

The Urgency for Conservation of the Marine Environment in the Course of Scientific Research in Areas beyond National Jurisdictions

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▪ Received: 2020/09/18

Accepted: 2020/10/29

Abstract

The oceans, which cover 70 percent of the Earth's surface, contain the most biologically diverse ecosystems on earth. We depend on the seas for our survival since they support us for life on earth. They are also essential for our economic prosperity, social well-being, and quality of life. Yet the marine environment is deteriorating fast. We need to find better ways of managing it. Over the last decade, significant advances in citizenship science have occurred, allowing projects to extend areas beyond national jurisdiction. Perhaps, however, our greatest challenges are those that exist in the Areas beyond National Jurisdiction (ABNJ), where management is reliant on international agreements and enforcement is likely to need remote monitoring methods using satellite technologies. Regarding such development, the aim of this paper is to provide some information on the marine scientific research and examine the applicability of the marine scientific research (MSR) regime of the UN Convention on the Law of the Sea (UNCLOS). However, the MSR regime of UNCLOS, apart from an absolute freedom, is based on responsibilities including, providing the legal basis for setting up obligations such as conservation and sustainable use of

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environment. The conclusion outlines some of the issues that should play an important role in the process of researching.

Keywords: Marine Environment, Scientific Research, Areas beyond National Jurisdictions, Law of the sea

Introduction

Ocean is still one of the least known areas of the world so a scientific understanding of the ocean is fundamental to carry out an effective management of the human activities that affect the marine environment. This scientific understanding is also essential to predict or forecast, mitigate and guide the adaptation of societies to cope with the many ways the ocean affects human lives and infrastructures at different spatial and temporal scales. The marine scientific research is a ground for the ocean and marine governance. That is the principles governing the use of oceans ought to be established on the basis of a reasonable scientific understanding of the marine environment. Apart from this, marine science can make a major contribution to eliminating poverty, ensuring food security, supporting human economic activities, conserving the world's the marine environment, and helping predict the natural events and disasters (UN,2011:49-50), Therefore, the marine scientific research is among the important subjects in the law of the sea. In fact, the evolution of the marine sciences and the law of the sea are essentially intertwined. Three properties are identified in this regard.

First, the marine scientific research is among accelerating parameters of the development of the law of the sea. This can be specifically observed in exploration of manganese conglomerates on the seabed and establishment of the legal regime governing the area. **Second**, marine scientific activities provide a set of fundamental information to enforce the regulations of the law of the sea. For example, the best existing scientific information related to the marine species are a prerequisite of determining the maximum quantity of the sustainable harvest and the overall catchable quantity. Moreover, the marine scientific research is in line with the implementation of critical precautionary and environmental approaches, because their implementation should be based on reliable scientific information. **Third**, the law of the sea can be a motivating factor for the expansion of the marine scientific research. An example of this is the progress of the recent seabed research in the field of gathering geological and discovering marine genetic resources for medical purposes in areas beyond national jurisdiction.

The preamble of the United Nations Convention on the Law of the Sea¹ (LOSC) declares the intention of its drafters to establish a legal order for the seas and



oceans to promote ‘the study, protection and preservation of the marine environment’. This announcement implies a seamless order and harmony between the aims of science and marine environmental protection. In practice, the relationship is much more complex, underlined occasionally by conflict surrounding the implementation and development of the parallel legal regimes for marine scientific research (MSR) and protection of the marine environment found in Part XIII and Part XII of the LOSC, respectively.

It is apt to point out from the start that science and international law have always been in dynamic tension with each other: science ‘buffets’ international law, whilst ‘at the same time, international law is in turn exerting a continuing and deep influence on the advancement of science itself’ (Dennis Livingston, 1968:6). On the one hand, law must somehow try to keep up with scientific and technological progress as it marches into uncharted terrain beyond the boundary of existing scientific regulatory and institutional frameworks. On the other hand, societal values and culture, embodied in science legal, policy and institutional frameworks, also exert a strong influence over the scientific system and the work of individual scientists (Sheila Jasanoff, 1996:263). Tracing the potential of progress through the historical development of the law of the sea, until the mid-twentieth century scientists were basically free to move throughout the oceans without constraint. (Alfred Soons, 1977:393) In the 1950s and 1960s, rapid post-war innovations led to the development of new oceanographic instruments, equipment and data collection methods, opening up greater opportunities for investigating the oceans. Ironically, growth in research also gave rise to restrictions on the mobility and access of scientists to make ‘observations when and where they wished’ (Ibid: 394). In particular, states drew the link between obtaining improved knowledge of the oceans and their growing interests in exploiting offshore natural resources and technological advances that might be relevant to naval security (Milner B, 1969). On the other, it was the main impetus for expanding regulation of MSR under international law.

The most important legal development relating to the conduct of marine scientific research (MSR) was the adoption of the LOSC. Concerns about the consequences of rapid scientific and technical progress led to the recognition of the need to address ‘mankind’s collective responsibility for preserving the marine environment and minimizing ocean pollution’ (John A. Knauss, 1973). Re-examination the freedom of scientific research and its legal limits culminated in the adoption of Part XIII of the LOSC which now provides the legal framework for the conduct of MSR.

