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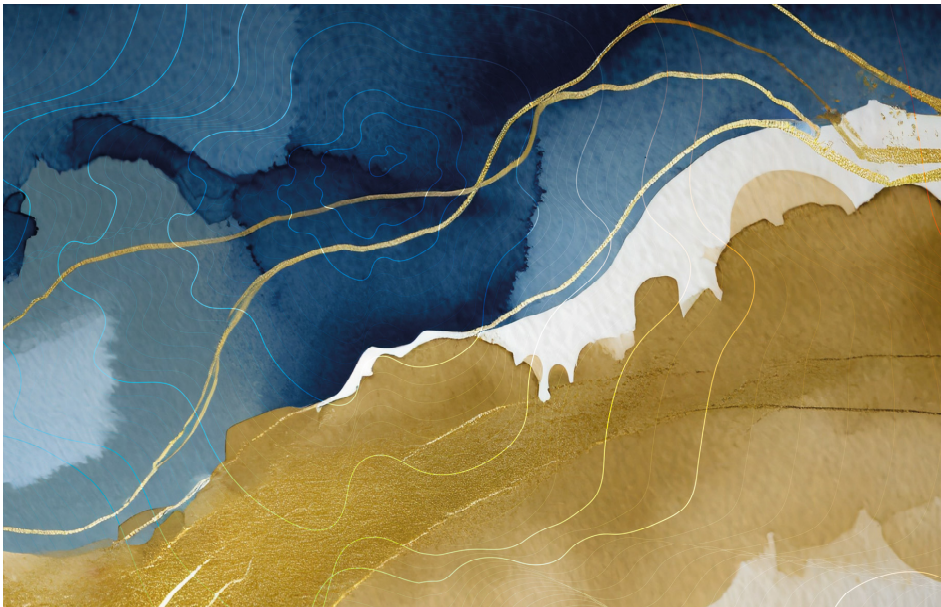
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THE PRACTICE OF SMALL ISLAND DEVELOPING STATES ON
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by

Luciana Fernandes Coelho



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Luciana Fernandes Coelho
Brazil

A dissertation submitted to the World Maritime University in
partial fulfilment of the requirements for the award of the
degree of
Doctor of Philosophy in Maritime Affairs

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To my husband, José Henrique, for the unconditional support
To Tarcisio, Rosangela, Adriana, Laura, Luiza, and Mariana for believing
To Uncle Socorro Coelho in memoriam
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To my soon-to-be-born child who has already brought a
renewed perspective to my life

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Abstract

The 1982 United Nations Convention on the Law of the Sea (LOSC) seeks to reconcile competing interests in marine scientific research (MSR) within areas under national jurisdiction through the consent regime. Amidst the heightened focus on the limited capacity of Small Island Developing States (SIDS) to undertake the necessary MSR to maintain their livelihoods, it has been suggested that the consent regime for MSR could offer support in enhancing the scientific and technological capabilities of SIDS. However, the framework's fitness for purpose in light of changing circumstances has been questioned. Within this context, this thesis analyzes the influence of SIDS in developing and reframing the consent regime for MSR under the LOSC.

To achieve this objective, the study undertakes a stepwise process answering four research questions. It begins by defining the objective and purpose of MSR consent, followed by an examination of the State practices of 31 SIDS across the Caribbean, Pacific, Indian, and Atlantic regions regarding the MSR consent regime from 2005 to 2020. The study then identifies tools employed by SIDS to adapt the MSR consent regime to changing circumstances. Finally, it ascertains principles and concepts to maintain the balance sought in the MSR consent regime under the LOSC in light of evolving circumstances. These changing circumstances include techno-scientific advances impacting MSR and developments in other areas of international law, notably related to the environment and biodiversity, postdating the adoption of the LOSC.

As a point of departure, the Third World Approaches to International Law (TWAIL) provide background for the study, also serving as the motivation to scope the study to focus on SIDS. Different methods were used in each step to obtain and analyze the relevant information to respond to each research question. These include (i) documental analysis; (ii) questionnaires; and (iii) a review of international law, law of the sea, and MSR scholarship.

