 16 (2) (f) (ii) and Annex III, art 2.

⁵⁴ A/60/63/Add.1, para 202, 15 July 2005.

provide a restriction for when to measure the differences. To base the separation on something from an earlier stage in the research process, such as intent of the researchers, may prove futile. There may be multiple objectives in one research project, and thus a unified intent may be difficult to establish. Further, one also has to assume that this intention will not change, which is problematic because academic scientists might at a later stage discover novel applications for their compounds.

There is a need to question the conditions applicable to research at sea, when addressing the claim of bioprospecting being a subsegment to marine scientific research. In Article 240, the LOSC provides the general perspectives applicable to marine scientific research. It must be “conducted exclusively for peaceful purposes” and shall be “conducted with appropriate scientific methods” while not unjustifiably interfering “with other legitimate uses of the sea.”⁵⁵ This principle addresses the equal access of all states to areas beyond national jurisdiction. Marine scientific research shall further be conducted in “compliance with all relevant regulations adopted in conformity with this Convention including those for the protection and preservation of the marine environment.”⁵⁶ These are thus the general frames established in the LOSC, but a larger complex of substantive rights and duties, and the connection between these and bioprospecting is examined in subsequent chapters.

General principles of marine scientific research are stipulated in the LOSC Articles 242 to 244, which contains a duty to communicate and distribute knowledge and information obtained from research in the hydrosphere. Cooperation is further required to enhance the scientific understanding of the ocean, for example by transferring data and results from research activities particularly to developing countries lacking capacities to conduct these operations themselves. A further investigation of these duties are necessary to shed light on obligations associated with bioprospecting, which again may clarify if it is appropriate to define bioprospecting as a subsegment of marine scientific research. This can potentially underpin the analysis on high seas access and benefit-sharing in subsequent sections, especially since the duty of sharing knowledge can constitute an integral part of this concept.

⁵⁵ LOSC, art. 240.

⁵⁶ *ibid.*

Firstly, it is necessary to resolve more precisely what the LOSC prescribes to be scientifically publicized and shared as well as how this process shall be conducted. Article 244 requires that states and qualified international organizations must secure availability “by publication and dissemination through appropriate channels information on proposed major programs, their objectives as well as knowledge resulting from marine scientific research.” States are obliged to independently and in concert with others to proactively encourage the flow of scientific knowledge, as long as it doesn’t put a state’s pivotal security interests at risk.⁵⁷ What is to be shared as a consequence of these activities is restricted to knowledge from marine scientific research.⁵⁸

Biotechnology is the most common industry for academic entrepreneurship. More than half of the spinoffs initiated at Massachusetts Institute of Technology from 1980 to 1996 were biotechnological and software firms, while over two thirds of new ventures in the University of California system were more specifically in health-related industries; i.e. pharmaceutical, biotechnology or medical device companies.⁵⁹ Most biotechnology is licensed from universities and research institutions and not owned by a company.⁶⁰ The leading research universities in United Kingdom, Canada and USA have established technology transfer offices with experts who register staff and faculty innovations and licenses the most attractive inventions out to private companies that commercialize them.⁶¹ Bioprospecting is usually regulated by contracts negotiated by the institution and its financial supporters. These entrepreneurial networks of public-private interactions blur the lines between pure and applied research. An extensive amount of empirical evidence suggests that universities are less willing to engage in open dissemination of knowledge when involved in commercially oriented research.⁶²

⁵⁷ LOSC, art 302.

⁵⁸ *ibid*, art 244.

⁵⁹ R. A. Lowe, *The Roles And Experience Of Inventors And Start-Ups In Commercializing University Research: Case Studies At The University Of California*, 2002, available at <<http://cshe.berkeley.edu/publications/docs/ROP.Lowe.6.02.pdf>> accessed 25 June; S. A. Shane, *Academic Entrepreneurship: University Spinoffs And Wealth Creation* (Edward Elgar Publishing 2004) 139.

⁶⁰ K. Allen, *Entrepreneurship for Scientists and Engineers* (Pearson 2010) 199.

⁶¹ S. A. Shane, *Academic Entrepreneurship: University Spinoffs And Wealth Creation* (Edward Elgar Publishing 2004).

⁶² *ibid* 281.

Academic patent regimes may restrict the ability to disseminate scientific knowledge, and additional agreements with industry may effectively bar publication. A survey conducted on academics in the field of biological sciences found that entrepreneurial scientists, ie start-up shareholders, were considerably more inclined to withhold scientific results from colleagues compared to other academic researchers.⁶³ Academic start-ups can thus reduce the amount of scientific knowledge shared with public. Yet the picture is not entirely black and white, Google executive Eric Schmidt, through his Schmidt Ocean Institute, for example funded a \$94 million research vessel set to study the deep ocean.⁶⁴ Scientists can use these facilities free of charge as long as they communicate their research findings and make their scientific data publicly available.⁶⁵ In that way, the outcome of complex private-public relations may be compatible with both the LOSC provisions and the interests of the international community.

Effective communication of scientific research can also be hampered because patent offices often require that inventors file for a patent prior to publishing their results and publication is usually set to 18 months after the earliest date of priority. However, publishing after the patent is awarded does not directly conflict with the LOSC, Article 244 does for example not provide a time frame for publication, given that it is not bound by other impeding arrangements. Furthermore, while exclusive licensing provides economic incentives to commercialize an innovation, the protection may also prevent an entrepreneur that can bring the technology to its fullest potential from accessing it.⁶⁶

The LOSC Article 244 stipulates the obligation to facilitate information availability by dissemination and publication of marine scientific research. This duty is directed at qualified international organizations and states, but their nationals are not referred to. As a consequence, merely research results where states are stakeholders are explicitly required to release scientific results to the public domain. If national laws does not fill in the gap for private

⁶³ *ibid.*

⁶⁴ K. A. Dolan, 'Google Chairman Eric Schmidt's Falkor, A Dream Ship For Ocean Researchers, Makes San Francisco Debut' *Forbes* (New York, 1 August 2013) available at <<http://www.forbes.com/sites/kerryadolan/2013/08/01/google-chairman-eric-schmidts-falkor-a-dream-ship-for-ocean-researchers-makes-san-francisco-debut/>> accessed 1 August 2013; D. Perlman, 'Google's voyage to bottom of the sea's dead zone' *San Francisco Chronicle* (San Francisco, 1 August 2013) available at <<http://www.sfchronicle.com/science/article/Google-s-voyage-to-bottom-of-the-sea-s-dead-zone-4699388.php?t=c789b8d4e347b02379&t=c789b8d4e3&t=c789b8d4e3>> accessed 1 August 2013.

⁶⁵ Schmidt Ocean Institute, Vision and Mission, available at <<http://www.schmidtocean.org/story/show/366>> accessed 1 August 2013.

⁶⁶ S. A. Shane, *Academic Entrepreneurship: University Spinoffs And Wealth Creation* (Edward Elgar Publishing 2004)

⁶⁶ 282.

actors, one could risk that only a portion marine research results could be under the obligation to be made public. Yet, such an outcome appears to conflict with the overall intention of the Article 244, as this section also serves as a mechanism stimulating proactive knowledge sharing regardless of the patron being the state or its nationals. A customary understanding of the duty to make marine scientific knowledge accessible indicates that active publication attempts are necessary; reacting to other states inquiries would alone hence be insufficient. Further, it is reasonable to interpret appropriate channels for publication as a combination of several credible academic forums, whether conferences, workshops, digital and printed journals, official web pages of scientific institutions as well as its associated social media channels. A patent invention disclosure may also be added to the appropriate channels of publication, as it may contain information of practical value to the international community. TRIPS Article 29 (1) prescribes these disclosures must be adequately “clear and complete for the invention to be carried out by a person skilled in the art,” a phrase which is also found in Article 83 of the 1973 European Patent Convention.⁶⁷ A disclosure of invention is rich in technical detail, and forms, along with the claims, the scope of the requested protection. At least one of the claims must contain utility, novelty or non-obviousness. Accordingly, the patent lawyer will word the claims in a way that is sufficiently broad so as to cover all the possible technology applications, yet similarly also specific enough to display uniqueness.⁶⁸ There are no detailed guidelines in the LOSC regarding the composition and exhibition of the scientific information, so when it comes to patents, disclosure information is more easily accessible to those practicing within the same technological discipline. Information is not normally included it comes to the geographical origin of natural resources, except for when it is regulated at the national level. Disclosure of origin has gained currency with the introduction of the CBD, it assigns measures to facilitate biodiversity conservation and research, and in relation to these activities it recognizes the country of origin as an important steward.⁶⁹ Requiring disclosure of origin would be a compelling action in support of CBD

⁶⁷ European Patent Convention (adopted 5 October 1973, entered into force 7 October 1977).

⁶⁸ K. Allen, *Entrepreneurship for Scientists and Engineers* (Pearson 2010) 78 - 79.

⁶⁹ CBD, art. 9.

Article 16 (5), which stipulates cooperation among parties to certify that intellectual property rights complements current legislative structures without conflicting with the CBD.⁷⁰

In 2006 Norway proposed an amendment of the TRIPS Agreement conforming to the objectives of CBD, which includes a more equitable distribution of the benefits arising from genetic resources.⁷¹ Norway is the first OECD country to submit a revision of the TRIPS on this matter, and is thus a proponent of legislation requiring patent applicants to disclose details about the genetic resources utilized in the invention.⁷² The proposal entails that biological information must be included in the patent filing before it can be processed; the patent filer shall also enclose if the country of origin requires a permission to access the country's genetic resources.⁷³ Thus far, the proposal has not gained sufficient support for amending TRIPS, and patent filers are hence free to omit details on biological material collected in areas beyond national jurisdiction. However, this exclusion may not be significant since Article 244 shall be enforced in all areas and does not prescribe inclusion of the marine zone in which the research was conducted. It is further not clear if it follows from Article 244 that one should specify in a publication that the information is acquired from marine research. As long as the research is distributed, there is no explicit duty to enclose the role of marine scientific research. When read in light of the general ambition of promoting and facilitating the conduct of marine scientific research, perhaps it ought to be included when possible as it would bring attention to the segment.⁷⁴ What such a requirement may yield is however questionable.

Accurately describing an invention based on a microorganism with the intention of a third party to replicate the process can be difficult, if not impossible. As a replacement or supplement for a written declaration, multiple states have settled for the deposit of microorganisms as sufficient disclosure in marine bioprospecting. A disclosure of a more tacit nature may thus be accepted. The Budapest Treaty on International Recognition of the Deposit

⁷⁰ The Royal Norwegian Ministry of Foreign Affairs, The relationship between the TRIPS agreement, the convention on biological diversity and the protection of traditional knowledge, 2006, available at <http://www.regjeringen.no/en/dep/ud/selected-topics/Trade-policy/wto/wto---doha-runden/trips_avtalen/The-relationship-between-the-TRIPS-agree.html?id=419588> accessed 3 July 2013.