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Much has changed since the adoption of the LOSC nearly 30 years ago. In the past, MSR primarily involved short-term research expeditions conducted at sea, taking measurements from research vessels and using fixed installations and platforms. Today, technological innovations have transformed marine environmental research, opening up many more possibilities to explore and better understand the oceans, including observation from space, expeditions traversing the globe from pole-to-pole or journeys in submersibles to the deep sea, all occurring over sustained periods of months to years (Florian H,2005). However, scientists now face new constraints on access arising from legal and geopolitical changes. In addition, the potential for conflicts has increased due to intensified and expanding uses of the oceans, such as renewable energy production, bio prospecting and marine geoengineering. While advances in science and technology have certainly contributed to increased human activities that impact the oceans, human pressures have pushed the global ocean into a state of rapid decline caused by, inter alia, habitat destruction, biodiversity loss, overfishing, pollution, climate change and ocean acidification.[†] In response, science's relationship with society is also changing. While it is recognized that 'scientific and technical advances bring unquestioned benefits,... they also generate new uncertainties and failures, with the result that doubt continually undermines knowledge, and unforeseen consequences confound faith in progress'(Sheila Jasanoff,2003:223-224)This growing ambivalence and fundamental questioning of the narrative of scientific progress has contributed to a trend in contemporary democracies leading to calls for responsible governance of science and innovation (Jack Stilgoe et al.2003). Concerns relate not only to the direct physical environmental impacts of experimental and observational activities,(Anna-Maria Hubert,2011) but also to the need to ensure that science serves the public good and that knowledge stays within the public domain so that everyone can benefit (Helga Nowotny,2005).

According to the international law, the freedom of the states in Areas beyond National Jurisdiction provides possibility for the marine scientific research. While freedom is a fundamental prerequisite of marine scientific research development, they may raise severe sensitivities respecting the marine

[†] GESAMP (IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection and Advisory Committee on Protection of the Sea), A Sea of Troubles (Rep. Stud. GESAMP No. 70 2001) unesdoc.unesco.org/images/0012/001229/122986e.pdf



environment. Accordingly, one important question is how to enable the consistency between the freedom of the marine scientific research and protection and preservation of the environment. In this study we will study the important legal subjects associated to the marine scientific research with respect to this question. The legal regimes in the LOSC for MSR in Part XIII and for the protection and preservation of the marine environment in Part XII are not static, and each influences the progressive development of the other. Furthermore, both are crosscutting issues in the Convention that frequently interact with the regimes for other ocean uses and different maritime zones. This article has examined the legal regime for MSR and its progressive development with a view to understanding its relationship to the regime for the protection and preservation of the marine environment.

The general principles of the marine scientific research

Ocean governance must be based on a sound scientific understanding of the marine environment. Thus it may be argued that the freedom of marine scientific research is a prerequisite of ocean governance. However, marine scientific research or other survey activities in the offshore areas may affect environment and biodiversity. To fully understand threats to the marine environment and to develop effective environmental protection strategies, we need advances in scientific knowledge, obtained through marine scientific research. At the same time, we might not fully comprehend the environmental impacts of the activity, and marine scientific research may thus be hampered due to environmental protection measures restricting the activity. This has been deemed the paradox of marine scientific research. Obligations concerning the protection and preservation of the marine environment may “stifle the conduct of [marine scientific research] by limiting access and creating overly onerous administrative requirements”. There is thus a challenge to reconcile the two, and find the balance between conducting marine scientific research, and the protection and preservation of the marine environment (Hilde Woker et al,2020). The United Nation Convention on the Law of the Sea is the general international legal framework for all maritime affairs and usages of the oceans, including marine scientific research. The UNCLOS has been in force since November 1994, and is legally binding on its 168 States parties.³ The objective of the UNCLOS is to

³ The United Nations Convention on the Law of the Sea, United Nations Treaty Collection

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create “a legal order for the seas and oceans which will facilitate international communication, and will promote the peaceful uses of the seas and oceans, the equitable and efficient utilization of their resources, the conservation of their living resources, and the study, protection and preservation of the marine environment” (Preamble). In other words, the UNCLOS regulates, at least to some extent, “almost every possible activity on, in, under, and over the sea”.

The main part of the principles and regulations governing the marine scientific research is embodied in the part thirteen of the convention, but due to the multidimensional nature of this subject, it is also related to the other parts of the convention as well.⁴ We will address the interpretation and implementation of the regulations prescribed in this part in the light of the main purpose of the convention regarding the protection of the marine environment.

While scientific research may be carried out for different purposes, to better understand the impacts of human activities as the main factor of the environmental changes, there is a significant and increasing need for these studies, as they can supply the required knowledge to understand the marine environment and its proper management, and they can prepare the grounds for realization of the environmental objectives. The general principles of conducting marine scientific research activities including due scientific tools and methods, avoiding hindrance to other legal utilizations of the oceans, and staging peaceful scientific research are laid down in the thirteenth part (LOSC, 1982:240). These regulations are enforced in all marine areas, even the areas beyond national jurisdiction where the freedom of doing the scientific research is recognized.⁵ The term ‘beyond the limits of national jurisdiction’ is used in UNCLOS in the context of the international seabed area (referred to as the Area), (LOSC, 1982:1.1.1) where the ocean floor and its mineral resources are the common heritage of mankind (LOSC, 1982:preamble). The term ABNJ in the evolving