The findings emphasize the role of the MSR consent regime in supporting the scientific and technological capabilities of SIDS. The study concludes that the consent regime remains operational, with SIDS employing diverse tools to integrate legal and techno-scientific advancements therein. Cooperation and “reasonableness” emerge as significant legal concepts to sustain the required balance within the MSR consent regime under the LOSC. This study contributes to

legal scholarship by exploring the adaptability of the LOSC over time in response to State practice, as well as in light of scientific and technological advances. At the same time, it advances the integration of social science and empirical methods in legal studies. Furthermore, it enhances the TWAIL movement by exploring SIDS perspectives, an area that has not been extensively investigated within the movement.

Key words: marine scientific research, consent regime, small island developing states, subsequent practice, TWAIL, capacity-building, transfer of marine technology, benefit-sharing.

Abbreviations

ABE-LOS	Advisory Body of Experts on the Law of the Sea of IOC-UNESCO
ABNJ	Areas beyond National Jurisdiction
ABS	Access and Benefit Sharing
ACP	African, Caribbean and Pacific
AIS	Atlantic, Indian Ocean and South China Sea
AOSIS	Alliance of Small Island States
AWNJ	Areas within National Jurisdiction
BBNJ	Biodiversity beyond National Jurisdiction
CANARI	Caribbean Natural Resources Institute
CARICOM	Caribbean Community
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CSC	Geneva Convention on the Continental Shelf
UNDESA	United Nations Department of Economic and Social Affairs
DFO	Fisheries and Oceans Canada
DIC	Developing Island Countries
DOALOS/OALOS	UN, The Division for Ocean Affairs and the Law of the Sea
DSM	Deep Seabed Mining
DTU	Technical University of Denmark
ECLAC	Economic Commission for Latin America and the Caribbean
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EU	European Union
FAO	UN Food and Agriculture Organization
FFA	Pacific Islands Forum Fisheries Agency
GEBCO	General Bathymetric Chart of the Oceans
GEOMAR	Helmholtz Centre for Ocean Research Kiel
GOOS	Global Ocean Observing System
ICJ	International Court of Justice
IFLOS	International Foundation for the Law of the Sea
IFREMER	Institut Français de Recherche pour l'Exploitation de la Mer
IGC-BBNJ	Intergovernmental Conference on an International Legally Binding Instrument under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction
IL	International Law
ILC	International Law Commission
IMar	Cape Verde's Instituto do Mar
IMO	International Maritime Organization
IO	International Organization
IOC	Indian Ocean Commission
IOC-UNESCO	Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization
ISA	International Seabed Authority

LDC	Least Developed Country
LOSC	United Nations Convention on the Law of the Sea
MARE	Marine and Environmental Sciences Centre
MAS	Marine Autonomous Systems
MASS	Marine Autonomous Surface Ships
MGR	Marine Genetic Resources
MPA	Marine Protected Area
MSR	Marine Scientific Research
NIEO	New International Economic Order
NIOZ	Royal Netherlands Institute for Sea Research
NIWA	National Institute of Water and Atmospheric Research
NOAA	National Oceanic and Atmospheric Administration
NOC	National Oceanography Centre
NP	Nagoya Protocol
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
OECS	Organisation of Eastern Caribbean States
OHRLLS	UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States
PF	Profiling Floats
PIF	Pacific Island Forum
PNG	Independent State of Papua New Guinea
PSIDS	Pacific Small Island Developing States
QA	Questionnaire A
QB	Questionnaire B
RPA	Remotely Piloted Aircraft
RSP	Regional Seas Programmes
ROV	Remotely Operated Vehicles
SDG	Sustainable Development Goal
SIDS	Small Island Developing States
SO	Seabed Observatory
SPC	Pacific Community (formerly South Pacific Commission)
SPREP	Secretariat of the Pacific Regional Environment Programme
SVG	Saint Vincent and the Grenadines
TWAIL	Third-World Approaches to International Law
UN	United Nations Conference on Environment and Development
UNCED	United Nations Conference on Environment and Development
UNCLOS I	First United Nations Conference on the Law of the Sea
UNCLOS III	Third United Nations Conference on the Law of the Sea
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
USP	University of South Pacific
UUV	Unmanned Underwater Vehicles
UWI	University of West Indies
VCLT	Vienna Convention on the Law of Treaties
WMO	World Meteorological Organization
WMU	World Maritime University