⁷¹ The Royal Norwegian Ministry of Foreign Affairs, TRIPS-avtalen, 2012, available at <http://www.regjeringen.no/nb/dep/ud/tema/handelspolitikk/wto/wto---doha-runden/trips_avtalen.html?id=446716> accessed 3 July 2013.

⁷² *ibid.*

⁷³ *ibid.*

⁷⁴ LOSC, art 239; 243; 255.

of Microorganisms for the Purposes of Patent Procedure (The Budapest Treaty) covers these deposits. The treaty supported by 78 parties, confirms that the biological material only needs to be deposited at one internationally acknowledged authority, and this deposit will consequently be recognised in all member countries.⁷⁵ Third party depository access is not codified in the treaty, and a question of availability is thus subject to the discretion of the patent holder. Nonetheless, the Budapest Treaty does limit public access in Article 9 by requiring rigid secrecy concerning the deposit and its nature. The Budapest Treaty may thus counter national efforts to enforce the LOSC provisions relevant to marine scientific research, as this regime does not actively mediate publication and distribution of scientific results. Research on marine genetic resources may be impeded by a nexus of patents and contractual arrangements, and therefore the LOSC Article 244 may not be complied with under certain circumstances.

Bioprospecting can perhaps be subject to the same high seas freedom as marine scientific research, yet patents and its related obligations counter the duties found in the LOSC on promotion, publication and distribution of marine scientific research. Current benefit sharing instruments are thus not utilized effectively, and an implementation gap follows as a consequence. Important LOSC duties covering marine scientific research are not compatible with the provisions protecting intellectual property rights. The implementation gap in combination with conflicting regimes, as well as bioprospecting having an objective of profit does convincingly counter the notion of bioprospecting as a subsegment of marine scientific research. Other legislative opportunities must thus be examined further to develop a more customized regime. The basics of inventions and intellectual property rights concerning biological material has been established at this point, and it is now appropriate to proceed with investigating the relations between these structures and the LOSC provisions on marine scientific research.

⁷⁵ WIPO, Budapest Treaty: Contracting Parties, 2013, available at <http://www.wipo.int/treaties/en/ShowResults.jsp?lang=en&treaty_id=7> accessed 5 July 2013; The Budapest Treaty on International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure (adopted 28 April 1977, entered into force 19 August 1980) art 3.

2.4.3 An Unprecedented Concept?

Since none of the apparent high seas freedoms sufficiently covers bioprospecting, and the list of high seas freedoms provided in the LOSC Article 87 is not exhaustive, there may be room for a unique solution. Should that be the case, identifying the relevant requirements of this freedom is necessary. Bioprospecting shares traits with freedoms included in Article 87. Thus, these similarities may advocate that bioprospecting shall be encompassed by this provision. Collecting living resources from the ocean is equally open to all, yet restricted by the environmental clauses in Part VII, while marine scientific research can be conducted with varying degrees of freedom, depending on the intent. Normally, marine scientific research should be granted. The intention of bioprospecting may differ from pure scientific research, but the scientific procedures are interchangeable. A commercial orientation is not alone enough to strictly limit this freedom, as industrial fishing is permitted in these areas. There are no rules altogether excluding bioprospecting from the high seas freedoms, and although bioprospecting has been practiced for decades on the high seas, there have been no recorded proposals against allowing these activities. Custom are thus a strong indicator of its standing. Due to the lack of objections, the argument pro considering bioprospecting as covered by the high seas freedom is compelling. Accordingly, there is not much doubt about this being an accepted practice. The more complex task is to further establish the principles that high seas bioprospecting is subject to.

2.5 The Legal Status of Genetic Resources in the Commons

In the next chapters, the resource dimension of bioprospecting will be utilized to better understand the rights and duties relevant to these activities. This means scrutinizing the legislation that affects marine genetic material used in commercial exploration and exploitation. Further, clauses covering these high seas resources will be examined, before analyzing the legality of bioprospecting in adjacent zones. The genetic resources of the areas beyond national jurisdiction is perceived as shared resources open to all, yet biological material in the high seas is not addressed explicitly in the LOSC. The freedom to exploit high seas resources are subject to limitations which are intended to secure sustainable use of the

common resources. Thus, the provisions regulating high seas exploitation of marine living resources holds restrictions of relevance.

2.5.1 The Continental Shelf

During the early part of the 20th century, cost-effective exploitation of the resources on the continental shelf was facilitated by enhanced marine technology. In the absence of a legislative instrument regulating access to these resources, unilateral claims were made to the seafloor. The most notable of these was the U.S. President Truman's claim of exclusive rights to seabed resources, which provoked similar proprietary declarations by other states.⁷⁶ These claims were further cemented through customary law, the negotiation of bilateral treaties, the Convention on the Continental Shelf, by ICJ decisions, and last, but not the least, the LOSC.⁷⁷ The LOSC concluded an even more extensive codification of the continental shelf by designating a 200 nm continental shelf to coastal states, irrespective of seabed composition, as well as a possibility to claim an extension where the shelf continued to a continental margin beyond 200 nm.⁷⁸ These rights are not dependent on proclamation or occupation; hence, the coastal states are naturally bestowed with sovereign rights for the purpose of exploring and exploiting natural resources in the physical continental margin.⁷⁹ Because coastal states can determine whether to explore or exploit their resources as well as whether or not to allow other states access to their resources, these rights are considered exclusive.⁸⁰ The early continental shelf provisions covered exclusively mineral resources, but this was subsequently extended to include sessile fisheries; those persistently connected to the ocean floor.⁸¹ The LOSC addresses resources on the high seas regardless of where in the water column it is located, but the situation of the resources on the seabed is rather more complex. This section will hence deal with questions that concern which legal regime these resources are affiliated with.

⁷⁶ D. R. Rothwell and T. Stephens, *The International Law of the Sea* (Hart Publishing 2010) 98.

⁷⁷ *ibid* 99.

⁷⁸ *ibid*.

⁷⁹ LOSC, art. 77 (3).

⁸⁰ *ibid* (2).

⁸¹ D. R. Rothwell and T. Stephens, *The International Law of the Sea* (Hart Publishing 2010) 104.

Exploring and exploiting continental shelf resources oblige an explicit consent from the coastal state.⁸² Nonetheless, the legal status of the waters superjacent to the seabed is not affected by the continental shelf rights of the coastal state.⁸³ The text gets more intricate when interpreted in relation to the codification of natural resources, which are “mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to sedentary species.”⁸⁴ This provision very accurately mirror the wording of the preceding Convention on the Continental Shelf, and in concert they both define sedentary species as “organisms which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil.”⁸⁵ This indicates that the deep seabed biological resources located within the 200 nm coastal state jurisdiction and are considered sedentary, are included in the continental shelf regime in conformity with Article 77 (1) and (4). However, resources that are non-sedentary are regulated by the EEZ regime, while the high seas regime covers biological resources from non-sedentary species situated above or on the continental shelf beyond the 200 nm limit. Not all these species does therefore need consent from the coastal state to be exploited. The LOSC does not elaborate on the “harvestable state” qualifier, but it is logical to interpret it as being in a somewhat mature phase of its life cycle. On the contrary, the “harvestable state” can be more difficult to define in connection with bioprospecting, as the matureness of an algae or fungi is not as easily diagnosed. Theoretically constructed provisions may not be compatible with the nature of deep sea ecosystems, and a degree of artificiality persists in the division between free-swimming and sedentary species.⁸⁶ The act of removing sedentary fisheries from the high seas freedom and including it in the continental shelf regime, also sparked controversy, as some sessile species naturally are a part of the continental shelf, e.g. mussels and corals, while other species that are also considered sedentary are only present on or in the continental shelf for part of the life cycle, e.g. oysters, crabs and lobsters.⁸⁷ This demonstrates the challenge of applying law to activities that were not properly addressed by legislators during the drafting

⁸² LOSC, art. 77.

⁸³ *ibid.*, art. 78.

⁸⁴ *ibid.*, art. 77 (4).

⁸⁵ *ibid.*; Convention on the Continental Shelf, art. 2 (4).

⁸⁶ D. R. Rothwell and T. Stephens, *The International Law of the Sea* (Hart Publishing 2010) 104.

⁸⁷ *ibid.*

process. An investigation of the legislation governing bioprospecting in the water column of the Area, will be the focus of the upcoming section.

2.5.2 Abyssal resources

The the development of deep seabed resource regulation is one of the most significant and belligerent processes of the LOSC law-making history. The LOSC Article 1 (1) defines the Area as “the seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction”. The LOSC does not define “seabed”, “ocean floor” and “subsoil”. It is hence essential for legislators to further define the term “seabed” in order to better distinguish the Area from the superjacent water column. For example, whether the seabed exclusively implies seabed materials of solid substance or whether it also can contain gases and liquid compounds is a question of relevance. Another issue prompted in this context is whether the mineral rich waters of hydrothermal vents belong to the Area or its neighboring water column. There is thus a need for examination of regulation addressing biological resources in the intersection between the high seas and the Area.

The LOSC acknowledges that there are differences between the water column and the seabed. For instance, the LOSC Article 135 acknowledges that the overlaying waters of the Area should not be legally affected by the regulative regime of Part XI. Marine scientific research is separately addressed in Area and the water column above the EEZ, still, Articles 256 and 257 do not define the substantive content, but merely implies that distinct standards are to be applied.⁸⁸ Factors that may determine the regulative regime the resource is subject to, includes whether the material readily can be separated from the encompassing water, as well as its relative position to the seabed.⁸⁹ The LOSC Article 133 affirms that the Area’s uppermost boundary ought not to be founded on a narrow perception of the “seabed,” as all solid, gaseous or liquid minerals “in the Area at or beneath the seabed” implies that the Area cannot be restricted solely to the seabed, but rather also can include areas beyond the seabed as well.⁹⁰

⁸⁸ LOSC, art. 256; 257.

⁸⁹ Drankier P et al, ‘Marine Genetic Resources in Areas beyond National Jurisdiction: Access and Benefit-Sharing’ [2012] *The International Journal of Marine and Coastal Law* 375.