(2019)

https://treaties.un.org/pages/ViewDetailsIII.aspx?src=TREATY&mtdsg_no=XXI-6&chapter=21&Temp=mtdsg3&clang=_en#1, (Accessed 26th August 2020)

[†] LOSC, Arts 19, 21 and 52 (innocent passage), Art. 40 (transit passage), Art. 54 (archipelagic sea lanes passage), Arts 56 and 62 (EEZ), Art. 87 (high seas), Art. 123 (enclosed or semi-enclosed seas) and Arts 143 and 155 (the Area). Part XII on ‘Protection and Preservation of the The marine environment’, Part XIV on ‘Development and Transfer of Marine Technology,’ Part XV on ‘Settlement of Disputes’ and Annex VIII ‘Special Arbitration’

^Δ The freedom of scientific research laid down in Art. 87 is subject to Parts XIII and VI of the Convention



lexicon of the law of the sea is understood to refer to both the Area and the high seas. The latter for the purpose of the application of the high seas provisions in Part VII of UNCLOS is all parts of the sea that are not included in the exclusive economic zone, in the territorial sea, internal waters or in the archipelagic waters.⁶ Accordingly, ABNJ are sea areas beyond the limits of coastal state sovereignty and jurisdiction, where two very distinctive jurisdictional frameworks apply under UNCLOS, namely: the high seas (Part VII) and the regime applicable to the Area (Part XI and Annex III of the Convention). Scientific research continues to reveal novel biological diversity from the 64% of the ocean that lies in areas beyond national jurisdiction (ABNJ) that is intricately connected, provides crucial ecosystem services, and inspires innovation but faces threats from human activities (Harden-Davies & Snelgrove,2020:2). In 2015, the UN General Assembly in Resolution 69/292 decided to develop an international legally binding instrument under the United Nations Convention on the Law of the Sea (UNCLOS) on the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction (ABNJ).⁷ To cover all issues related to ABNJ in 2017, the General Assembly decided in Resolution 72/249 to convene an intergovernmental conference with a view to developing the instrument as soon as possible (UN Doc. A/RES/72/249,2017:para.1). The intergovernmental conference is to meet in four sessions. Upon resolution, the new binding agreement shouldn't undermine existing international or regional conventions and is a complementary for the law of the sea convention. In this regard, in the following paragraphs the 1982 convention will be considered.

Since there is no definition given to the term “marine scientific research” in United Nation Convention of the Law Of the Seas, in order to determine the scope of the UNCLOS Marine Scientific Research regime, one has to look at the regime and the Convention as a whole.⁸ Marine Scientific Research (MSR) is expressly listed as one of the freedoms on the high seas that is to be exercised with due regard for other rights and interests (UNCLOS,1982: 87(1)). In the Area, all

⁶ UNCLOS art 86. In contrast to the 1958 High Seas Convention, 450 UNTS 11 (entered into force 30 September

1962), the term ‘high seas’ is not defined expressly in UNCLOS. See Douglas Guilfoyle ‘The high seas’ in Rothwell and others (eds) *The Oxford Handbook of the Law of the Sea* (n 3) 203–53 at 205.

⁷ Resolution adopted by the General Assembly on 19 June 2015, UN Doc. A/RES/69/292.

⁸ Vienna Convention on the Law of Treaties, 1155 U.N.T.S. 332, Article 31(1).

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States and competent international organizations also have the right to conduct MSR, but all MSR activities within the Area are to be carried out “exclusively for peaceful purposes” and “for the benefit of mankind as a whole.” (UNCLOS,1982:143(1)) A legal challenge potentially arising from the current practices of marine scientific research is the risks these technologies pose to the marine environment, and how these can be regulated. All MSR activities regardless of location are to be conducted in line with the general principles enumerated in Article 240 UNCLOS, which requires all Marine Scientific Research to

(a) be conducted exclusively for peaceful purposes; (b) be conducted with appropriate scientific methods and means compatible with this Convention; (c) not unjustifiably interfere with other legitimate uses of the sea compatible with this Convention and shall be duly respected in the course of such uses; (d) 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.

The general principle of clause D of article 240 of the law of the sea convention is an ingredient which clarifies the legal association between the system of doing scientific research and protection and preservation of the marine environment (Philomène A. Verlaan,2007:210). This article accentuates that marine scientific research shall be conducted in compliance with the regulations of the conservation and sustainable use of marine environment. Although in general, the environmental threats due to marine scientific research are slight compared to other utilizations of the oceans, yet there are evidences indicating that some of such activities have led to environmental impairments (Angela R. Benn and others,2010). The tone of articulation for clause D of article 240 implies that the purview of this article is not limited to the regulations laid down in the twelfth part, but marine scientific research shall be conducted in compliance with all environmental regulations adopted in conformity with the convention on the law of the sea, including the regulations laid down in the national law and the regional and international treaties.