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Papers Included in This Dissertation

This doctoral thesis is based on the following five interrelated papers, which are included at the end. These are referred to in the text by the roman numerals:

Paper I Coelho, L. F. (2022). Marine scientific research and Small Island Developing States in the twenty-first century: Appraising the United Nations Convention on the Law of the Sea, *The International Journal of Marine and Coastal Law*, 37 (3), 493–528. doi: <https://doi.org/10.1163/15718085-bja10099>.

Paper II Coelho, L. F. (2024). The practice of the Caribbean SIDS on the consent regime for marine scientific research under UNCLOS: Trends, gaps, and recommendations. *Ocean Development and International Law*, 1–29. <https://doi.org/10.1080/00908320.2024.2332304>.

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Paper III Coelho, L. F. (forthcoming). Developing and reframing UNCLOS in changing circumstances: The practice of Small Island Developing States on the consent regime for marine scientific research [*revised, accepted with minor revisions*].

Paper IV Coelho, L. F., and Rogers, R. (2023). The use of Marine Autonomous Systems in the delivery of Marine Scientific Research under UNCLOS: Resuming balance and sharing benefits. In T. Johansson, D. Dalaklis, J. E. Fernández, A. Pastra, & M. Lennan (Eds.), *Smart ports & robotic systems: Navigating the waves of techno-regulation & governance* (Vol. 2). Palgrave Macmillan. <https://doi.org/10.1007/978-3-031-2529696>. *The author of this thesis was involved in conceptualizing the main argument and structure, planning, and write-up.*

*This chapter is not currently available for open access. The attached version is a pre-print containing peer reviewer comments. Copyright remains with the author.

Paper V

Polejack, A., & Coelho, L. F. (2021). Ocean science diplomacy can be a game changer to promote the access to marine technology in Latin America and the Caribbean. *Frontiers in Research Metrics and Analytics* 6 (April), 34–36.

<https://doi.org/10.3389/frma.2021.637127>.

The author of this thesis was involved in conceptualizing the main argument and structure, planning, and write-up.

"I believe the goal is that our discipline has to go beyond approaches, such as those characterized by an exclusive black letter law emphasis, that do not adequately capture the type of epistemic injustices that could result from the failure to adequately capture alternative views or, for my purposes, the experience and worldviews of non-Western peoples. It is the privileging and centrality given to certain locales and ideas in the production of very particular types of (governing) international law—against which other less visible locales and ideas are to be measured—that is the problem."

Gathii, J. T. (2020). Promise of International Law: A Third World View (Including a TWAAIL Bibliography 1996–2019 as an Appendix). *Proceedings of the ASIL Annual Meeting*, 114, p. 177.

1. Introduction

This thesis analyzes the influence of Small Island Developing States (SIDS) in developing and reframing the 1982 United Nations Convention on the Law of the Sea (LOSC or the Convention) (United Nations Convention on the Law of the Sea, 1982/1994). It investigates the State practice of SIDS concerning the consent regime for marine scientific research (MSR), also examining the level of support for such practice from researching States and general interpretations. The findings substantiate the overarching arguments that a central tenet of the consent regime is to provide capacity-building opportunities to developing countries and that SIDS have developed and reframed the framework to changing circumstances. The thesis contends that discussing the purpose of the consent regime and its flexibility serves as a catalyst for reorientation toward a paradigm of collaboration and mutual benefit.