⁹⁰ *ibid.*

Burke supported this notion by suggesting that the LOSC Part XI also covers the mineral rich waters emitted from hydrothermal vents.⁹¹

The specific legislation covering the Area is located in the LOSC Part XI, and because Article 133 (a) defines “resources” as mineral resources, biological material are thus not considered “resources” in the Area. One of the main principles governing the Area and its resources is “the common heritage of mankind”, found in Article 136. Other core elements in this doctrine include *inter alia* reservation from appropriation of the seabed by states or private entities, benefit sharing and international governance through the International Seabed Authority (ISA). Since Part XI excludes biological resources, ISA is confined to control and coordinate mineral resources. Yet, extensive commercial mining is not considered economically viable after the 2008 financial crisis, and interest is therefore currently limited. On the contrary, bioprospecting is more widespread in the deep sea, although genetic resources are not regulated explicitly in these environments.

There is thus a need for investigation of which regulative regime is appropriate for the living resources of the deep seabed beyond national jurisdiction. Common benefits would be promoted by open access and scientific publication, if the regime of high seas marine scientific research were to apply. But this approach may be impeded by the legal division between mineral prospecting and marine scientific research. The 1994 Agreement Relating to the Implementation of Part XI did not address genetic resources, even though bioprospecting operations were viable at the time.⁹² The contemporary status of genetic resources is thus a result of certain states opposing regulation on these resources. The prevailing outcome is therefore that these resources remain a segment of the high seas, as the “common heritage of mankind” concept is difficult to enforce on these resources in the Area. It is presently perhaps more reasonable for legislators to first resolve the separation of continental shelf resources from the high seas before taking on the onerous resource distinction in the Area and the deep seabed.

⁹¹ W. T. Burke, ‘State Practice, New Ocean Uses, and Ocean Governance under UNCLOS’ in TA Mensah (ed.) *Oceans Governance: Strategies and Approaches for the 21st Century* (Law of the Sea Institute 1996) 231.

⁹² Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982, (adopted 28 July 1994, entered into force 28 July 1996) 1836 UNTS 3.

2.5.3 Intellectual Property Rights

If bioprospecting is a part of marine scientific research, one ought to establish which conditions apply to bioprospecting. Consequences considered onwards may inherently comprise of arguments pro and contra perceiving bioprospecting as a marine scientific research segment. Although, the LOSC is not in general perceived as an instrument of intellectual property rights, exclusive rights are regularly sought under the jurisdiction of one or more states, to protect inventions derived from bioprospecting. Further, a short outline of the most important aspects of intellectual property law and an examination of whether and, if so, how the LOSC impacts bioprospectors who pursue such rights, will follow to add further clarity to the relationship between public and private law. Multiple economic theories asserts that intellectual property rights benefits the international community by equipping bioprospectors with an incentive to develop, disclose and commercialize novel products such as medicines.⁹³

Intellectual property rights are a temporary monopoly on a specific technology, and it is subject to the national and regional legal structures where protection is awarded. The area where protection is acknowledged, also defines the jurisdictional scope of the patent, and the patent owner can thus prohibit making, selling and importing of products illicitly based on the patented solution. The patent is thus considered the most powerful intellectual property protection. Global minimum standards for national regulation are established by the WTO TRIPS, and through this agreement members are obliged to make patents available for products and processes which are novel, contain an inventive step and have the capacity to be applied on an industrial scale.”⁹⁴ Likewise, member states may protect health and nutrition; stimulate public interest of significance to technological and socioeconomic development.⁹⁵ One of the problems associated with this agreement, is that it does not prescribe regulation explicitly for innovations based on resources from areas outside national jurisdiction. Further,

⁹³ R. S. Eisenberg, ‘Patents and the Progress of Science’ [1989] *University of Chicago Law Review* 50, 1017 - 1086; E. W. Kitch, ‘The Nature and Function of the Patent System’ [1977] *Journal of Law and Economics* 20, 265 - 290; R. P. Merges and R. R. Nelson, ‘On the Complex Economics of Patent Scope’ [1990] *Columbia Law Review* 90, 839 - 916; K. Allen, *Entrepreneurship for Scientists and Engineers* (Pearson 2010); J. P. Kesan, *Intellectual Property Rights and Agricultural Biotechnology*, *American Behavioral Scientist* 44 (3), November 2000, 464; K. Allen, *Entrepreneurship for Scientists and Engineers* (Pearson 2010).

⁹⁴ Agreement on Trade-Related Aspects of Intellectual Property Rights (adopted 15 April 1994, entered into force 1 January 1995) art. 27 (1).

⁹⁵ *ibid.*, art. 8 (1).

the origin of the genetic resources, which may facilitate the state of origin to exert control and claim benefit-sharing is not required in patent law. The EU is among the proponents of amending the TRIPS, and the WTO system is hence addressing these features in ongoing discussions.⁹⁶ It follows that if origin disclosure were to be required in patent applications, this obligation could potentially also be applied to genetic resources in the Area or areas beyond national jurisdiction.⁹⁷

Marine microorganisms cannot be excluded from patenting and are hence patentable under TRIPS.⁹⁸ However, discoveries, as opposed to inventions, do not generally qualify for patents. It is not easy to isolate discoveries of new biological material from e.g. microorganisms that are eligible for patenting. The rapid development of biotechnology has given rise to many complex legal questions during the past decades. What qualifies as an invention has evolved through changed practices so that bacteria, viruses and genes isolated from nature now can be patented.⁹⁹ In several states discoveries of substances that already existed in nature are being patented.¹⁰⁰ Ongoing complaints of patent decisions in the EU and the U.S. shows that there are still legal gray areas encompassing the patenting of genetic material.¹⁰¹ According to Article 27 of the TRIPS Agreement, patents have to be available for any inventions, whether products or processes, in all fields of technology, which includes biotechnology. The invention concept does not have a consolidated definition internationally, but it has to at least be a novel product or process without prior presence. American courts have defined some very specific exclusions to patentability; such as laws and phenomena of nature and naturally occurring substances.¹⁰² On the contrary, if an inventor alters something found in nature, it may be eligible for a patent. A genetically modified organism is defined as any living organism, e.g. plant, animal or bacteria that have had their genetic material altered by engineering. In the

⁹⁶ WTO, Minutes of the meetings of the TRIPS Council held on 26–27 October 2010, IP/C/M/64, available at: <http://www.wto.org/english/tratop_e/trips_e/intel6_e.htm> accessed 17 June 2013.

⁹⁷ P. Drankier et al, 'Marine Genetic Resources in Areas beyond National Jurisdiction: Access and Benefit-Sharing' [2012] *The International Journal of Marine and Coastal Law* 375.

⁹⁸ *ibid.*

⁹⁹ M. W. Tvedt, *Norsk genressursrett* (Cappelen Akademisk 2010).

¹⁰⁰ WTO, Minutes of the meetings of the TRIPS Council held on 26–27 October 2010, IP/C/M/64, available at: <http://www.wto.org/english/tratop_e/trips_e/intel6_e.htm> accessed 17 June 2013.

¹⁰¹ *ibid.*

¹⁰² Office of Patent Legal Administration United States Patent and Trademark Office, Evaluating Subject Matter Eligibility Under 35 USC para. 101, 2012, available at <http://www.uspto.gov/patents/law/exam/101_training_aug2012.pdf> accessed 21.06.2013; K. Allen, *Entrepreneurship for Scientists and Engineers* (Pearson 2010).

U.S. Supreme Court Case, *Diamond v. Chakrabarty*, the latter had engineered a bacterium that broke down crude oil components.¹⁰³ Since no such bacterium existed in nature, the Court concluded that this was a product of human ingenuity and could be patented.¹⁰⁴ Still, materials isolated from naturally occurring substances are being patented without meaningful changes. Technically, there is no difference between the patenting of genes from microorganisms, plants or animals, but if you patent a gene and use it for plant breeding, plants you grow from that process may be effectively covered by the patent.

There are clear restrictions on patenting plants and animals; through the TRIPS Agreement discretion is left with the members to exclude patentability of plants and animals other than microorganisms.¹⁰⁵ Generally, members shall thus grant patent protection for microorganisms and for microbiological processes and non-biological, in contrast, patents on plant varieties or animal breeds are normally not provided, but if the inventions are not limited to specific plant varieties and animal species, it may be a feasible patent case. It is for example possible to patent a host cell of a plant which may be used to compose a medicine. Large corporations tend to file many patents to protect their investments, but if these patents lead to a market concentration and a decrease in biodiversity, such a development can be problematic, especially where it jeopardizes the livelihood of developing communities. From a democratic perspective, it is hence troubling that the European patent system is perceived as very closed, technocratic and limited largely to pure patent law. The enforcement of laws and treatment of complaints are conducted by people working in the patent field. Therefore, the patent logic is prevailing, and there is no Supreme Court with judges with non-patent background one can appeal the case to. Since this discussion is beyond the objective of this paper, a more in-depth analysis has to be left for another study.

2.5.4 Appropriation in Areas Beyond National Jurisdiction

Marine scientific research must not provide the legal foundation for any claims to the marine environment or its resources, in accordance with the LOSC Article 241. The reservation

¹⁰³ *Diamond v. Chakrabarty* [1980] 447 U.S. 303.

¹⁰⁴ *ibid.*

¹⁰⁵ TRIPS, art 27(3) (b).

regarding appropriation reaffirms similar provisions on the high seas and the Area.¹⁰⁶ However, there is an exception to the prohibition on appropriation of biological material in this region. Pursuant the LOSC Part XI, states have the right to conduct marine scientific research in the Area, which includes the right to collect genetic samples.¹⁰⁷ The LOSC regime established under Part XIII is not restricted to any resource, in contrast to Part XI which specifically addresses the seabed mineral resources. The language is in general broadly phrased. The phrasing of Article 241, emphasizing “any claim” suggests broad coverage addressing public and private claims. Likewise, the reference to the “marine environment” lacks limits on its extent in the hydrosphere, so the seabed ought to be included in its scope. Further, Article 241 incorporates marine scientific research in areas beyond national jurisdiction as it refers to all parts of the ocean and is placed under the general provisions of the LOSC Part XIII. It is also natural to interpret “resources” as encompassing equally living and nonliving material.

