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BIOPROSPECTING AND ARCTIC GENETIC RESOURCES A CHALLENGE FOR INTERNATIONAL LAW

INTRODUCTION

For many years bioprospecting has been one of the most controversial issues in environmental law. A key development in this debate was the negotiation of the Convention on Biological Diversity in 1992. Growing scientific and commercial interest in biotechnology developed from the biotechnology potential of extreme and isolated environments has in turn presented new challenges for environmental governance, especially in areas beyond national jurisdiction. Due to climate change the Arctic has become more accessible to commerce and industry. The melting ice caps have made access to the Arctic oil and gas resources a reality. The more recent rapid retreat of the sea ice will provide new lucrative shipping routes from Asia to Europe. The existing fishing grounds in the Arctic *seem set to enlarge* as the ice retreats, and seaborne tourism has been steadily growing for the last years and now brings around a million people to the Arctic each year. These new commercial opportunities may bring not only economic benefits, but also new challenges for the sustainable management of the Arctic ecosystem. The rapid environmental changes have raised concerns about the future of the Arctic region and effect of these changes at a global level. Bioprospecting is also a growing activity in the Arctic, where the states concerned are signatories to the Convention on Biological Diversity, providing a national framework for ownership, management and control of the activities.

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1. THE DEFINITION

There is no commonly agreed definition of the term “bioprospecting” in international use. Prior to the Convention on Biological Diversity (CBD) genetic resources meant: “genetic material of actual or potential value” and further it defines genetic materials as: “any material of plant, animal, microbial or other origin containing functional units of heredity”, but the convention does not define “bioprospecting”.¹ The definition tells us that genetic material may have any biological origin, whereas of plant, animal or microbial. Genetic resources are a subset of biological resources.² The genetic material should have two other elements – functionality and value.

According to the CBD the definition of “genetic material” is any material containing “functional units of heredity”. The word “functional” contains a dynamic element as the state of knowledge and technology develops through history³. Genetic materials that are not functional at the moment can become significant in a couple of years. Functionality is used in connection with the term “units of heredity” which relates to biology, knowledge and technology. So genetic materials can be understood as material from any biological sources where units of heredity are operating or having a function.⁴

The second part of the definition says that genetic resources are materials with “actual or potential value”. The understanding of the term is not restricted to the economic value only. It should be understood as being of the social, economic, cultural and spiritual nature. The terms “actual and potential” used in the CBD definition should be read as a reference to the technological state of the art.⁵ The actual value concerns the value of genetic material in combination with the techniques known and developed at the time of access. The potential value should be understood as the possible new techniques developed in the future.

The term “genetic resources” has spread since its inclusion in the CBD, and appears in many international treaties and documents and also in national laws. The lack of consistency creates legal uncertainty. From a legal point of view it is unclear under which regime MGRs fall and under what conditions they can be patented. There are three main legal instruments – the 1982 United Nations

¹ H. Cohen, *Some Reflections on Bioprospecting in the Polar Regions*, (ed.) D. Vidas, Law, Technology and Science for Oceans in Globalisation. IUU Fishing, Oil Pollution, Bioprospecting, Outer Continental Shelf, Leiden-Boston, 2010, p. 339.

² UNEP/CBD/WG-ABS/7/2, Annex par.3.

³ P.J. Schei, M.W. Tvedt, *Genetic resources in the CBD. The Wording, the Past, the Present and the Future*, Fridtjof Nansen Institute, Norway 2010, p. 2.

⁴ *Ibidem*, p. 3.

⁵ *Ibidem*.

Convention on the Law of the Sea (UNCLOS), the 1992 Convention on Biological Diversity (CBD) and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). The TRIPS convention is an international regulation for intellectual property rights, specifically patents and its compatibility with UNCLOS and CBD is a subject for another discussion. The article analyzes the legal status of bioprospecting in the light of UNCLOS and the access and commercial exploitation in the light of CBD.