The attached principle of clause B of article 240 accentuates that marine scientific research shall be conducted with appropriate scientific means and methods compatible with the contents of the convention. The term “proper” is not defined in the convention, but as far as its prevalent definition it refers to those methods and means compatible with the prescribed conditions (Anna-Maria



Hubert,2011:330-31). These regulations are provisioned to restrain those methods imposing unjustifiable impairments to the marine environment and other utilizations of the oceans (Elmar Döhler and Carsten Nemitz,2000). To support this interpretation, the text of the convention can be referred to (UNLOSC,1982:194(3)(a)), where it is accentuated that marine scientific research shall be compatible with other related environmental regulations(Angus Stevenson:2014),the governments' measures to prevent introducing toxic and harmful substances to the sea (Alfred H.A. Soons,1982:136), and the utilization of the technology under their supervision(UNLOSC,1982:240(d)) Regardless of the general principles laid down in the article 240, the convention on the law of the sea is silent about responsible practice of marine scientific research. Despite the guidelines provisioned for ethical conduct of research respecting the humans and animals, respecting the environmental standards in conduct of scientific researches is a novel concept gaining attention recently(UNLOSC,1982:196(1)). A wide spectrum of binding and non-binding legal documents have been concluded in the past decade to address the responsible conduct of scientific research, ultimately forming the general principles of article 240 of the convention(Helene Marsh and Richard Kenchington,2004:300). The most comprehensive of the said documents is OSPAR regulating the imperative procedures and standards to conduct marine scientific research.⁹

The International Cooperation in the Marine Scientific Research

Considering the complexity of the nature of the oceans, no state is capable of independently describing the functions of the oceans. Hence, the international cooperation is naturally required in marine scientific research. Section two of part thirteen of the law of the sea convention is allocated to the international cooperation in marine scientific research. Clause 1 of article 242 imposes a general commitment on the states and the international organizations regarding cooperation in conducting marine scientific research. Specifically, article 243 compels the states and the competent international organizations to “create favorable conditions for the conduct of marine scientific research in the marine

⁹ OSPAR Commission, ‘OSPAR Code of Conduct for Responsible Marine Research in the Deep Seas and High Seas of the OSPAR Marine Area’ OSPAR 08.24/1, Annex 6 (2008)www.ospar.org (OSPAR Code of Conduct for Responsible Marine Research) (last accessed 29 May 2020).

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environment and, to integrate the efforts of scientists in studying the essence of phenomena and processes occurring in the the marine environment and the interrelation between them”. The said cooperation shall be accomplished by conclusion of international treaties. The need for cooperation in marine scientific research is further pointed out in article 255, which compels the states to adopt reasonable rules and procedures to promote marine scientific research.¹⁷ Article 244 embodies the commitment to publication and dissemination of information and findings resulted from marine scientific research. This commitment is also reflected in the addendum six of the final document of the third UN conference on the law of the sea.¹⁸

In this regard, a special attention must be paid to technical and financial assistance to developing States. Provided that these scientific marine facilities are inadequate for developing States, it is imperative to provide them with technical and financial assistance in order to promote marine scientific research. Accordingly, the addendum six of the final document of the third UN conference on the law of the sea obliges industrial States to assist developing States in preparing and implementation of the sciences, marine technology, and ocean services development plans.¹⁹ Article 202 of the convention explicitly explains a commitment for technical and financial assistance to developing States in line with protection and preservation of the marine environment. The said assistances include providing training services for their scientific and technical personnel, facilitating their participation in relevant international programs, supplying them with necessary equipment and facilities, enhancing their capacity to manufacture such equipment, and supplying them with relevant advice on and developing facilities for research, monitoring, educational and other required programs. International cooperation with different international institutions has been developed in marine scientific research. For instance, the United Nations Educational, Scientific, and Cultural Organization (UNESCO), through the Intergovernmental Oceanographic Commission (IOC), is the recognized competent international organization in the fields of marine scientific research programs and transfer of marine technology under the law of the sea convention.

¹⁷ 723 *Virginia Commentaries*, vol. IV, p. 477.

¹⁸ 724 Annex VI is entitled 'Resolution on Development of National Marine Science, Technology and Ocean Service Infrastructures'.

¹⁹ 726 *Ibid.*, para. 3.



The intergovernmental oceanographic commission has developed a number of programs in marine science and technology, with a view to empowering developing countries to sustainably use their marine resources.¹³

The FAO organization has also provided technical assistance and training to strengthen national capacity in fisheries sciences and to strengthen the knowledge base for the implementation of the ecosystem approach to fisheries in developing countries.¹⁴ The authority has established the international seabed authority endowment fund^{*15} for marine scientific research activities in the area. It has facilitated capacity-building for scientific and technical assistances to developing countries.¹⁶

Marine Scientific Research and Oceans Conservation

The convention on the law of the sea depicts that the intention of the legislators is to secure legal order for the oceans, so that the investigations and preservation of the the marine environment would be enhanced. This phrase implies the relationship between the objectives of science and protection and preservation of the marine environment. This relationship is extensively complex in practice, and the parallel legal systems of marine scientific research and preservation of the marine environment under parts twelve and thirteen relatively create some problems. Until the mid-twentieth century, the scientists were free to sail across the oceans (Alfred Soons,1997:393). During the 1950s and 1960s, the extensive inventions of the post-war era led to development of novel oceanographic documents and equipment and methods of data collection, accommodating even

¹³ 727 un General Assembly, *Oceans and the Law of the Sea: Report of the Secretary- General*, A/ 65/ 69, 29 March 2010, p. 26, para. 100.

¹⁴ 728 *Ibid.*, p. 30, para. 112.