The genetic resources of the seabed in areas beyond national jurisdiction can also constitute a part of the marine environment. Article 241 covers marine scientific research on the deep seabed because “resources” in the Area is limited to mineral resources. In addition, high seas biological material should also be defined as part of the marine environment. The LOSC provisions stipulates that marine scientific research activities shall not provide the legal basis for a claim, but the patent claim does not necessarily have to be based on marine scientific research. It is possible to assert that the appropriation is not acquired directly through to the marine scientific activities, but instead a consequence of ingenuity in the terrestrial domain. However, marine scientific activities are vital for the subsequent exercises, and such a segregation of process components thus seems unproductive. One could in relation consider patent claims through marine scientific research legitimate, due to the close connection between marine scientific research and later ventures, but that would likely undermine the general nature of the commons. Nonetheless, contradicting interpretations of Article 241 is possible. In order to facilitate a better understanding, other sources such as preparatory works and routines should be given consideration. Reports expose that the clause was included to

¹⁰⁶ LOSC, art 89; 137 (1); (3).

¹⁰⁷ *ibid* art. 256.

prevent research from supporting claims of “exploitation rights or any other rights in areas beyond national jurisdiction.”¹⁰⁸ As a result, patents awarded by virtue of marine genetic resources would conflict with Article 241. The first gene patents were issued in the 1970s, hence contemporary biotechnology was not among the prevailing issues during the LOSC negotiations.¹⁰⁹ The negotiations signaled that a broad interpretation of “claim” was indeed intended. The current regime ironically insinuates that appropriation of genetic resources for scientific purposes is prohibited, while commercially oriented material sampling and patenting is accepted.¹¹⁰ This accordingly makes academic entrepreneurship, joint ventures and private funding of public institutions difficult to address effectively. External financing is in many cases vital due to the high costs associated with bioprospecting operations on the high seas and later in laboratories. If bioprospecting constitutes a part of the current or an extended marine scientific research regime, it may restrain states and their associated entrepreneurs from pursuing and awarding patents related to high sea genetic resources. The LOSC Article 244 reinforces the divide between marine scientific research and bioprospecting, as the former must be published and disseminated while the results of the latter may obtain confidentiality. Bioprospectors and other entrepreneurial scientists ought to be rewarded for their financial risk. Nevertheless, further exploration of biological material in areas beyond national jurisdiction should not be discouraged by an ambiguous regime. Competition between different scientific disciplines, patents, publishing and market interests are among the features that are not adequately addressed under Part XIII.¹¹¹ Perhaps bioprospecting may be better governed under a novel regime?

2.5.5 Environmental obligations

An overarching legal framework for marine environmental protection is embedded in the LOSC. Both Part VII and Part XII carry the environmental legislation addressing biological material in the high seas. Part XII outlines provisions for the protection and preservation of

¹⁰⁸ M. H. Nordquist et al, *United Nations Conference of the Law of the Sea: A commentary*, 1991, 464; A. Bonfanti and S. Trevisanut *TRIPS on the High Seas: Intellectual Property Rights on Marine Genetic Resources*, *Brooklyn Journal of International Law*, Vol. 37, No. 1, 2012, available at <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2002695> accessed 26 June 2013.

¹⁰⁹ K. Allen, *Entrepreneurship for Scientists and Engineers* (Pearson 2010) 75.

¹¹⁰ E. Canal-Forgues, ‘Les ressources génétiques des grands fonds marins ne relevant d’aucune juridiction nationale’[2005] *Annuaire du droit de la mer* 105; N. Leroux and M.M. Mbengue, *Deep-Sea Marine Bioprospecting Under UNCLOS and the CBD*, available at <<http://www.gmat.unsw.edu.au/ablos/ABLOS10Folder/S3P1-P.pdf>> accessed 14 June 2013.

¹¹¹ T. Greiber, *Access and Benefit Sharing in Relation to Marine Genetic Resources from Areas Beyond National Jurisdiction A Possible Way Forward*, 2011.

marine ecosystems. These provisions are fairly broad and applicable to industries on a global scale. Article 192 stipulates the general duty to preserve and protect the marine environment. This principle covers all maritime zones. There is also an obligation to consistently with the LOSC avert and curtail marine pollution.¹¹² In this setting, marine pollution means introducing energy or substances into the marine environment, which may harm the living resources of the ocean.¹¹³ Some of the biggest environmental threats to marine genetic resources in the high seas stem from fisheries, acidification and mining. However, bioprospecting is relatively moderate in scale and impact, and are thus rather more compatible with the effects derived from marine scientific research. The environmental concern is thus related to energy exuding activities causing subtle noise, light and temperature changes in the water, which is covered by the general provisions of Articles 194 to 196.¹¹⁴ Due to the lack of sufficient scientific information about the features and functions of high seas ecosystems, a case-based precautionary approach should be employed to safeguard against irreversible biodiversity loss. Articles 117 to 119 address high seas living resources in general, while Section 2 of Part VII is especially designed for fish stock conservation. Preventing environmental threats can be done unilaterally or in cooperation, in conformity with Articles 117 or 192. Article 118 stipulates the obligation to collaborate in order to underpin high seas management and conservation. The International Tribunal for the Law of the Sea (ITLOS) further confirmed that “the duty to cooperate is a fundamental principle in the prevention of pollution of the marine environment under Part XII of the Convention and general international law.”¹¹⁵ Article 117 obligates states to take measures “as may be necessary for the conservation of living resources”. An evolutionary interpretation is allowed for in the phrase “may be necessary”, granting novel approaches inclusion over time. More details are not provided by the LOSC to aid understanding in this regard.

¹¹² LOSC, art. 194.

¹¹³ *ibid.*, art. 1 (1) (4).

¹¹⁴ S. Arico and C. Salpin, UNU-IAS Report: Bioprospecting of Genetic Resources in the Deep Seabed: Scientific, Legal and Policy Aspects, 2005, available at <<http://www.ias.unu.edu/binaries2/DeepSeabed.pdf>> accessed 16 May 2013; L. Slobodian et al, Bioprospecting in the global commons: Legal issues brief, UNEP, available at <<http://www.unep.org/delc/Portals/119/Biosprecting-Issuepaper.pdf>> accessed 5 July 2013; N. Leroux and M. M. Mbengue, Deep-Sea Marine Bioprospecting Under UNCLOS and the CBD, available at <<http://www.gmat.unsw.edu.au/ablos/ABLOS10Folder/S3P1-P.pdf>> accessed 14 June 2013; D.K . Leary, ‘Bioprospecting and the Genetic Resources of Hydrothermal Vents on the High Seas: What is the Existing Legal Position, Where Are we Heading and What are our Options?’ [2004] *Macquarie Journal of International and Comparative Environmental Law* 137.

¹¹⁵ *MOX Plant (Ireland v. United Kingdom) (provisional measures)* [2002] 41 ILM 405 [82].

The future ecosystem impact from bioprospecting is predicted to be low due to the small amount of biological resources that needs to be sampled.¹¹⁶ Because the bioprospectors benefits from preservation of biodiversity, there is a strong interdependence between the two.¹¹⁷ Even though there is uncertainty connected with these operations, the estimated impact is still fairly small and bioprospecting does thus not prompt extensive environmental measures as there is no evidence or prospects for serious or adverse effects being caused by these activities. Specific measures under Article 117 are neither prescribed generally, but have to be assessed on a case-to-case basis depending on the geographical context of the cruise. An in-depth discussion of environmental issues is beyond the scope of this thesis, so the attention will be shifted to regulation relevant for resources of the seabed. The legality of the areas in the intersection between the high seas and the seabed will accordingly be subject to review.

Even though bioprospecting is covered by limiting standards, it can licitly be conducted in areas beyond national jurisdiction. In the first section covering bioprospecting, duties of the LOSC differ with the legislative fundament. In the examination in a resource context, bioprospectors may freely utilize high seas genetic resources. There is no decisive interpretation providing that marine scientific research or other legislative concepts provide the basis for bioprospecting, but international agreements covering patents may not be compatible with certain parts of the LOSC. In order to facilitate a *de lege ferenda* analysis on access and benefit-sharing in areas beyond national jurisdiction, the existing benefit-sharing instruments and their associated attributes shall be assessed.

¹¹⁶ United Nations Environmental Programme, Millennium Ecosystem Assessment, Current State & Trends Assessment, Ch 10, 18, 2005, available at <<http://www.unep.org/maweb/en/condition.aspx>> accessed 15 June 2013.

¹¹⁷ *ibid.*

Chapter 3 - Access and Equitable Sharing of Benefits

3.1 The Concept

Access and benefit-sharing for genetic resources from areas outside national jurisdiction is not explicitly referenced in LOSC. The benefit-sharing provisions found in Part XI, Articles 137 (2) and 140 (1), explains that exploration and exploitation of the Area's resources shall benefit mankind, while Articles 137 (2) and 140 (2) ensures that financial resources and other economic benefits will be shared equitably by the International Seabed Authority (ISA). Further, Article 144 (1) promotes and encourages technology transfer in order for all states to benefit. These provisions do, however, not cover genetic resources because Article 133 limits the scope to mineral resources at or beneath the seabed. This thus excludes resources in the adjacent water column.

Under the high seas regime, the LOSC Part VII, there is no regime for genetic resources nor is there an absolute freedom to exploit these resources. Subject to Article 118, there is an obligation to cooperate in management of living material. Arrangements addressing access and benefit-sharing can contribute to strengthening the collaborative aspects. Furthermore, benefit-sharing is treated in LOSC Part XIII in relation to marine scientific research, its Article 244 (1) handles information from research, Article 244 (2) prescribes transfer of knowledge and data, and Article 242 again encourages international cooperation in research. In the Area, benefit-sharing linked to scientific research is covered in Article 143 (1) and (3), where scientific research should benefit mankind and research results disseminated to promote collaboration in international research.

The challenge is to unify how states address the lack of direct references to vital concepts, and to guide stakeholders to adhere accordingly. In contrast to LOSC, access and benefit-sharing is listed in the CBD as a prioritized objective and subsequently echoed in other contexts of international law.¹¹⁸ ABS is not thoroughly defined, but access will in this setting be defined as an opportunity to physically claim biological resources, as well as the right to use and benefit from them. Benefitting from resources means gaining an advantage, while the act of

¹¹⁸ CBD, art. 1.

benefit-sharing transmits this advantage. Benefits can embody different structures; they can be concrete or intangible as well as financial or non-monetary. There are several examples of benefits found in Bonn guidelines.¹¹⁹ Examples of enlisted monetary benefits are *inter alia* access fees, co-ownership of IPR, joint ventures, and research funding, while the non-monetary benefits consists of capacity building, research collaboration, distribution of scientific results and in other ways contributions to the local economy.¹²⁰ The benefit catalogue is clearly diversified, and can even vary more extensively as these lists are not exhaustive. Potential benefit-sharing methods under the LOSC, including alternative ABS models that might complement high seas bioprospecting, will be discussed in consecutive chapters.