2. UNITED NATIONS CONVENTION ON THE LAW OF THE SEA

UNCLOS was adopted by the Third United Nations Conference on the Law of the Sea on 10 December 1982 and entered into force on 16 November 1994. UNCLOS, considered the “constitution for the oceans,” as declared by the U.N. General Assembly and repeatedly confirmed by the states, “sets out the legal framework within which all activities in the oceans and seas must be carried out”. Despite its aim to be comprehensive UNCLOS does not cover all aspects of activities on and in the oceans.⁶ The issues of marine biodiversity and marine genetic resources fall into these categories. UNCLOS does not contain any provision explicitly regulating bioprospecting. There are only brief references to “biodiversity” in UNCLOS. There is no reference at all to “genetic resources”. In the 1970s when the convention was being negotiated the importance of biodiversity and genetic resources was only poorly understood.

UNCLOS sets out general principles and rules for the protection of the marine environment. Part XI addresses flora and fauna that might be affected by seabed mining; and Part VII deals with the consequences of fishing on dependent and associated species. Article 194 (5) requires States to take measures: “(...) necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life”. Article 196, which requires States to take all the measures necessary to protect the marine environment from the use of technologies under their jurisdiction or control, or the intentional or accidental introduction of alien or new alien species, is also relevant. Part VII, on the High Seas, also refers briefly, albeit indirectly, to biodiversity. Part XIII UNCLOS, which focuses on marine scientific research, lays down the principles and rules for its use in all areas.

In areas under national jurisdiction the states have an obligation to regulate the collection of living resources in accordance with international law. The coastal

⁶ D.R. Rothwell, *The Arctic in International Affairs: Time for a new Regime?*, “Brown Journal of World Affairs” 2008, vol. 15/1, pp. 241–253.

states may regulate those activities through domestic laws. In the territorial sea the coastal states have sovereignty over the resources. In the exclusive economic zone the coastal states have sovereign rights over natural resources, but if any other state wishes to collect living resources to harvest them for use, the coastal state has the obligation to allow such activity⁷. The coastal state has sovereign rights to explore and exploit natural resources on its continental shelf. This right includes collecting mineral and other non-living resources of the seabed and the subsoil and the living organism of sedentary species on or under the seabed. Unlike in the EEZ the state has no obligation to allow other states access to any resources on its continental shelf.

In areas beyond national jurisdiction it is necessary to separate MSR in the high seas from that in the Area. UNCLOS provides that the deep seabed, as it lies beyond national jurisdiction, is subject to the common heritage of mankind, managed by the International Seabed Authority. However, the water column beyond national jurisdiction is the part of the high seas regime and that means it is subject to the freedoms of navigation and of scientific research. There is a disagreement as to whether the MGRs come under the common heritage of mankind (CHM) regime or not. Some states considered that MGR fell within the freedom of high seas set out in UNLCOS Part VII, others believed that they were part of the CHM and fell within the regime for the Area established under Part XI. Others considered that MGR fell within neither regime and that a new regime had to be negotiated⁸. This distinction creates one of the elementary problems when it comes to applying UNCLOS to MGRs. It is, however, important to outline the main characteristics of both regimes in order to foresee the legal framework that might regulate MGRs and the related issues.

“The Area”— the floor and the subsoil of areas beyond national jurisdiction — is subject to the regime of the “common heritage of mankind.”⁹ The common heritage of mankind was first introduced by the Maltese representative, Arvid Pardo, in his speech in front of the U.N. General Assembly in 1967. His idea is reflected in Article 137 which provides:

1. No State shall claim or exercise sovereignty or sovereign rights over any part of the Area or its resources, nor shall any State or natural or juridical person appropriate any part thereof. No such claim or exercise of sovereignty or sovereign rights nor such appropriation shall be recognized.

⁷ *Ibidem*, p. 342

⁸ T. Scovazzi, *Is the UN Convention on the Law of the Sea the Legal Framework for All Activities in the Sea. The Case of Bioprospecting*, (ed.) D. Vidas, Law, Technology and Science for Oceans in Globalisation. IUU Fishing, Oil Pollution, Bioprospecting, Outer Continental Shelf, Leiden-Boston, 2010, p. 310.