Examining the interpretation of parts of the LOSC by a group of States—the SIDS—is pertinent at this time, given that 2022 marked the 40th anniversary of the LOSC’s adoption. In this sense, as informed by Tladi (2014, p. 97), the law emanating from a treaty over time “is often influenced by other processes, including interaction with other norms of international law, fragmentation resulting from nonuniversal ratification, reservations, subsequent agreements relating to the treaty, subsequent practice as well as the potential for varying pronouncements exacerbated by the lack of unified judicial settlement system.” Therefore, such a commemorative milestone prompts an assessment of the current state of the law emanating from the consent regime for MSR under the LOSC. Furthermore, examining the subsequent practice of SIDS unveils the contributions of States that have historically been in the periphery in the development of international law.

By the time the LOSC was adopted, Ambassador Tommy Koh, president of the Third United Nations Conference on the Law of the Sea (UNCLOS III) acknowledged that MSR was a polarized topic during the negotiations. Notwithstanding that, in his view, the final compromise was promising:

Why was [MSR] such a controversial issue at the Conference? Why was the cause of freedom of scientific research advocated by only five or six States and opposed by most of the coastal States? There are several explanations. First, marine scientific research, which involves ships, trained manpower, and laboratories, is an expensive business. Only a handful of countries such as the United States, the Soviet Union, the United Kingdom, France, the Federal Republic of Germany, and Japan, have major

programs in marine scientific research. This means that the rest of the world, especially the developing countries, do not feel that they have a stake in the promotion of scientific research. Second, some developing countries fear that marine scientific research may disguise other less wholesome activities, such as espionage. Third, developing coastal States fear that the research States will gather valuable economic data about living and non-living marine resources which they would then use to their advantage in bilateral negotiations with the coastal States.

(...)

The provisions of the Convention on marine scientific research have wisely sought to achieve the objective of mutual benefits for the research State and for the coastal State. The coastal State will be fully informed of, among other things, the nature and objectives of the research project. The coastal State also will be given an opportunity to participate in the research project and will have access to the results of the research projects. In these ways, the coastal States will have an incentive to cooperate with the research States (Koh, 1983a, pp. 773–75).

Nevertheless, the aspirations of SIDS and developing countries to derive mutual benefits from advancements in scientific and technological domains have, regrettably, largely remained unrealized at present (IOC-UNESCO, 2020; IOC-UNESCO et al., 2017; Long, 2022; Sanders, 1997; Tolochko & Vadrot, 2021; Zitoun et al., 2020). In effect, demands for equitable opportunities for participation in the generation of knowledge pertaining to the marine environment and the acquisition of marine technology have resurfaced as prominent themes during the Intergovernmental Conference on an International Legally Binding Instrument under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (IGC-BBNJ) and were considered in the new agreement (Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction, 2023) (Harden-Davies, Lopes, Coelho, et al., 2024). Therefore, a question arises as to the continued validity of the balance crafted under the framework for MSR.

Such overarching concerns serves as the foundational impetus for this article-based thesis, which derives its analytical insights from a suite of five papers, included in Appendix 6. To establish a cohesive framework uniting these articles, this kappa is organized as follows. Section 1 provides background information for the research. Section 2 explains the research design. Section 3 explores the conceptual and legal framework that underpins this research. Section 4 summarizes all papers comprising the dissertation, outlining their findings. Section 5 is dedicated to discussing the findings of the research and responding to the research questions. Lastly, Section 6

offers concluding remarks and proffers recommendations for prospective research endeavors.

Contextualizing this study, Section 1 first reviews the pertinence of MSR for the development of humankind and sustaining the earth system. Second, it delineates the primary facets characterizing the regulatory framework governing MSR within the ambit of the LOSC. Third, the section discusses ecological, political, technical, and legal developments post-LOSC, underscoring how they may potentially challenge the applicability of the provisions on MSR in the LOSC. Fourth, it examines the protagonist of SIDS in ocean governance, elucidating the imperative for an examination of the perspective on the law of the sea. This introduction concludes with consideration of the relevance of MSR to address the special circumstances of SIDS.