3.2 The Convention on Biological Diversity

International instruments that potentially may contribute to a more holistic regime covering high seas bioprospecting, genetic resources and access and benefit-sharing shall be outlined in this section. This overview will subsequently serve as the fundament for further analysis of suitable regulative options promoting a more equitable ocean governance regime in areas outside national jurisdiction.

Both the LOSC and the CBD have a significant number of contractors; practically all LOSC parties are also CBD parties. Its connection with the LOSC is governed by Article 22, which stipulates that the CBD shall be implemented “consistently with the rights and obligations of States under the law of the sea.” The CBD Article 22 thus reinforces the terms of the LOSC Article 311 (3), and if conflict were to arise the LOSC would normally prevail as other agreements shall not be “incompatible with the effective execution of the object and purpose of this Convention, and provided further that such agreements shall not affect the application of the basic principles embodied herein.”¹²¹

¹¹⁹ COP 6 Decision VI/24.

¹²⁰ COP 6, Decision VI/24: Bonn Guidelines on access and benefit-sharing as related to genetic resources and fair and equitable sharing of the benefits arising out of their utilization, Appendix II (1) and (2) available at <<http://www.cbd.int/decision/cop/default.shtml?id=7198>> accessed 30 May 2013.

¹²¹ LOSC, art. 311 (3).

The CBD was established to provide a comprehensive framework for the conservation and sustainable use of biological diversity. It is unique in terms of being the only international instrument to address biological diversity. Areas both within and beyond national jurisdiction is addressed in the CBD, but not in the same manner.¹²² The current scope of the CBD is, in accordance with Article 4 (a), restricted to components “within the limits of its national jurisdiction.”¹²³ Article 4 (b) continues to stipulate that the CBD governs activities and processes “regardless of where their effects occur, carried out under jurisdiction or control, within the area of its national jurisdiction or beyond the limits of national jurisdiction.”¹²⁴ Accordingly, where activities such as marine scientific research and bioprospecting are undertaken in the Area or the high seas and are subject to a CBD party’s jurisdiction, they may be covered by the CBD. Article 4 (a) rather than the subsequent Article 4 (b) perceived to have a stronger relation with the concept of “genetic resources.” Thus, biological resources in areas beyond national jurisdiction are essentially not regulated within the CBD. Parties are further prescribed to cooperate “directly or, where appropriate, through competent international organizations.”¹²⁵

The CBD acknowledges “the sovereign rights of States over their natural resources, the authority to determine access to genetic resources rests with the national governments and is subject to national legislation.”¹²⁶ Hence, the authority to determine access to genetic resources rests with the national governments and is accordingly also subject to their national regulations. On the other hand, access to genetic resources is left unregulated.

One of the three CBD objectives is the “fair and equitable sharing of the benefits arising out of the utilization of genetic resources”.¹²⁷ This mission is further detailed in several CBD provisions, but can also be traced back to the LOSC, and found in the voluntary Bonn Guidelines and the legally binding Nagoya Protocol.¹²⁸ The framework promoting equitable

¹²² CBD, art. 4 and 22.

¹²³ CBD, art. 4 (a).

¹²⁴ *ibid.*, art. 4 (b).

¹²⁵ *ibid.*, art. 5.

¹²⁶ *ibid.*, art. 15.

¹²⁷ *ibid.*, art. 1.

¹²⁸ COP 6, Decision VI/24; CBD, art. 15, 16, 19.

bioprospecting on the high seas can thus find legislative support in the CBD. It is expected that the contracting parties “create conditions to facilitate access to genetic resources for environmentally sound uses by other Contracting Parties and not to impose restrictions that run counter to the objectives of this Convention.”¹²⁹ If access is granted, it “shall be on mutually agreed terms” and made “subject to prior informed consent of the Contracting Party providing such resources, unless otherwise determined by that party,” according to Article 15.¹³⁰ The Nagoya Protocol is particularly relevant with regard to access and benefit-sharing, and will henceforth be investigated.

3.2.1 The Nagoya Protocol

Because access and benefit-sharing provisions were considered too broad, countries did not successfully conform to the principles. The general framework on access and benefit-sharing in the CBD is complemented by the Nagoya Protocol. The latter is expected to enter into force by 2015 and is intended to enhance legal clarity.¹³¹ The third objective of the CBD is duplicated verbatim in the Nagoya Protocol’s objective, and further details the intention by including that access and benefit-sharing should reinforce “the conservation of biological diversity and the sustainable use of its components.”¹³² The Nagoya Protocol accordingly further consolidates the objectives of the CBD with the ABS concept. To facilitate access to genetic resources, it provides for transfer of technology to developing countries.¹³³

In Article 10 of the Nagoya Protocol, parties must “consider the need for and modalities of a global multilateral benefit sharing mechanism to address the fair and equitable sharing of benefits derived from the utilization of genetic resources and traditional knowledge associated with genetic resources that occur in transboundary situations or for which it is not possible to grant or obtain prior informed consent.”¹³⁴ A more effective approach to biological benefit-sharing in the high seas could hence be materialized through such a system. Therefore it is

¹²⁹ *ibid.*, art. 15 (2).

¹³⁰ *ibid.*, art. 15 (4), (5).

¹³¹ COP 10, Decision X/2: Strategic Plan for Biodiversity 2011-2020, available at <<https://www.cbd.int/decision/cop/default.shtml?id=12268>> accessed 21 June 2013.

¹³² Nagoya Protocol, art. 1.

¹³³ *ibid.*, art. 23.

¹³⁴ *ibid.*, art. 10.

essential to further assert if bioprospecting on the high seas comprise exploitation where there is no chance of prior informed consent to be obtained or granted.¹³⁵

3.3 The FAO Treaty

The FAO Treaty was the first binding legislative body to operationalize the CBD concept of access and benefit-sharing, but the preceding treaty negotiations had progressed slowly because of a divide between the G77 block and the OECD nations.¹³⁶ During the lawmaking process, the FAO Treaty was suggested to perhaps evolve into a CBD Protocol, but this idea was subsequently dismissed because it was perceived as more of an instrument of agriculture rather than an environmental compromise.¹³⁷ The main focus in this section will thus be biological resources utilized directly or indirectly for food, in contrast to the CBD where access and benefit-sharing is addressed regardless of intent and sector.

A system of facilitated access to a shared resource pool is included in Part IV, Article 12, of the FAO Treaty. For the purpose of conservation and use, access is only given to “research, breeding and training for food and agriculture, provided that such purpose does not include chemical, pharmaceutical and/or other non-food/feed industrial uses.”¹³⁸ As the results of bioprospecting targets a broader market, the limited scope of the FAO Treaty does not provide sufficient coverage. Some of the system traits could be beneficial in respect of areas beyond national jurisdiction. For example, parties could be provided access to something that they not normally would be able to access. Article 12 (4) of the FAO Treaty provides that facilitated access under the multilateral system must be subject to a standard material transfer agreement (MTA).¹³⁹ Signing of a MTA is the only requirement for accessing biological resources under the multilateral system.¹⁴⁰ This agreement specifies that the information about all transfers is

¹³⁵ *ibid.*

¹³⁶ P. Drankier et al, ‘Marine Genetic Resources in Areas beyond National Jurisdiction: Access and Benefit-Sharing’ [2012] *The International Journal of Marine and Coastal Law* 375.

¹³⁷ G. Moore and W. Tymowski, *Explanatory Guide to the International Treaty on Plant Genetic Resources for Food and Agriculture* (IUCN 2005).

¹³⁸ FAO Treaty, art. 12 (3).

¹³⁹ The Governing Body of the FAO Treaty adopted the standard material transfer agreement in its resolution 1/2006 of 16 June 2000.

¹⁴⁰ FAO Treaty, Article 12 (4) stipulates that facilitated access under the multilateral system must be provided pursuant to a standard material transfer agreement. The Governing Body of the Treaty adopted the standard material transfer agreement in its resolution 1/2006 of 16 June 2000.

to be supplied the FAO secretariat by the provider. Under the MTA, recipients shall not claim intellectual property rights that restrict access to the resources provided.¹⁴¹ Further, the multilateral system should be provided all relevant research results which are non-confidential.¹⁴² The recipient is also obligated to pay a fixed percentage of sales of a commercialized and restricted product which is based on resources subject to the MTA.¹⁴³

One of the features contributing to caution among recipients of the MTA, is the fact that there is no limitation on time with regards to the obligation to share benefits. Thus, an endpoint for sharing of benefits could be stipulated, in order not to hamper innovation as well as to provide more stable frames for investors.¹⁴⁴ However, relative to a monetary obligation earlier in the product life cycle, an endpoint does not necessarily affect the incentive to invent, because an obligation as late as 20 years into the future would be an issue of minor salience in comparison to a more immediate monetary contribution.¹⁴⁵ Since a scientific process may take years to finish, it can correspondingly take multiple years for financial benefits may be accumulated, making early monetary contributions less favorable. Hence, this notion could be supported by the fact that no compulsory payments have thus far been materialized under the auspices of the FAO Treaty.¹⁴⁶ A discrepancy may be made between legislative enforcement and softer approaches enforcement by raising awareness, considering the feasibility of enforcement of the access and benefit-sharing elements in the FAO Treaty.

Article 13 of the FAO Treaty details how benefits ought to be shared. The mandatory monetary benefit-sharing clauses is stipulated in Article 13 (2) (d) and refers to commercialized products, based on biological resources acquired from the multilateral system. Such payments are excluded where there are no restrictions on research and breeding. In the latter case, financial contributions from the developer of a commercialized product are only

¹⁴¹ FAO Treaty, art. 6 (2).

¹⁴² *ibid* (9).

¹⁴³ *ibid* (7).

¹⁴⁴ P. Drankier et al, 'Marine Genetic Resources in Areas beyond National Jurisdiction: Access and Benefit-Sharing' [2012] *The International Journal of Marine and Coastal Law* 375; T. Young and M. W. Tvedt, *Balancing Building Blocks of a Functional ABS System*, FNI Report No. 7/2009 (Fridtjof Nansen Institute 2009); M. W. Tvedt and A. E. Jørem, 'Bioprospecting in the High Seas: Regulatory Options for Benefit Sharing' [2013] *The Journal of World Intellectual Property* 150.

¹⁴⁵ M. W. Tvedt and A. E. Jørem, 'Bioprospecting in the High Seas: Regulatory Options for Benefit Sharing' [2013] *The Journal of World Intellectual Property* 150.