⁹ UNCLOS, art. 136

2. All rights in the resources of the Area are vested in mankind as a whole, on whose behalf the Authority shall act. These resources are not subject to alienation.(...)
3. No State or natural or juridical person shall claim, acquire or exercise rights with respect to the minerals recovered from the Area except in accordance with this Part.

The concept or principle of the CHM covers five elements. Firstly, it prohibits national appropriation of any areas or resources in areas beyond the limits of national jurisdiction. Secondly, it requires that the area and any activities therein be devoted to peaceful purposes. Thirdly, the area and its resources should be used for the benefit of all mankind. Fourthly, the principle requires the establishment of an international organisation entitled to act on behalf of mankind in the exercise of rights over the resources in question. Finally, the environment and flora and fauna of the area should be protected and conserved for the future generations.

When UNCLOS was negotiated, the existence of living resources in the Area and their possible economic value was unknown. As a result, Article 133 defines resources as “all solid, liquid or gaseous mineral resources *in situ* in the Area at or beneath the seabed, including polymetallic nodules.” This narrow definition of the resources has led some to posit that the common heritage of mankind regime does not apply to MGRs.¹⁰

The water column beyond the EEZ is termed the High Seas. The principles and rules governing the high seas are set out in LOSC Part VII. Article 87 of Part VII outlines the basic principles underlying the concept of the freedom of the high seas. It means is that: “[t]he high seas are open to all States, whether coastal or land-locked.” All States are free to engage in lawful activities such as navigation, overflight, fishing, laying of pipelines and cables, the construction of artificial islands and other installations, and marine scientific research. However, all activities on the high seas are subject to the respect for the interests of other States and their activities on the high seas, and are subject to certain conditions and detailed regulations, including the responsibility to preserve and protect the marine environment. The freedom of high seas does not mean that states can do anything they like. The freedom is well regulated by customary and treaty law.

The fundamental condition for enjoying these freedoms is the nationality of the vessels. The vessels exercising activities in the high seas have to be linked with a state, which has exclusive jurisdiction and control over them.

¹⁰ D. Leary, *International Law and Genetic Resources of the Deep Sea*, (ed.) D. Vidas, Law, Technology and Science for Oceans in Globalisation. IUU Fishing, Oil Pollution, Bioprospecting, Outer Continental Shelf, Leiden-Boston, 2010, p. 364

3. CONVENTION ON BIOLOGICAL DIVERSITY

The Convention on biological diversity was concluded in Rio de Janeiro in 1992 and entered into force in December 1993. The Convention on Biological Diversity (CBD) has been hailed as the epitome of a new generation of multilateral environmental agreements (MEA) at the crossroads of environmental protection and development.¹¹ At the time of its inception, it marked a departure from earlier international environmental law instruments by supporting a balance between conservation and sustainable use rather than a blanket preference for conservation.¹² It introduced novel legal concepts such as biodiversity,¹³ ecosystems,¹⁴ genetic resources and biotechnology, benefit sharing, and traditional knowledge.¹⁵ It provided an innovative and flexible framework for accommodating developed and developing countries' concerns and capacities¹⁶ and for encouraging partnerships between national and local authorities, local and indigenous communities, and the private sector.¹⁷ It has currently been ratified by 193 states. The CBD regulates access to resources that falls under state jurisdiction. Due to CBD states have sovereign rights to exploit their natural resources¹⁸. The access to genetic resources in areas under national jurisdiction is governed by two mandatory principles. Firstly, the access to genetic resources falls under the jurisdiction of the national authority of the state on the territory of which the resource is located.¹⁹ Secondly, the terms that allow access are agreed between the provider state and the user.²⁰

The CBD addresses directly the issues of the conservation and sustainable use of biodiversity in general, including marine biodiversity. As set out in Article 1 there are three objectives:

¹¹ Convention on Biological Diversity, 31 I.L.M. 822 (1992) [CBD]. L. Glowka et al., *A Guide to the Convention on Biological Diversity* (1994); C. Tinker, *A New Breed of Treaty: The United Nations Convention on Biological Diversity* 12 *Pace Env'tl L. Rev.* 191 (1995)

¹² S. Johnston, *The Convention on Biological Diversity: The Next Phase* 6 *R.E.C.I.E.L.* 219 (1997).