¹⁵ The international seabed authority endowment fund promotes and encourages the accomplishment of the joint marine scientific researches in the international seabed region for the good of mankind in the two following ways:

By supporting the participation of the competent scientists and technical staff from the developing countries in the marine scientific research programs and activities; By providing these scientists with opportunities to participate in the related projects. [http:// iocaribe. Ioc-unesco. org/ news- international- seabed- authority- endowment- fund.](http://iocaribe.ioc-unesco.org/news-international-seabed-authority-endowment-fund)

¹⁶ 730 *Ibid.*, p. 27, para. 104.

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more opportunities to explore the oceans. The progress of researches created more constraints for the scientists to move and access whenever and wherever they desired (Ibid,394). In fact, the governments found the relationship between the advanced knowledge and access to the natural resources of the oceans. This led to the progress of marine scientific research on one hand, and it became the main motivation for development of the international law regarding marine scientific research on the other hand.

The most important legal progress related to the conduct of marine scientific research was the ratification of the convention on the law of the sea. The recognition of the governing laws and the authority of the coastal governments and establishment of new marine areas have restrained the scientists in reaching to the marine environment. The existing concerns about the consequences of the expanded scientific and technical progresses, raised the need for a collective human responsibility to preserve the marine environment and to reduce oceans pollution (Milner B. Schaefer,1969). A review on the freedom of marine scientific research and its legal constraints has been depicted in the regulations set forth under part thirteen of the convention on the law of the sea, which constitutes the legal regime of marine scientific research today. Obviously, a lot of amendments have been made since the convention was concluded, and the manner and type of the scientific research have changed drastically with regards to the latest technical and technological progresses. However, the scientists face new constraints today due to the legal and geopolitical changes. Moreover, the potentiality of disputes have increased due to the extensive exploitation of the oceans in the manner of, for example, production of reproducible energy, ecological explorations, etc. While the scientific and technical progresses enable the human access, yet this may leave diverse impact on the oceans and may put their conditions at stake. Therefore, although the scientific and technical progresses encompass undeniable advantages, they have also created concerns that were followed by the introduction of the subject of responsible governance of the science and inventions into the legal literature.

Conducting marine scientific research may leave destructive impacts on the environment (Philomène A. Verlaan,2007). The knowledge achieved as a result of scientific research may lead to increased exploitation of the natural resources, creation of new technologies, or implementation of such usages that may leave diverse and destructive impacts on the marine environment (Silvio Funtowicz and Jerome Ravetz,1993).



This makes point for the responsible governance of the modern technology^{1y} and raises questions regarding the association between parts thirteen and twelve of the law of the sea convention.

Part twelve is specially tailored to cover the marine environment protection and preservation. A primary review of the convention may raise the hypothesis that there is a hierarchical order between parts twelve and thirteen (Florian H. Th Wegelein,2005:75-6). Especially according to clause D of article 240, marine scientific research must be in conformity with all of the related regulations and comply with the convention, which is the marine environment preservation.^{1^}

However, the textual interpretation does not imply the preference of part twelve, but the two parts should be considered as supporting one another. The main core of part thirteen is the basic obligation of States in preserving the marine environment and their focus on prevention, reduction, and control of the sea pollution (UNLOSC,1982:192). Clause 1 of article 194 accentuates that States shall take all measures consistent with the convention that are necessary to prevent, reduce, and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their policies in this connection. According to the definition, pollution of the marine environment means the introduction by man, which is likely to directly or indirectly lead to impairment of the marine environment(UNLOSC,1982:1(4)) Clause 1 of article 194 may be considered as

^{1y} Some marine geoengineering methods may fall within this category of ‘post-normal’ science which is characterized as involving high uncertainties and high stakes given the societal implications of the knowledge gained from such studies. See generally Rob Bellamy, ‘Beyond Climate Control: “Opening up” Propositions for Geoengineering Governance’ (Climate Geoengineering Governance Working Paper Series: 011, 27 May 2014) www.geoengineeringgovernanceresearch.org/perch/resources/workingpaper11bellamybeyonclimatecontrol.pdf (last accessed 27 May 2020); Lisa Dilling and Rachel Hauser, ‘Governing Geoengineering Research:

Why, When and How?’ (2013) 121 *Climatic Change* 553. Regarding the lack of a clear distinction between science and application in the case of ocean fertilization research see Aaron L. Strong, John J. Cullen and Sallie W. Chisholm, ‘Ocean Fertilization: Science, Policy and Commerce’ (2009) 22 *Oceanography* 236

^{1^} Note, however, that Art. 240(d) qualifies the general principle that: ‘MSR shall be conducted in compliance with all relevant regulations adopted in conformity with this Convention including those for the protection and preservation of the the marine environment’ (emphasis added).