¹⁴⁶ P. Drankier et al, 'Marine Genetic Resources in Areas beyond National Jurisdiction: Access and Benefit-Sharing' [2012] *The International Journal of Marine and Coastal Law* 375.

encouraged and not compulsory. Article 13 also prescribes non-monetary benefits, which includes transfer of technology, building capacity and distributing information. Measures to ensure compliance were detailed by a designated Compliance Committee. Absence of compliance may be remedied by Contracting Parties, whether it involves activities under their control or where other parties fail to comply.

The *ex situ* resources are more accessible and better assessed in comparison to the less scrutinized *in situ* material. Thus, multilateral system covers the former category more effectively. The consequence of the main emphasis being on *ex situ* resources is that the scope of the FAO Treaty fails to address bioprospecting in pristine areas beyond national jurisdiction. The treaty also supports fair and equitable sharing of benefits, sustainable use and conservation of plant genetic resources for food and agriculture, in conformity with the CBD. The two conventions regard access and benefit-sharing differently.

Even though the FAO Treaty has a significant amount of parties, it is vulnerable to fragmentation in the implementation process. System cohesion is thus necessary. The effectiveness of the system is also contingent on the amount of material governed by the multilateral system, as the availability and benefit-sharing has a better chance of making a positive impact when the exchange volume is greater.¹⁴⁷

The FAO Treaty contains elements which can inspire change in the current regime for biological material. Together with its multilateral system, the FAO Treaty displays favorable mechanisms, such as the multilateral system of access and benefit-sharing, and may hence serve as a model for future instruments. Since the access process is balanced against the benefit-sharing prospect, the success of the system is contingent on the performance and operationalization of both components. Thus, the extent of the benefit-sharing depends on the benefits yielded, but determining the specific point in which a product will trigger benefit-sharing can be challenging.

¹⁴⁷ *ibid.*

3.4 Regulative Options

Arico, Salpin and Drankier et al. are among the scholars who have examined the feasible alternatives for governing genetic resources in areas beyond national jurisdiction. Their research will henceforth be drawn upon.

The first apparent alternative is to maintain the current system, where access and benefit-sharing regarding marine biological material is unregulated. Because relevant international regulations stipulate that a counterpart is necessary when drafting contracts, genetic resources in areas beyond national jurisdiction cannot be accessed through to contractual agreements. The vessels bioprospecting on the high seas thus have an obligation to adhere to the “exclusive jurisdiction on the high seas flag states”¹⁴⁸ The flag states are hence the principal enforcer of measures and standards concerning activities conducted on the high seas and in the Area. When the minimum requirements of the LOSC are met, states are free to regulate the conditions of access to biological material for their nationals. Tvedt and Jørem suggest that an option in this regard is to make nationals subject to permits that could obligate benefit-sharing.¹⁴⁹ Another alternative is a scenario where the UNGA adopts guidelines highlighting coordination of flag state relationships.¹⁵⁰ These guidelines can be specified further by a code of conduct, as guidelines comparatively are not rich in detail.¹⁵¹ The non-legally binding nature may be a temporary arrangement which may evolve into something more permanent. In general, states would rather avoid placing economic burdens on national industries as this would give them a relative disadvantage in the international market.¹⁵² An international approach is hence preferred.

Further, the CBD framework may be applied to activities and processes under state control or jurisdiction. Regulations within this framework can also merely address activities that may have considerable repercussions for the environment. Thus, for the CBD to cover access and benefit-sharing in areas beyond national jurisdiction, an expanded mandate may be needed. An

¹⁴⁸ LOSC, art. 92 (1).

¹⁴⁹ M. W. Tvedt and A. E. Jørem, ‘Bioprospecting in the High Seas: Regulatory Options for Benefit Sharing’ [2013] *The Journal of World Intellectual Property* 150.

¹⁵⁰ P. Drankier et al, ‘Marine Genetic Resources in Areas beyond National Jurisdiction: Access and Benefit-Sharing’ [2012] *The International Journal of Marine and Coastal Law* 375.

¹⁵¹ *ibid.*

¹⁵² M. W. Tvedt and A. E. Jørem, ‘Bioprospecting in the High Seas: Regulatory Options for Benefit Sharing’ [2013] *The Journal of World Intellectual Property* 150.

amendment of the CBD or adopting a Protocol subject to the CBD Article 28 would in this regard be necessary.¹⁵³

In the Nagoya Protocol there is no particular reference to biological resources from marine areas beyond national jurisdiction. The intention of not making biological material from areas beyond national jurisdiction subject to a new access and benefit-sharing regime under the CBD is thus mirrored this decision.¹⁵⁴ Regarding the alternative of applying a regime addressing marine genetic resources in the Area, the international community is split. This separation primarily concerns the question of whether the genetic resources of the seabed are covered by the common heritage of mankind concept. Relevant principles could thus be applied to genetic resources, if they were to be subject to the Area. Accordingly, resources should be utilized exclusively for peaceful purposes and neither commercial companies nor states can thus appropriate these resources.

The prevalent bilateral structure regarding resource transactions in the access and benefit-sharing system, where one state authorize access to a user in return for a portion of its benefits, is a prevalent shortcoming. Since other states with equivalent resources have to abstain from these benefits, these agreements can provoke rivalry and may as a consequence be inequitable, and regional and global funds have hence been initiated to remedy the effects of this practice.¹⁵⁵ Nevertheless, the factual source states may stay unknown if the geographical distribution of the resource is not sufficiently mapped. Efficiency is impeded by the bilateral agreements as the state providing the resource, depend on the developer when supervising the resource use. Thus, resource surveillance is not feasible since resources may be spread between different users and applied in very different contexts. To prevent illicit use of resources, the current access and benefit-sharing system features bureaucratic processes.

Biological databases containing an overview of genetic resources, their distribution and origin could hence cover a gap in the existing system and strengthen transboundary cooperation.¹⁵⁶

¹⁵³ Supra 157.

¹⁵⁴ *ibid.*

¹⁵⁵ Fedder B, *Marine Genetic Resources, Access and Benefit Sharing: Legal and biological perspectives* (Routledge 2013).

¹⁵⁶ *ibid.*

Through centralized databases, a product could be traced to all the states where the genetic ingredient is located, and hence enact the Nagoya Protocol's global multilateral benefit-sharing system. This could constitute a more equitable approach, because benefits would be distributed to all the identified source states. Furthermore, valuable information about companies, intellectual property rights and scientific papers connected with use of the resources would be provided by these databases. A summary of all relevant data on uses of genetic resources since it was accessed would thus be provided by such a system. The provider states could use the database to request benefit sharing when a product is commercialized. In general, since individual bureaucracy can be cut and regulations relaxed, research and development can be better promoted. These databases would strengthen the objective of the CBD and support the multilateral mechanism initiated under the Nagoya Protocol. The vitality of these databases should thus be recognized by all parties in order to enhance the current access and benefit-sharing system.

Furthermore, an international agreement is needed to facilitate access to biological resources on the seabed for those interested in commercial development. From such an alternative it follows that benefits accumulated from these activities should be shared with mankind. Nonetheless, the current regime exclusively concern mineral resources. For the Area and the ISA's regulative scope to be extended to cover genetic resources, it could be done by a LOSC amendment, establishing an implementing agreement, adopting a Protocol, or ratifying an agreed interpretation of the LOSC, while stipulating that the genetic resources on the deep seabed are subject either to the freedom of the high seas or the Area.¹⁵⁷ Either way, an extensive reform would be necessary to extend the ISA's mandate and the relation between bioprospecting and marine scientific research need to be resolved.¹⁵⁸ A novel LOSC implementing agreement addressing living resources in areas beyond national jurisdiction and matters related to access and benefit-sharing, may consequently also resume the LOSC negotiations, and with many stakeholders involved, the process may tie up considerable resources. Judging by the current division of interests it is not unreasonable to expect a stalemate when scrutinizing the application of freedom of the high seas or the common

¹⁵⁷ P. Drankier et al, 'Marine Genetic Resources in Areas beyond National Jurisdiction: Access and Benefit-Sharing' [2012] *The International Journal of Marine and Coastal Law* 375.

¹⁵⁸ *ibid.*

heritage of mankind. An implementation agreement comparable to the arrangements established in relation to Part XI and the Fish Stocks Agreement would benefit from optimization regarding areas beyond national jurisdiction.¹⁵⁹ Still, an implementation agreement establishing a multilateral system for living resources in areas beyond national jurisdiction does not seem viable in the current political climate.¹⁶⁰ Other regulatory regimes shall thus be examined. Within the LOSC framework, the CBD and the Area's common heritage regime will be further investigated.

3.5 An International Agreement Under Siege?

A mechanism allocating access to genetic resources in areas beyond national jurisdiction is necessary if a permissive complex is preferred. The COP of the CBD is held every two years and is thus perhaps not the best body for operational administration of more frequent access inquiries.¹⁶¹ A more compact and enduring mechanism, for example an subordinate body, would be preferred in relation to access and benefit-sharing, in order to more readily manage and mediate tailored solutions for stakeholders.¹⁶²

In a regime applying the common heritage of mankind, the deep ocean floor and its biological material would not be subject to appropriation. Benefits resulting from exploitation should be shared with mankind and these tasks would thus entail institutional administration.¹⁶³ For example, delegating a managing mandate to the ISA could facilitate increased competence and systemic coherence. Because of the unique mix of resources on the deep seabed, a revised regime devoted to genetic resources in areas beyond national jurisdiction may not be entirely compatible with the current regulative format of the Area. On the other hand, stakeholders benefiting from genetic resources being subject to the freedom of the high seas are not eager to renegotiate the existing system. This includes states with industries heavily invested in biotech

¹⁵⁹ Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982, (adopted 28 July 1994, entered into force 28 July 1996) 1836 UNTS 3; Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, 2167 UNTS 3, adopted 4 August 1995, in force 11 December 2001.

¹⁶⁰ P. Drankier et al, 'Marine Genetic Resources in Areas beyond National Jurisdiction: Access and Benefit-Sharing' [2012] The International Journal of Marine and Coastal Law 375.

¹⁶¹ CBD, Conference of the Parties (COP), available at <http://www.cbd.int/cop/> accessed 22 June 2013.

¹⁶² P. Drankier et al, 'Marine Genetic Resources in Areas beyond National Jurisdiction: Access and Benefit-Sharing' [2012] The International Journal of Marine and Coastal Law 375.