¹³ R. Rayfuse, *Biological Resources*, [in] D. Bodansky, J. Brunnée, and E. Hey, (eds.), *The Oxford Handbook of International Environmental Law*, 362 (2007).

¹⁴ D. Tarlock, *Ecosystems*, in Bodansky, Brunnée, and Hey supra note 12, 574.

¹⁵ A. Meyer, *International Environmental Law and Human Rights: Towards the Explicit Recognition of Traditional Knowledge* 10 *R.E.C.I.E.L.* 37 (2001).

¹⁶ D. McGraw, *The CBD: Key Characteristics and Implications for Development* 11 *R.E.C.I.E.L.* 17 (2002).

¹⁷ L. Kimball, *Institutional Linkages between the Convention on Biological Diversity and Other International Conventions* 6 *R.E.C.I.E.L.* 239 (1997).

¹⁸ CBD art. 3.

¹⁹ CBD art. 15.5

²⁰ CBD art. 15.4

1. the conservation of biological diversity
2. the sustainable use of its components
3. the fair and equitable sharing of the benefits arising out of utilization of genetic resources.

The CBD applies primarily within national jurisdiction. In relation to each State party it applies both to components of biological diversity and to the process and activities. Since the conventions have limited the territorial scope there is a problem when it comes to applying CBD to MGRs in the water column and in the seabed beyond national jurisdiction. The convention would apply to activities beyond national jurisdiction only to the extent in which states regulate the activities of their own nationals.²¹ State parties are obligated to apply the general principles of the CBD to processes and activities carried out under their jurisdiction or control. This includes taking measures to control the actions of both their nationals and ships flying their flag.²² Furthermore, under Article 5 State parties are required to cooperate directly, or through competent international organizations, for the conservation and sustainable use of biodiversity in areas beyond national jurisdiction.

4. BIOPROSPECTING IN THE ARCTIC

Although there is considerable research in relation to all fields of biotechnology across the Arctic countries, research in relation to biotechnology based on Arctic genetic resources is focused on five main areas. These areas are: enzymes for use in a range of industrial processes including food technology²³, bioremediation and other pollution control technologies²⁴, anti-freeze proteins for use in

²¹ D. Leary, *International Law and Genetic Resources of the Deep Sea*, (ed.) D. Vidas, Law, Technology and Science for Oceans in Globalisation. IUU Fishing, Oil Pollution, Bioprospecting, Outer Continental Shelf, Leiden-Boston, 2010, p. 363.

²² L.A. de La Fayette, *A New Regime for the Conservation and Sustainable use of Marine Biodiversity and Genetic Resources Beyond the Limits of National Jurisdiction*, *The International Journal of Marine and Coastal Law* 24 (2009), p. 243

²³ Several companies have expressed interest in this research. One of those companies is Arla Foods – a Danish company with interests in milk based products. Arla Foods was a formal participant in a project with Danish researchers on both cold active enzymes and stable enzymes for use in various dairy processes. Arla Foods has also been involved in a research project that aims to develop new peptides using milk proteins cleaved with cold-active proteases from Arctic microorganisms.

²⁴ Human activities in the Arctic often involve the use of petroleum hydrocarbons for power generation, heating and operation of vehicles, aircraft and ships.

food technology²⁵, dietary supplements with a particular focus on polyunsaturated fatty acids²⁶ and pharmaceuticals and other medical uses.²⁷ Of all the Arctic States, Norway has the most developed and successful marine biotechnology sector that is focused on Arctic genetic resources. Norway has four universities pursuing research into marine biotechnology (in Oslo, Bergen, Trondheim and in the Arctic at Tromsø), several marine research institutes (including the Institute of Marine Research in Bergen and the Norwegian Institute of Fisheries and Aquaculture in Tromsø), several large-scale aquaculture stations (near Bergen, and in Tromsø) and a research station at Ny Ålesund, Spitzbergen; but also Canada and the U.S. are developing well prospecting marine biotechnology sectors. Most of the companies involved in Arctic bioprospecting are from the U.S. Today over fifty companies are involved in bioprospecting and or sale of products derived from or based on the genetic resources of the Arctic.