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a prerequisite for conduct of scientific research (Alex G. Oude Elferink, 2012:224). As depicted by the seabed disputes chamber of the international tribunal for the law of the sea as an advisory opinion about responsibilities and obligations of States sponsoring persons and entities with respect to activities in the area, those measures described as due diligence may change over the time, as measures considered sufficiently diligent at a certain moment may become not diligent enough in light of new scientific or technical knowledge (Seabed Mining Advisory Opinion, paras 111–7) The main core of part thirteen of the convention is article 238, according to which all States and competent international organizations have the right to conduct marine scientific research. Although this right is subject to the rights and duties of other States as provided for in the convention (UNLOSC, 1982:238). Therefore, the said right is subject to the regulations embodied in part twelve regarding the marine environment preservation. Clause 4 of article 194 affirms that in taking measures against pollution of the marine environment, States shall refrain from unjustifiable interference with activities carried out by other States in the exercise of their rights and in conformity with the convention. Therefore, a State may take certain restraining measures to prevent pollution of the marine environment, even if this action would be followed by hindrance of marine scientific research. Moreover, several commitments related to international facilitation and cooperation in scientific and technical subjects are provisioned in part twelve with the purpose of increasing knowledge about the conditions of the marine environment and deleterious activities. Article 200 urges the States to cooperate in undertaking programs of scientific research and the exchange of information and data related to marine scientific research for the assessment of the pollutants, their pathways, risks and remedies. Article 201 obliges the States to cooperate in establishing appropriate scientific criteria for the formulation of rules, standards, and recommended practices and procedures for the subject of pollution of the marine environment. These obligations are also reflected in other regulations of the convention such as management and preservation measures related to marine living resources, preservation of ice-covered areas that shall be accomplished based on the best available scientific evidence, environmental impact assessment or monitoring of the risks of pollution which shall be practiced by “recognized scientific methods” (UNLOSC, 1982:204). Even if not explicitly required, but scientific experts shall ensure precise implementation of the regulations under part twelve (Patricia Birnie, 1995:245).

The precautionary approach adjusts the condition of a substantial volume of



available scientific evidences where there is scientific uncertainty. Although the precautionary approach is approved by the seabed disputes chamber as an inseparable part of liability to take all measures necessary, but the consensus exists that does not consider scientific data as unnecessary (Yoshifumi Tanaka,2008:227-8). This implies that marine scientific research shall be conducted following the precautionary measures that gathers necessary information, in order to accomplish the regulatory procedure. In short, marine scientific research is an activity tailored for collecting information which is imperative for the management of resources and environmental regulations. Hence, the regulations under part twelve related to the marine environment protection and preservation shall be considered as complementary to part thirteen (Gerald Francis Graham,1980:8).

If marine scientific research poses impairment to the marine environment, the legal liability conditions will be enforced. In addition to the general principles of international obligations of States arising upon breach of these obligations,¹⁹ the law of the sea convention considers a specific basis for obligations, when a damage arises out of an act or omission of an act in the conduct of marine scientific research (UNLOSC,1982:263). States and international organizations shall be responsible and liable pursuant to clause 3 of article 263 for damage caused by pollution of the marine environment arising out of marine scientific research undertaken by them (UNLOSC,1982:263(3)). This principle is related to the general principles of liability for environmental damages under article 235 of part twelve which includes compensations and relief (UNLOSC,1982:235). Under some circumstances, application of these regulations for damages arising out of scientific research might be limited due to the complicated marine ecosystem. This is often due to novelty of scientific activities. Under certain circumstances, establishment of legal responsibility for damages arising from marine research pursuant to clause 3 of article 263 requires evidences of causality relationship between the *actus reus* of the State involved and the damage. The precautionary principle applied in scientific uncertainty instances where it is difficult to prove a cause and effect relationship, may act to lower the level of standards of proving causality relationship under such circumstances.²⁰ In fact, a

¹⁹ See ILC Articles on State Responsibility, Report to the United Nations General Assembly, UN Doc A/56/10 (2001).

²⁰ Caroline E. Foster, Science and the Precautionary Principle in International Courts and

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substitutive approach may lower the burden of proving the causality relationship and propound responsibility for the marine environmental damages.¹¹ The possibility of tailoring other methods of propounding legal accountability for the marine environmental damages is explicitly depicted in the convention. It is laid down in article 304 that the provisions of the convention regarding responsibility are without prejudice to the development of further rules regarding responsibility and liability under international law.¹²

If a MSR activity does result in harm to the marine environment, issues regarding legal responsibility and liability arise. In addition to the general rules on state responsibility regarding the breach of an international obligation by a state vis-à-vis other states, 139 the LOSC provides a specific basis for responsibility and liability where a wrongful act or omission occurs in respect of MSR (UNLOSC, 1982:263). States and international organizations are responsible and liable under Article 263(3) for damage caused by pollution of the marine environment as a result of MSR undertaken by them or on their behalf (UNLOSC, 1982:263). This rule links to the general provision on responsibility and liability for environmental damage in Article 235 of Part XII that entails, inter alia, a requirement to ensure that compensation or other relief is made available for damage caused (UNLOSC, 1982:235).

In some circumstances these provisions may be of limited use in ensuring legal accountability for specific damage arising from research activities to naturally variable, complex marine ecosystems. This is particularly so in the case of novel, often one-off, in situ experiments, for which scientific uncertainty is bound, by definition, to exist, given the very object and purpose of carrying out the research is to reduce scientific uncertainty. In such circumstances, the sticky wicket of establishing legal responsibility and liability for specific pollution damage incurred from marine research activities in accordance with Article 263(3) (and indeed in most environmental cases) concerns the requirement to prove to

Tribunals: Expert Evidence, Burden of Proof and Finality (Cambridge University Press 2011)273; Miriam Haritz, An Inconvenient Deliberation: The Precautionary Principle's Contribution to the Uncertainties Surrounding Climate Change Liability (Kluwer Law International 2011)306–309; Simon Marr, 'The Southern Bluefin Tuna Cases: The Precautionary Approach and Conservation and Management of Fish Resources' (2000) 11 European Journal of International Law 815, 822–3.