¹⁶³ LOSC, art. 136, 137 (2), 140.

and marine genetic patents. These stakeholders are concerned that an increased emphasis on the common heritage concept will lead to a bureaucratic system that impedes private initiative and innovation. The contemporary infrastructure of the ISA may not be ideal to balance diverging interests related to genetic resources, as its institutional composition revolves around minerals and the mining sector. Because of its mineral resource focus, the distinct interests of investors, consumer and producer states in relation to deep seabed mining are emulated in ISA's Council. There are additionally no capacities of significance devoted to bioprospecting and intellectual property rights nor benefit-sharing in this structure. Its sector specific anatomy thus makes it less suited for biotech endeavors.

With sufficient backing, there may also be room for a more extensive compromise with enhanced environmental measures in areas beyond national jurisdiction. A coalition of developing and developed nations has proposed that UN should start negotiating an international agreement to improve high seas governance. In addition to addressing how the benefits from commercial operations should be shared, the proposal also stipulates protected areas and impact evaluations regarding proposed activities outside national jurisdiction. If a compromise on the common heritage of mankind is not feasible, there is a need for alternative solutions.

If there is agreement on the common heritage of mankind, a protocol based on the CBD appears to be the best solution. Both the CBD's scope and objectives would be complemented by addressing biological material in areas beyond national jurisdiction. However, at the moment there is not much unity in relation to the expansion of the common heritage regime. Drankier et al projects that the most likely outcome is no consensus on the application of the common heritage concept, and that it hence is vital to replicate the Antarctic Treaty's 'agreement to disagree' as a fundament for further negotiations.¹⁶⁴ In accordance with that sentiment, the exponents of a revised regime in areas beyond national jurisdiction should further evaluate sustainable solutions for a multilateral benefit-sharing regime. Clearly prioritizing to strengthen the legal structures related to access to both in situ and ex situ

¹⁶⁴ P. Drankier et al, 'Marine Genetic Resources in Areas beyond National Jurisdiction: Access and Benefit-Sharing' [2012] *The International Journal of Marine and Coastal Law* 375; Hemmings A, Rothwell D R and Scott, K N, *Antarctic Security in the Twenty First Century: Legal and policy perspectives* (Routledge 2013).

resources and focusing on sharing non-monetary benefits may be an initial way forward. Their shared interests need to be detailed and consolidated in order to establish a robust platform.

Chapter 4 - Conclusions

Technological evolution has facilitated increased commercial exploration of biota located in increasingly extreme spheres over the last decades. Like most commons, the areas beyond national jurisdiction are inadequately regulated. Patents based on genetic resources of the high seas document that bioprospecting has been conducted in these areas for some time now, still sufficient regulations are absent. Bioprospecting in areas beyond national jurisdiction involves high risks for stakeholders, not only due to the hostile location of these resources but also because of substantial uncertainty connected with clinical trials that over time accumulate high costs. Major investments are thus required. Regardless of these obstacles, successful products may generate significant return on investment and considering the abundance of unidentified marine microorganisms in pristine habitats, it is likely that industrial and scientific interest will persist. Nevertheless, new regulations must thus not hamper incentives to invest in these costly ventures, yet at the same time conservation efforts should be promoted through remedial mechanisms. The fair and equitable sharing of benefit can support these mechanisms, by sharing vital scientific findings.

The point of departure in this study, was thus to find which existing standards could be applicable to bioprospecting, and to subsequently address how to remedy legislative inconsistencies. Accordingly, mechanisms which can contribute to distributing the benefits derived from bioprospecting in a fair and equitable manner were investigated and viable regulative options highlighted.

In order to examine which existing standards might be applicable to bioprospecting and genetic resources in areas beyond national jurisdiction, the LOSC provisions of Part VII and Part XI on the high seas and the Area were scrutinized. Resources governed by the LOSC Part XI are explicitly defined as “mineral resources”. Hence, genetic resources are currently not subject to this regime. The high seas are in customary and conventional sources considered *res communis*, and accordingly the resources in this sphere are open to all; neither state nor organization can control the allocation of these resources. Some developed nations with vested interests in biotechnological industries supports the principles of open access and “first-come, first-serve” in the LOSC Part VII, in contrast to other major groups defending the stance that

this conflicts with the very logic of international law. Of the activities explicitly recorded as subject to the high seas freedoms, “marine scientific research” was found to be most compatible, as both concepts share traits such as similar research methods regarding data collection, sampling and laboratory work. There is currently no internationally agreed definition of “marine scientific research” or “bioprospecting.” However, clarifying these concepts and their compatibility has proved vital for establishing the rights and obligations that cover bioprospecting. Protecting innovations based on marine genetic resources conflicts with the LOSC duty of dissemination and publication of scientific results and this thus needs special attention in a novel regulative structure. Another significant difference is the objective of profit for commercial bioprospectors.

Previously, utilization was an ambiguous term, as it did not involve restraints of significance. With the CBD complex, particularly the Nagoya Protocol, that changed. Because it prompts benefit-sharing, the CBD objective “utilization of genetic resources” is a core concept relating to biological material. Even though the Nagoya Protocol was an innovation with regard to access and benefit-sharing, the vague references to research and development does not stipulate very accurately what “utilization” constitutes. Other sources interpreting “biotechnology” and “utilization” should thus be considered where the Nagoya Protocol fails to provide additional instructions.¹⁶⁵ These systems specify uses which are projected into activities reconstructing biological structures examine molecules and administrate biological data. In areas beyond national jurisdiction, there is no existing international authority to address bioprospecting. The Nagoya Protocol was established within the CBD framework to equitably distribute the benefits derived from genetic resources, but it did not address the legal lacuna concerning genetic resources in areas outside national jurisdiction. Hence, the legal status of the genetic resource is currently dependent on bilateral relations and state regulations, which can hamper conservation efforts as well as effective access and benefit-sharing.

Requirement prescribing disclosure of origin is among the efforts made by individual states. For a more coherent and effective approach to access and benefit-sharing in the international

¹⁶⁵ Fedder B, *Marine Genetic Resources, Access and Benefit Sharing: Legal and biological perspectives* (Routledge 2013).

community, enhanced measures are necessary. To comply with international agreements, user parties could implement conforming measures and ought to equally allow provider states to invoke force regarding relevant access and benefit-sharing provisions.

Finally, a regime dedicated to genetic resources in areas beyond national jurisdiction can be materialized if there is sufficient political enthusiasm and consensus concerning the appropriate instruments. Provided that there is enough political support, an access and benefit-sharing system could be sustainable, but there is hitherto a need to find the most appropriate legislative vehicle. Further research on mechanisms that may align diverging interests are hence needed amend the status quo.

Words: 17 957

Bibliography

Books

Allen K, *Entrepreneurship for Scientists and Engineers* (Pearson 2010).

Churchill R R and Lowe A V, *The Law of the Sea*, (3rd edn, Manchester University Press 1999).

Fedder B, *Marine Genetic Resources, Access and Benefit Sharing: Legal and biological perspectives* (Routledge 2013).

Freestone D, *The 1982 Law of the Sea Convention at 30: Successes, Challenges and New Agendas* (Martinus Nijhoff Publishers 2013).

Hand J and Baruch L, *Intangible Assets* (Oxford University Press 2003).

Hemmings A, Rothwell D R and Scott, K N, *Antarctic Security in the Twenty First Century: Legal and policy perspectives* (Routledge 2013).

Rothwell D R and Stephens T, *The International Law of the Sea* (Hart Publishing 2010).

Rothwell D R, *The Polar Regions and the Development of International Law* (Cambridge University Press 1996).

Shane S A, *Academic Entrepreneurship: University Spinoffs And Wealth Creation* (Edward Elgar Publishing 2004).

Soons A H A, *Marine Scientific Research Provisions in the Convention on the Law of the Sea: Issues of Interpretation* (Law of the Sea Institute 1989).

Tvedt, M W, *Norsk genressursrett: rettslige betingelser innenfor bio - og genteknologi* (Cappelen akademisk 2010).

Articles

- Canal-Forgues E, 'Les ressources génétiques des grands fonds marins ne relevant d'aucune juridiction nationale' [2005] *Annuaire du droit de la mer* 105.
- De Fontaubert A C, Downes D R and Agardy T S, 'Biodiversity in the Seas: Implementing the Convention on Biological Diversity in Marine and Coastal Habitats' [1998] *Georgetown International Environmental Law Review* 753.
- Drankier P, Elferink A G O, Visser B and Takács T, 'Marine Genetic Resources in Areas beyond National Jurisdiction: Access and Benefit-Sharing' [2012] *The International Journal of Marine and Coastal Law* 375.
- Eisenberg R S, 'Patents and the Progress of Science' [1989] *University of Chicago Law Review* 50.
- Farrier D and Tucker L, 'Access to Marine Bioresources: Hitching the Conservation Cart to the Bioprospecting Horse' [2001] *Ocean Development and International Law* 213.
- Glowka L, 'The Deepest of Ironies: Genetic Resources, Marine Scientific Research, and the Area' [1996] *Ocean Yearbook* 154.
- Grassle J F and Maciolek N J, 'Deep-sea species richness: regional and local diversity estimates from quantitative bottom samples' [1992] *The American Naturalist* 313.
- Hemmings A D and Stephens T, 'The extended continental shelves of sub-Antarctic Islands: implications for Antarctic governance' [2010] *Polar Record* 312.
- Kitch E W, 'The Nature and Function of the Patent System' [1977] *Journal of Law and Economics* 20.
- Leary D K, 'Bioprospecting and the Genetic Resources of Hydrothermal Vents on the High Seas: What is the Existing Legal Position, Where Are we Heading and What are our Options?' [2004] *Macquarie Journal of International and Comparative Environmental Law* 137.
- Merges R P and Nelson R R, 'On the Complex Economics of Patent Scope' [1990] *Columbia Law Review* 90.
- Proelss A, 'ABS in Relation to Marine Genetic Resources', in E.C. Kamau & G. Winter (eds.), *Genetic Resources, Traditional Knowledge and the Law* (Earthscan Publishers 2009).

Tvedt M W and Jørem A E, 'Bioprospecting in the High Seas: Regulatory Options for Benefit Sharing' [2013] *The Journal of World Intellectual Property* 150.

Winter G, Towards regional common pools of genetic resources - improving the effectiveness and justice of ABS, in Kamau E C and Winter G (eds) *Genetic resources, traditional knowledge, and the law solutions for access and benefit sharing* (Earthscan 2009).

International Treaties and Guidelines

Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (adopted 4 August 1995, entered into force 11 December 2001) 2167 UNTS 3.

Agreement on Trade-Related Aspects of Intellectual Property Rights (adopted 15 April 1994, entered into force 1 January 1995).

Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982 (adopted 16 November 1994, entered into force 28 July 1994) 1836 UNTS 3.

Antarctic Treaty (adopted 1 December 1959, entered into force 23 June 1961) 402 UNTS 72.