There is a clear division within the international community whether marine genetic resources should be governed under Part XI UNCLOS as common heritage of mankind and be subject to a benefit-sharing regime through the International Seabed Authority or whether these resources are subject to Part VII UNCLOS and are part of the high-sea freedom regime. For the Arctic fragile ecosystem it would be better to recognise marine bioprospecting as subject to Part XI UNCLOS. Pursuant to Article 140 activities in the Area are to be carried out for the benefit of mankind as a whole and the International Seabed Authority is to provide for the equitable sharing of financial and economic benefits of those activities. That means that they do not belong to any person, company or state, but to mankind as a whole, and the benefits would be shared by all mankind. It would be a significant anomaly if bioprospecting and the sustainable use of biodiversity generally were the only activities in the Area not undertaken for the benefit of mankind. But some arctic states like the United States will never agree to that, but even if MGRs in the Area cannot be considered part of the heritage of mankind regime, MGR are resources which the majority of states have an interest

²⁵ Arctic living organisms are exposed to freezing temperatures and have developed ways to adapt to life at sub zero temperatures. The properties of anti-freeze proteins isolated from such species have a wide number of possible applications in biotechnology including: enhancing the cold storage and cryopreservation of cells and tissue use as ice nucleators to inhibit recrystallisation of ice during freezing and thawing with application in the cold storage of food preservation of food texture and flavour in frozen food; preservation of food texture and flavour in frozen food.

²⁶ The extraction and manufacturing of fish oil rich in omega 3 fatty acids is already an established industry that has been operating in several Arctic countries for over a century.

²⁷ One of the most surprising examples of Arctic biodiversity being studied for medical purposes is the Arctic ground squirrel (*Spermophilus parryii*) research on this animal may offer clues for treating or preventing stroke-related brain injury in humans when blood flow transiently reaches the low level typical of hibernation.

in because of their location – in areas beyond national jurisdiction, and so potentially exploitable by all states – and are also common because of their potential benefits to mankind.

In the Arctic MGR in the territorial sea, in the EEZ and in the Continental Shelf is to be conducted only upon the consent of the coastal state. Some of the Arctic Ocean coastal states have enacted national legislation for bioprospecting in marine areas under their jurisdiction. For example, in Canada some laws and regulations at the federal, provincial and territorial levels cover some of the elements of access and benefit sharing.²⁸ The other Arctic Ocean coastal states have only limited legislation or are still developing domestic regulatory frameworks for bioprospecting for MGR. The content and operation of national legislation may affect the debate on the regulation of bioprospecting at the global level. Although research on biotechnology potential of Arctic genetic resources is largely occurring on sovereign territory or waters of the Arctic States, melting ice gives opportunities for bioprospecting in areas beyond national jurisdiction.

What can and will the Arctic states do to protect their environment from excessive bioprospecting? First of all, the legal regime could be left unaltered and marine biological diversity outside of national jurisdiction would remain unregulated by the CBD and freely available to those willing to invest in exploiting those biological resources. This would seem to be the preferred position of the United States. Doing nothing poses a risk of an irreversible loss of diversity and concomitant economic, scientific, and medical opportunities. Precautions dictate that it is preferable that states act to establish norms for the conservation of marine biodiversity outside national jurisdiction. Furthermore, waiting until the interests have been vested and reasonable expectations have been created to establish a legal regime or guiding principles for regulating marine biodiversity will make it much harder to ensure that sustainable use is on a fair and equitable basis. It will also undermine any sort of interpretation of biological diversity beyond the limits of national jurisdiction as falling within the common heritage of mankind.

A second alternative or conserving marine biodiversity outside national jurisdiction would be to bring such resources within the UNCLOS regime governing the Area and the control of the International Seabed Authority. This suggestion has a number of advantages. Firstly, a structure for the agreed international supervision of the conservation and sustainable use of resources under UNCLOS there has already been in place, one of the most comprehensive environmental treaties extant a decision to pursue this alternative would be compatible with and supportive of the benefit sharing approach contained in both the CBD and UNCLOS.