¹¹ See generally Jutta Brunnée, 'International Legal Accountability through the Lens of the Law of State Responsibility' (2005) 36 Netherlands Yearbook of International Law 21

¹² See also LOSC, Art. 235(3).



relevant evidentiary standards,^{۳۳} a causal link between a state's wrongful act and a loss or injury (Roda Verheyen, 2004:249). In such situations the precautionary principle, which applies in circumstances of scientific uncertainty in which it is difficult to prove cause-effect relationships, may operate to lower the standard of proof required to prove a claim of damage to the marine environment from polluting research activities.^{۳۴}

In connection with settlement of disputes related to marine scientific research^{۳۵}, the convention recognizes the compulsory competence of the International Tribunal in accordance with the general principles prescribed in articles 296 and 297 and considering some exceptions (UNLOSC, 1982:264). There are some specific constraints in implementation of compulsory procedures of dispute settlement in scientific marine research in the exclusive economic zone and the continental shelf. Disputes concerning claims of a State conducting research that the coastal State has acted in contravention of the provisions in regard to its

^{۳۳} Regarding the standard of proof applied by international courts and tribunals see Separate Opinion of Vice -President Wolfrum, The M/V 'Saiga' Case (Saint Vincent and the Grenadines v. Guinea) ITLOS Case No. 2 (1999); Separate Opinion of Judge Greenwood, Case Concerning Pulp Mills on the River Uruguay (Argentina v. Uruguay) [2007] ICJ Rep 21, paras 25–6. See also James Harrison, 'International Courts and Tribunals in the Settlement of Environmental Disputes and the Development of International Environmental Law' (2013) 25 *Journal of Environmental Law* 501.

^{۳۴} Caroline E. Foster, *Science and the Precautionary Principle in International Courts and Tribunals: Expert Evidence, Burden of Proof and Finality* (Cambridge University Press 2011) 273; Miriam Haritz, *An Inconvenient Deliberation: The Precautionary Principle's Contribution to the Uncertainties Surrounding Climate Change Liability* (Kluwer Law International 2011) 306–309; Simon Marr, 'The Southern Bluefin Tuna Cases: The Precautionary Approach and Conservation and Management of Fish Resources' (2000) 11 *European Journal of International Law* 815, 822–3.

^{۳۵} Robin R. Churchill and A.V. Lowe, *The Law of the Sea*, 3rd edn (Manchester University Press 1999) 447–8 point out that marine scientific can also give rise to litigation in municipal courts. Regarding potential conflicts with the protection of the marine environment, see, eg, *Qikiqtani Inuit Association v. Canada (Minister of Natural Resources)* 2010 NUCJ 12 in which a Canadian court granted a temporary injunction to prevent seismic testing by the German RV *Polarstern* on the grounds that could potentially impact marine wildlife in the area. See also

Hannah Hoag, 'Inuit concerns stall seismic testing' *Nature News* (12 August 2010) <http://www.nature.com/news/2010/100812/full/news.2010.403.html> (last accessed 4 June 2019).

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sovereign rights under articles 246 and 253 in the areas within its national jurisdiction are excluded from compulsory dispute settlement mechanisms, although they may be settled through compromise based on demand raised by every state party to the convention under special conditions (UNLOSC, 1982:297(2)). The interpretation and application of the regulations under the law of the sea convention concerning scientific marine research are not focusing on international disputes to this date. However, scientific research is a normative subject between the States which enables international arbitration.^{٧٢} In the context of other disputes related to the interpretation and implementation of the law of the sea including territorial claims, marine scientific research may be the result of States discord. This even implies preservation of marine environment and its resources as well. According to the convention, it is obvious that scientific cooperation in contentious territories can terminate all claims related to the marine areas and their resources (UNLOSC,1982:241).

The legal regime of the law of the sea convention concerning marine scientific research under part thirteen, and marine environment preservation under part twelve are not static and interact in their development. Moreover, both are reciprocal subjects in the convention often interacting with the related regimes concerning other utilizations of the ocean and different marine areas. The legal system of scientific marine research and its development was reviewed with consideration of its relationship with the marine environment preservation. In many aspects, the rules and regulations governing scientific marine research and the marine environment preservation support one another. Accessibility of scientific information is a prerequisite for effective environmental regulations and requires States cooperation. Especially with regards to the environmental protection, States need to cooperate in conducting studies, research programs, and exchange of information concerning sea pollution and development of appropriate scientific criteria for such researches. Examination of the text of these two parts reveals that they do not outrank one another. Considering special conditions, the States may undertake restraining measures to prevent impairments and damages to the marine environment, even if their action would lead to restraining the conduct of marine scientific research, but the said constraints shall be necessary and reasonable.^{٧٣}