Budapest Treaty on the International Recognition of the Deposit of Microorganism for the Purposes of Patent Procedure (adopted 28 April 1977, entered into force 19 August 1980).

Convention on Biological Diversity (adopted 5 June 1992, entered into force 29 December 1993) 1760 UNTS 79.

Convention on the Conservation of Antarctic Marine Living Resources (adopted 20 May 1980, entered into force 7 April 1982) 1329 UNTS 48.

Convention on the Continental Shelf (adopted 29 April 1958, entered into force 10 June 1964) 499 UNTS 311.

Convention on the High Seas (adopted 29 April 1958, entered into force 30 September 1962) 450 UNTS 11.

European Patent Convention (adopted 5 October 1973, entered into force 7 October 1977).

International Undertaking on Plant Genetic Resources (adopted by the FAO Conference in November 1983 under Resolution 8/83) available at <http://www.fao.org/ag/CGRFA/iu.htm> accessed 22 June 2013.

International Treaty on Plant Genetic Resources for Food and Agriculture, Food and Agriculture Organization of the United Nations (adopted 3 November 2001, entered into force 29 June 2004) 2400 UNTS 303.

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 (adopted 29 October 2010).

Statute of the International Court of Justice (adopted 26 June 1945).

United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 3, available at http://www.un.org/depts/los/convention_agreements/convention_overview_convention.htm accessed 10 May 2013.

Vienna Convention on the Law of Treaties (adopted 23 May 1969, entered into force 27 January 1980) 1155 UNTS 331.

Reports, documents and other instruments

Arico, S, and Salpin, C, UNU-IAS Report: Bioprospecting of Genetic Resources in the Deep Seabed: Scientific, Legal and Policy Aspects, 2005, available at <http://www.ias.unu.edu/binaries2/DeepSeabed.pdf> accessed 16 May 2013.

Arnaud-Haond, S, Arrieta, J M, Duarte, C M, Marine Biodiversity and Gene Patents, 2011, available at http://www.imedea.uib-csic.es/~txetxu/Publications/Arnaud-Haond_2011_Marine.pdf accessed 11 June 2013.

CBD, Subsidiary Body on Scientific, Technical and Technological Advice, note by the Secretariat on Bioprospecting on the Deep-Seabed, 24 July 1996, available at <http://www.iisd.ca/biodiv/sbstta/sb215.html> accessed 20 June 2013.

COP 5, Decision V/2: Progress Report on the Implementation of the Programme of Work on the Biological Diversity of Inland Water Ecosystems (Nairobi, Kenya from 15 - 26 May 2000) available at

<<http://www.cbd.int/decision/cop/default.shtml?id=7144>> accessed 20 June 2013.

COP 7, Decision VII/5: Marine and coastal biological diversity (Kuala Lumpur, Malaysia from 9 - 20 February 2004) available at

<<http://www.cbd.int/decision/cop/default.shtml?id=7742>> accessed 23 June 2013.

COP 8, Decision VIII/21: Marine and coastal biological diversity: conservation and sustainable use of deep seabed genetic resources beyond the limits of national jurisdiction (Curitiba, Brazil from 20 - 31 March 2006) available at

<<http://www.cbd.int/decision/cop/default.shtml?id=11035>> accessed 23 June 2013.

COP 9, Decision IX/20: Marine and coastal biological diversity (Bonn, Germany from 19 – 30 2008) available at

<<http://www.cbd.int/decision/cop/default.shtml?id=11663>> accessed 23 June 2013.

COP 10, Decision X/2: Strategic Plan for Biodiversity 2011-2020 (Nagoya, Japan from 18 – 29 October 2010) available at

<<https://www.cbd.int/decision/cop/default.shtml?id=12268>> accessed 21 June 2013.

Diamond v. Chakrabarty [1980] 447 U.S. 303.

Food and Agriculture Organization of the United Nations, Report of the Workshop on Bioprospecting in the High Seas, 2003, available at

<<http://www.fao.org/docrep/008/y5890e/y5890e0d.htm>> accessed 24 May 2013.

Greiber T, Pena Moreno S, Ahrén M, Nieto Carrasco J, Kamau E C, Cabrera Medaglia J O, Different Options for ABS in Relation to Marine Genetic Resources in ABNJ, Seminar on Conservation and Sustainable Use of Marine Biodiversity Beyond National Jurisdiction, 2011, available at <<http://www.bfn.de/fileadmin/ABS/presentation5.pdf>> accessed 18 May 2013.

International Union for Conservation of Nature, IUCN Information Papers for the Intersessional Workshop on Marine Genetic Resources 2-3 May, available at

<<http://www.un.org/depts/los/biodiversityworkinggroup/documents/IUCN%20Information%20Papers%20for%20BBNJ%20Intersessional%20Workshop%20on%20MGR.pdf>> accessed at 2 June 2013.

- Leary D, UNU-IAS Report: Bioprospecting in the Arctic, 2008, available at <http://www.ias.unu.edu/resource_centre/Bioprospecting%20in%20the%20Arctic.pdf> accessed 4 June 2013.
- Leroux, N, and Mbengue, M M, Deep-Sea Marine Bioprospecting Under UNCLOS and the CBD, available at <<http://www.gmat.unsw.edu.au/ablos/ABLOS10Folder/S3P1-P.pdf>> accessed 14 June 2013.
- Moore G and Tymowski W, Explanatory Guide to the International Treaty on Plant Genetic Resources for Food and Agriculture (IUCN 2005).
- MOX Plant (Ireland v. United Kingdom) (provisional measures) [2002] 41 ILM 405.
- OECD, Global Forum on Biotechnology: Marine Biotechnology – Potential and Challenges, available at <<http://www.oecd.org/sti/biotech/oecdglobalforumonbiotechnologymarinebiotechnologypotentialandchallenges.htm>> accessed 15 May 2013
- Perron-Welch M J, Ali F, Williams N, An explanatory guide to the Nagoya Protocol on access and benefit-sharing, IUCN environmental policy and law paper, 2012, available at <http://www.iucn.org/about/work/programmes/environmental_law/elp_resources/elp_re_s_publications/?uPubsID=4763> accessed 15 May 2013.
- Royal Norwegian Ministry of Foreign Affairs, The relationship between the TRIPS agreement, the convention on biological diversity and the protection of traditional knowledge, 2006, available at <http://www.regjeringen.no/en/dep/ud/selected-topics/Trade-policy/wto/wto---doha-runden/trips_avtalen/The-relationship-between-the-TRIPS-agree.html?id=419588> accessed 3 July 2013.
- Scientific Committee on Antarctic Research, Scientific Research in Antarctica, Information Paper, XXIII Antarctic Treaty Consultative Meeting (1999).
- Slobodian L, Kinna R, Kambu A, and Ognibene L, Bioprospecting in the global commons: Legal issues brief, UNEP, available at <<http://www.unep.org/delc/Portals/119/Biosprecting-Issuepaper.pdf>> accessed 5 July 2013.
- United Nations General Assembly, Res 2749 (12 December 12 1970) S/RES/2749.
- United Nations, Summary of proceedings prepared by the Co-Chairs of the Working Group, I/A/10, 2013, available at

<http://www.un.org/depts/los/biodiversityworkinggroup/biodiversityworkinggroup.htm>
accessed 22 July 2013.

United Nations, Letter dated 30 June 2011 from the Co-chairs of the Ad Hoc Open-ended Informal Working Group to the President of the General Assembly, available at <http://www.un.org/depts/los/biodiversityworkinggroup/biodiversityworkinggroup.htm> accessed 23 June 2013.

United Nations, Marine Scientific Research. A revised guide to the implementation of the relevant provisions of the United Nations Convention on the Law of the Sea (United Nations Publication 2010), available at http://www.un.org/depts/los/doalos_publications/publicationstexts/msr_guide%202010_final.pdf accessed 22 June 2013.

United Nations, Yearbook of the International Law Commission: Documents of the eighth session including the report of the Commission to the General Assembly, 1956, available at [http://untreaty.un.org/ilc/publications/yearbooks/Ybkvolumes\(e\)/ILC_1956_v2_e.pdf](http://untreaty.un.org/ilc/publications/yearbooks/Ybkvolumes(e)/ILC_1956_v2_e.pdf) accessed 17 June 2013.

United Nations Environmental Programme, Millennium Ecosystem Assessment, Current State & Trends Assessment, 2005, available at <http://www.unep.org/maweb/en/condition.aspx> accessed 15 June 2013.

United Nations General Assembly, Res 66/288 (27 July 2012) UN Doc A/Res/66/288, available at <http://www.un.org/en/ga/66/resolutions.shtml> accessed 25 June 2013.

US Commission on Ocean Policy, Connecting the Oceans and Human Health, Chapter 23 in An Ocean Blueprint for the 21st Century, 2004, available at http://govinfo.library.unt.edu/oceancommission/documents/full_color_rpt/23_chapter23.pdf accessed 26 June 2013.

Virginia Commentaries, vol 4, 444-49.

WTO, Minutes of the meetings of the TRIPS Council held on 26–27 October 2010, IP/C/M/64, available at: http://www.wto.org/english/tratop_e/trips_e/intel6_e.htm accessed 17 June 2013.

Young, T. and Tvedt, M. W., Balancing Building Blocks of a Functional ABS System, FNI Report No. 7/2009 (Fridtjof Nansen Institute 2009).

Other

Dolan K A, 'Google Chairman Eric Schmidt's Falkor, A Dream Ship For Ocean Researchers, Makes San Francisco Debut' *Forbes* (New York, 1 August 2013)
<<http://www.forbes.com/sites/kerryadolan/2013/08/01/google-chairman-eric-schmidts-falkor-a-dream-ship-for-ocean-researchers-makes-san-francisco-debut/>> accessed 1 August 2013.

Perlman D, 'Google's voyage to bottom of the sea's dead zone' San Francisco Chronicle (San Francisco, 1 August 2013)
<<http://www.sfchronicle.com/science/article/Google-s-voyage-to-bottom-of-the-sea-s-dead-zone-4699388.php?t=c789b8d4e347b02379&t=c789b8d4e3&t=c789b8d4e3>>
accessed 1 August 2013.

Schmidt Ocean Institute, Vision and Mission, available at
<<http://www.schmidtocean.org/story/show/366>> accessed 1 August 2013.

Figures

Figure 1. The 200-Mile Limit, Fisheries and Oceans Canada, available at <<http://www.dfo-mpo.gc.ca/international/rfmo-orgp/index-eng.htm>> visited 15 June 2013.