It is worth noting that, unless expressly indicated otherwise, the legal provisions referenced in this work refer to the LOSC, and the web sources cited were accessed during the period spanning March to April 2023.

1.1. The Significance of Marine Scientific Research for Humankind

The ocean encompasses over 70 percent of the Earth's surface, assuming an indispensable role in upholding life on our planet (Inniss et al., 2016). Its significance lies in economic activities and tangible and intangible ecosystem services, including climate regulation, oxygen generation, nutrient cycling, and biodiversity support (Inniss et al., 2016). Moreover, the ocean serves as a vital arena for human development, offering substantial opportunities in the realms of sustenance, energy, medicine, and recreation (UN, 2021). Nevertheless, the ocean confronts an unprecedented array of threats, predominantly attributable to human activity, comprising overfishing, pollution, habitat loss, and climate change (UN, 2021). The gravity of these challenges poses profound implications for the preservation and sustainable utilization of marine resources, prompting geologists to christen the current epoch as the Anthropocene (Aswani et al., 2018; Chakrabarty, 2018; Malhi, 2017).

Science and technology were pivotal as enablers of the Anthropocene epoch, but they also have the potential to prevent humanity from transgressing planetary boundaries and to foster ocean sustainability (Vidas, 2011). It is noteworthy that the industrial revolution and colonial expansion exemplify situations where science and technology were mobilized for economic gains, leading to detrimental consequences for the Earth's ecosystem and promoting societal inequalities

(Mickelson, 2014; Vidas, 2011). The pioneering British *HMS Challenger Expedition* (1872–1876) introduced the term “fundamental oceanographic research”—subsequently changed to MSR¹—referring to inquiries pertaining to physical oceanography, chemical oceanography, marine oceanography, and marine geology and geophysics devoid of primary economic objectives² (Soons, 1982, p. 6). MSR has an indispensable role in building knowledge for understanding the intricate and dynamic nature of the oceans, including their interactions with the atmosphere, terrestrial realms, and biosphere. Furthermore, MSR stands as a critical instrument in tackling both present and emerging challenges that impinge upon the oceans' health and productivity, and their contributions to human well-being. Lastly, evidence generated through MSR can support policy formulation and management measures, thereby facilitating effective governance and conservation of marine resources.

The United Nations (UN) has acknowledged the paramount importance of MSR in fostering peace and ensuring a sustainable future, as evidenced by its inclusion as one of the targets within Sustainable Development Goal (SDG) 14: “Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.” Specifically, this goal aims to enhance knowledge, develop research capacity, and facilitate the transfer of marine technology (UN Docs. A/RES/70/1). To support this vision, the UN actively endorses various initiatives and programs designed to promote and facilitate MSR, with a particular focus on aiding developing countries, as exemplified by the Regular Process for Global Reporting and Assessment of the State of the Marine Environment (World Ocean Assessment) and the Decade of Ocean Science for Sustainable Development (UN Docs. A/RES/72/73). Additionally, numerous UN agencies play instrumental roles in promoting MSR, including the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific, and Cultural Organization (IOC-UNESCO), the Food and Agriculture Organization (FAO), the International Seabed Authority (ISA), and the World Meteorological Organization (WMO), among others.

In a bid to cultivate and foster the practice of MSR to advance our understanding of the marine environment, while also safeguarding against its potential detrimental

¹ Historically, the terms “fundamental oceanographic research,” “oceanic research,” and “marine scientific research” were used interchangeably to encompass a wide range of data collection activities in the ocean space. During the Third Conference on the Law of the Sea, participating States reached a consensus to adopt “MSR” as the official legal term for such activities (Gorina-Ysern, 2003, p. 209).

² Recently, the *Global Ocean Science Report* has used the term “ocean science” as an umbrella for eight categories of research: (i) marine ecosystems functions and processes; (ii) ocean and climate; (iii) ocean health; (iv) human health and well-being; (v) blue growth; (vi) ocean crust and marine geohazards; (vii) ocean technology (viii) Ocean observation and marine data (IOC-UNESCO, 2020, p. 19).

applications, the LOSC has established the foundational international framework to govern MSR activities, as discussed in the next subsection.