²⁸ See more www.ec.gc.ca/apa-abs/default.asp?lang+En&n+AEFC44AD-1>

Another possibility is to adopt a common approach, whether through the Arctic Council or through an *ad hoc* agreement of the five coastal states, to the issue of Arctic biodiversity beyond national jurisdiction in general and MGR in particular, their action would have impact on the practice of bioprospecting in the central part of the Arctic Ocean. Bioprospecting for MGR in areas beyond national jurisdiction might give rise to a conflict because of the lack of agreement at the global level on the relevant legal regime. Also non-Arctic states and other entities claim their right to MSR in the Arctic. This may give rise to potential conflicts between the parties. It is important to examine what framework governs the MSR in the Arctic. The Arctic Ocean coastal states may adopt a common approach, whether through the Arctic Council or through the *ad hoc* gathering of the five Arctic Ocean coastal states to the issue of Arctic biodiversity beyond national jurisdiction in general and Arctic MGR in particular.

CONCLUSIONS

As the Arctic has become more accessible, the industrial and commercial interest in the resources of the Arctic has increased. This includes also the interest in the genetic resources of the Arctic. The existing legal framework which includes UNCLOS and CBD is not sufficient. It is difficult to draw a line between scientific research and exploration, or between MSR and bioprospecting, between common heritage of mankind and the high-sea regime. Most of the Arctic Ocean consists of international waters. How much of the seabed is concerned to be the common heritage of mankind has not been known yet. Despite the difficulties in defining “marine scientific research”, it remains the fact that the coastal states have jurisdictional rights when it comes to marine scientific research activities in their EEZ.

We have to keep in mind that the draft ocean treaty proposed by Malta in 1971 included both biological and mineral resources in the sea area beyond 200 nm. During UNCLOS III, biological resources were omitted from Part XI, because at the time it was believed that they fell mainly within national jurisdiction. Since very little was known about marine organisms in the open ocean and the deep seabed, it was assumed that these areas were largely devoid of life. Certainly, no one imagined that the few animals believed to exist had any commercial value. Since the reason for declaring the mineral resources to be the CHM was the expectation of their commercial value, it is reasonable to suppose that had the States been aware of the potential value of biological resources in the Area, these resources would have been included in the CHM.

Notably, the Preamble to the LOSC refers back to Resolution 2749 (XXV) underlining that the purpose of the LOSC is to develop the principles established by the resolution, in particular, that the oceans' resources are the CHM and should be developed for the benefit of all mankind. Furthermore, Article 136 provides that the Area and its resources are the CHM. Since the Area itself is the CHM, it would seem reasonable to conclude that everything within it, both living and non-living, should also be the CHM. The CHM lies at the origins of the LOSC and remains one of its fundamental concepts or principles. This is made clear, not only in the Preamble, but also in the provisions on amendments.

Pursuant to Article 140, activities in the Area are to be carried out for the benefit of mankind as a whole, and the ISA is to provide for equitable sharing of financial and other economic benefits of those activities. Under Article 143, MSR is to be carried out for the benefit of mankind as a whole, and parties must develop a program for MSR for the benefit of developing countries and technologically less developed countries. Pursuant to Article 149, all objects of an archaeological and historical nature found in the Area must be preserved or disposed of for the benefit of mankind as a whole.

It would be a significant anomaly if bioprospecting and the sustainable use of biodiversity generally were to be the only activities in the Area not undertaken for the benefit of mankind as a whole. Taking into consideration the purpose of UNCLOS to regulate all activities on the oceans and to the benefit of all mankind, as well as the nature of MGR as the functional units of heredity (heritage), it would only be logical that genetic resources should be included in the CHM. If the goals of equity and economic development are to be achieved, all the resources in ABNJ must be protected and used sustainably for the benefit of all mankind. For all these reasons, MGR should be considered as the CHM and should be expressly declared as such in an implementing agreement to UNCLOS.

Melting ice in the Arctic seems to raise a number of questions, which need to be discussed. One of them is bioprospecting. The changes and responsibility have to go hand in hand while exploring the Arctic resources.