Since the scientific knowledge is imperative for effective management of the

^{٧٢} Eg, Whaling in the Antarctic Case; Southern Bluefin Tuna Cases

^{٧٣} See further regarding LOSC, Arts 194(4) and 240(d)



environment, distinction shall be attached to necessary researches for managerial decisions and those not directly related to the environment preservation (Florian H.Th Wegelein,2005:76), although conclusion of such distinction is not always facile. The regulations of scientific marine research may pose secondary risks leading to constraints for research activities, lowering the understanding of marine environment and impacts of human activities on the oceans. Sometimes marine scientific research may leave destructive impacts on the environment, albeit insignificant. For example, technical and scientific capacities to collect information in the oceans provide us with a comprehensive picture of the oceans systems. However, these modern oceanographic procedures and equipment may directly leave destructive effects of the marine environment. Therefore, the environmental regulations for marine scientific research may be justifiable under certain circumstances. The important development is the allocation of the best practices to the conduct of scientific research in compliance with the general principles of clauses B and D of article 240.^{۲۸} Another variety of the best practice is related to transparency in planning and conduct of scientific research with maximum benefit for the society^{۲۹} and minimum environmental damage.^{۳۰} It is noteworthy that the convention encompasses several regulations concerning dissemination of research results and sharing the scientific information. Full implementation of such regulations is in compliance with the principle of reciprocal benefit which dictates States obligation under article 242 concerning cooperation in the conduct of scientific research. Moreover, this convention encompasses regulations that holds States liable in relation with damages to the marine environment raising out of their research. Additionally, undertaking an assessment of such regulations about legal obligation, ensuring responsibility, and compensation of damages to the marine environment is essential.

Conclusion

^{۲۸} See OSPAR Code of Conduct for Responsible Marine Research.

^{۲۹} Regarding transparency in international environmental law see generally Jutta Brunnée and Ellen Hey, 'Transparency and International Environmental Institutions' in Andrea Bianchi and Anne Peters (eds) *Transparency in International Law* (Cambridge University Press 2013).

^{۳۰} See OSPAR Code of Conduct for Responsible Marine Research, paras 17 and 21–3. See also Ocean Fertilization Assessment Framework, para. 3.6.1.

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The marine environment includes the waters of seas and estuaries, the seabed and its subsoils, and all marine wildlife and its sea and coastal habitats. The ultimate aim is to keep our oceans and seas biologically diverse and dynamic, and also safe, clean, healthy and productive. The marine environment is a vital resource for life on Earth. The marine environment is also a great contributor to economic prosperity, social well-being and quality of life. The past decades have witnessed dramatic evolutions in science and technology, which enable humans to venture into the deep sea and discover the unknown biological world in areas beyond national jurisdiction (ABNJ). Although The international community critically depends on science and technology to address such threats because scientific knowledge gaps impede informed decision-making, there are also new challenges for governance, especially considering the possible environmental impacts of sampling activities, and the concerns with regard to conservation and sustainable use of marine environment during scientific research. Since any observation of a natural system has the risk that it will disturb that system, proper design of marine scientific research will be applied which can reduce, or even eliminate, this risk. It is particularly important that efforts that aim at improving the understanding of marine ecosystems should not damage those ecosystems. In many respects, the rules and principles that regulate MSR and environmental protection are mutually reinforcing. The availability of scientific information is a prerequisite for effective environmental regulation. This is reflected in the normative structure of the LOSC, which requires that states promote, facilitate and cooperate in MSR. Specifically, with regard to environmental protection, states are required to cooperate for the purpose of studies, research programs and exchange of information and data about marine pollution and based on this information are required to develop appropriate scientific criteria for such regulations. A contextual reading of the relationship between Parts XII and XIII suggests that, in law, one regime does not stand above the other.

It is underscored, however, that MSR can have adverse effects on the marine environment. For example, extended scientific technical capability for data collection and in situ experimentation in the oceans gives us a much more comprehensive picture of the ocean system. However, these new oceanographic research methods and equipment may have direct adverse impacts on the marine environment. Therefore, environmental regulation of MSR activities can be justified in certain circumstances. An important development is the specification of best practices for the conduct of MSR for specific matters in accordance with



the general principles in Article 240(b) and (d). Another form of ‘best practice’ relates to the promotion of transparency relating to the planning and conduct of MSR by maximizing the benefits to the whole of society and minimizing environmental damage by preventing redundant study. It is noteworthy in this respect that the LOSC contains several provisions on scientific information sharing and the open publication and dissemination of research results, data and information. Full implementation of these provisions accords with the principle of mutual benefit, which qualifies the obligation of states in Article 242 to promote and cooperate in MSR. Moreover, the LOSC contains rules that make states responsible and liable for damage caused to the marine environment as a result of MSR undertaken by them or on their behalf. Further evolution of these rules on legal responsibility and liability may be necessary to ensure accountability and reparation for damage to the marine environment as a result of MSR.

Since marine scientific research is a freedom of the high seas and all States have the right to conduct marine scientific research in marine areas beyond national jurisdiction, so conservation and sustainable use of the environment are crucial. To achieve sustainable development and conservation goals, we must improve the integration of science into marine policy, with an increasing need for innovative multidisciplinary approaches that provide insights into social, cultural, economic and political concerns. Use of expert, evidence-based advice and assessment using an ecosystem-based approach during further development of marine resources so as to minimize undesirable impacts on the marine environment; Capacity building for both essential research infrastructures (including research vessels and remote and autonomous observation and survey capabilities) and human capital through education; Establishment of an improved data storage and management system that ensures open access by scientists globally; and Sharing of information gained through research activities carried out under extensive and multinational collaboration, to monitor process and outcomes by mandate. Codification of new binding instruments for conservation and sustainable use of biodiversity in areas beyond national jurisdiction in General Assembly will be a chance to consider such important issue.

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