1.2. Introducing the Legal Framework Governing MSR

The LOSC is acclaimed as the “constitution for the oceans” (Koh, 1983b), because it provides the foundation of the law of the sea, has nearly universal application, prevails over treaties inconsistent with it, and is flexible to accommodate changing circumstances (Churchill, 2015). The social and political processes culminating in the Convention's adoption spans centuries, as it not only introduces novel regulations but also codifies established customary norms. In contrast, the endeavor to regulate MSR is relatively recent, dating back to the last century. This is not because humanity's pursuit of understanding oceanic processes is recent, but rather because the geopolitical context driving the development of global regulations emerged more recently.

From a European historical perspective, since the seventeenth century, the principle of “freedom of discovery, exploration and scientific research” was generally accepted, rendering the ocean a conduit for initiating and perpetuating colonial and imperial expansions, founded on the principle of *res nullius primo occupanti* (Gorina-Ysern, 2003, pp. 13–15; Mickelson, 2014). In the mid-twentieth century, the revelation of the economic potential of seabed mineral resources and fossil fuels, coupled with enhanced fishing capabilities and the first wave of decolonization, sparked contestation of the principle of freedom by newly sovereign coastal States, which unilaterally asserted authority over sea areas adjacent to their coastlines (Mukherjee, 1981; Roberts, 2007, pp. 148–66; Rothwell & Stephens, 2016). It was in this geopolitical context that international rules governing the law of the sea and MSR were negotiated.

The subsequent development of the international law of the sea, and regulation of MSR, gradually evolved from merely balancing the principles of freedom and sovereignty to also considering other values of significance for humankind. The process of codifying the law of the sea was initiated in the 1930 Hague Conference but materialized only in 1957, when the first United Nations Conference on the Law of the Sea (UNCLOS I) was convened pursuant to the UN General Assembly (UNGA) Resolution 1105 (XI) (Rangel, 1979). UNCLOS I concluded with the adoption of an optional protocol and four treaties, among them the 1958 Geneva Convention on the Continental Shelf (hereinafter CSC).³ The CSC addressed MSR

³ The other treaties are Convention on the Territorial Sea and the Contiguous Zone (Geneva April 29, 1958, in force September 10, 1964) 516 UNTS. 205; Convention on the High Seas (Geneva, April 1958, in force September 30, 1962) 450, UNTS 82; and Convention on Conservation of the Living

under Articles 5 (1) and 5 (8), distinguishing between fundamental and applied research, while also conferring specific rights to the coastal State for participation, if desired, in pure scientific research. An essential addition to the framework was the requirement of prior consent from the coastal State for any research “concerning the shelf and undertaken there” by other States, introduced through a proposal submitted by Indonesia (Article 5 [8], CSC) (UN Docs. A/CONF.13/C.4/L.40) (Soons, 1982; Tanaka, 2019). Subsequently, a French proposal endeavored to balance this prerequisite by stipulating the duty to “normally” grant MSR consent if the research project is submitted by a qualified institution, which aims to publish its results, is solely focused on investigating the physical or biological characteristics of the continental shelf, and allows for the coastal State's participation or representation in the research (Article 5 [8], CSC) (Gorina-Ysern, 2003, p. 213). Over time, the regulation provided by the CSC was found to be insufficient in effectively governing MSR activity (Gorina-Ysern, 2003, p. 255; Rothwell & Stephens, 2016, p. 564). Inadequate mechanisms to promote the participation of developing countries in MSR were identified, along with gaps and imprecisions, especially in light of the unilateral expansion of coastal State jurisdiction and technological developments (Anand, 1977). Furthermore, Latin American States accused researching States of failing to seek clearance for their scientific projects (Anand, 1982, pp. 194–195; Gorina-Ysern, 2003, pp. 256, 271–272).

That dissatisfaction was compounded by the mounting pressure exerted by developing countries to effect reforms in the legal and political domains. The advent of a second wave of decolonization gave momentum to the assertion of the right to self-determination,⁴ adopting a New International Economic Order (NIEO), and declaring the right of peoples and nations to permanent sovereignty over their natural wealth and resources during the 1960s (UNGA Resolution 1803 [XVII]) (Anand, 1977, 1982; Frere et al., 2020; Salomon, 2013). In the law of the sea domain, this movement was galvanized by Ambassador Arvid Pardo's resounding statement at the United Nations General Assembly (UNGA), wherein he proclaimed the seabed, ocean floor, and subsoil as the common heritage of humankind (UN Docs. A/C.1/PV.1515 and A/RES/2749 [XXV]) (Anand, 1982; Koh, 1983a;

Resources of the High Seas, (Geneva, April 29, 1958, in force March 20, 1966) 559, UNTS 825. An Optional Protocol of Signature concerning the Compulsory Settlement of Disputes was also concluded in 1958 (Optional Protocol of Signature concerning the Compulsory Settlement of Disputes (Geneva, April 29, 1958, in force September 30, 1962, 169) UNTS 450.

⁴ According to Frere et al. (2020, pp. 653–654), the right or principle of self-determination relates to the rights “to life, adequate food, water, health, an adequate standard of living (including adequate housing), the productive use and enjoyment of property, and cultural practices and traditions.” In the view of this research, the enjoyment of this right to self-determination is directly connected to sufficient access to scientific knowledge and technological infrastructure by SIDS.

Mickelson, 2019). It was within this dynamic context that the United Nations convened the Third United National Convention on the Law of the Sea (UNCLOS III) in 1973, culminating in the landmark adoption of the LOSC.

In UNCLOS III, MSR was negotiated in the third committee, together with provisions about the protection of the marine environment (Part XII) and the transfer of marine technology (Part XIV) (UN Docs. A/CONF.62/SR.190, A/CONF.62/SR.188, A/CONF.62/SR.185, A/CONF.62/SR.27, A/CONF.62/L.6.). Breakthroughs in the second committee relating to the Exclusive Economic Zone (EEZ) and the extended continental shelf influenced compromises on MSR (Soons, 1982, pp. 162–163). The Latin American, African, and Caribbean SIDS participated prominently in the negotiation of Part XIII as representatives of developing countries (Coelho, 2022; Franssen, 1973). Meanwhile Pacific SIDS (PSIDS), which were fewer States because many were still not independent, were more focused on topics such as the regimes of archipelagos, islands, and fisheries (Slade, 2003).

The LOSC regulates MSR in Part XIII, alongside other pertinent articles (e.g., Articles 19, 60, and 143). Part XIII encompasses 27 articles organized into six sections. The initial section establishes the right of all States and competent international organizations to conduct MSR as well as their obligation to promote and facilitate the development and conduct of the activity. MSR under the LOSC must be conducted exclusively for peaceful purposes; use appropriate scientific methods and means; avoid unduly interference with other legitimate uses of the sea; and comply with relevant regulations, including for the protection of the marine environment. The second section regulates international cooperation for MSR under the principle of mutually benefiting the States concerned. Section three governs the conduct and promotion of MSR, encompassing most of the provisions related to the consent regime. Section four regulates the deployment of scientific research installations or equipment in the marine environment. Section five addresses the special regime of responsibility and liability concerning MSR. The sixth section regulates the settlement of disputes and interim measures.

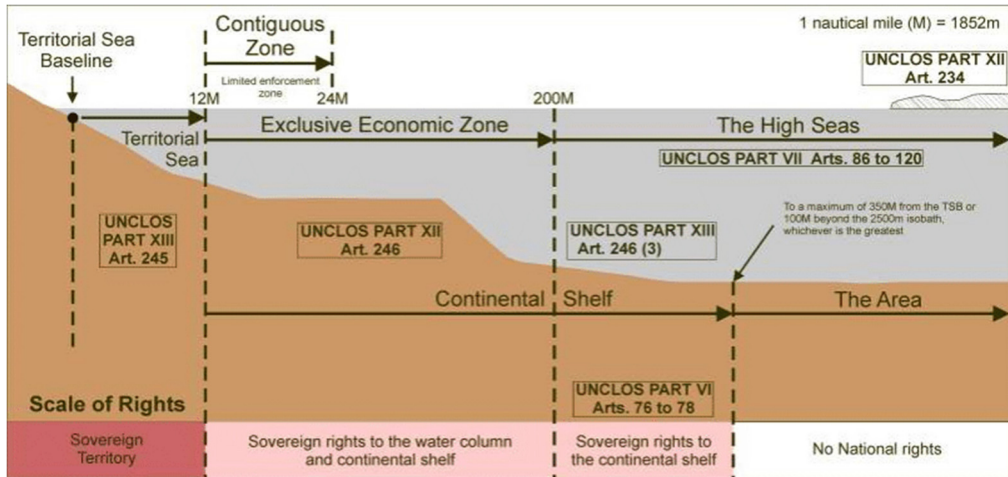
Part XIII is not a self-contained framework; instead, it establishes interconnections with various other parts of the Convention. Notably, it has intricate links with Part XII, concerning the protection and preservation of the marine environment, and with Part XIV, which addresses the transfer of marine technology encompassing research infrastructure (Yankov, 1983). These topics were, in fact, negotiated together, with specific influence between Part XIII and XIV (UNGA Res. 3203 [S-IV]), taking into consideration that NIEO also included a claim for an international code on the transfer of technology (UN Docs. TD/CODE TOT/47). Crucially, Part XIII is complemented by the preamble and Annex VI of the Final Act of UNCLOS III (United Nations Convention on the Law of the Sea, 1982/1994, Annex VI). The preamble explicitly states that the promotion of the study, and protection and

preservation of the marine environment are among the objective and purpose of the Convention. Annex VI emphasizes the importance of taking into account the specific needs and interests of developing countries and the equitable sharing of marine scientific and technological achievements to narrow the gap between developing and developed countries (United Nations Convention on the Law of the Sea, 1982/1994, Annex VI). Of particular significance to this study is the regulation of coastal State consent, which originated in the 1958 CSC and was subsequently elaborated upon by the LOSC, as further explained in the following subsection.

1.2.1. Overview of the Consent Regime for MSR under the LOSC

During UNCLOS III, the divergence of views between States seeking greater control over foreign MSR and those advocating for research freedom in areas within national jurisdiction (AWNJ) was resolved through the adoption of Trinidad and Tobago's proposal for a qualified consent regime (UN Docs. A/CONF.62/L.18) (Jarmache, 2003, pp. 306–307; Nordquist et al., 1985). Consequently, the consent framework established under the 1958 CSC underwent significant elaboration, resulting in the establishment of a complex regime of rights and obligations for coastal and researching States, with the scope varying depending on the distance from the coast of the maritime space involved (Caflisch & Piccard, 1978; Gavouneli, 2007, p. 64; Jennings & Watts, 2008; O'Connell, 1988).

Articles 245, 246, 248, and 249 are widely recognized as the cornerstones of the consent regime for MSR (Huh & Nishimoto, 2017c, pp. 1680–1681; Jarmache, 2003; Jennings & Watts, 2008; Mukherjee, 1981; Treves, 2008). In sum, the coastal State enjoys full sovereignty in the territorial sea, and other States shall always require authorization to undertake research therein and must comply with the requirements imposed. Within the territorial sea, the coastal State exercises complete sovereignty, and other States shall seek authorization before undertaking any research activities therein. In the EEZ and on the continental shelf, the coastal State's authority to withhold consent for marine scientific projects is limited, while researching States must comply with obligations regarding the marine environment and capacity-building. In the extended continental shelf, the coastal State's authority to withhold consent is confined to areas where exploration and exploitation are likely to occur in the near future and which have been designated for this purpose. In the Area, no consent is required for MSR, and the ISA and State parties bear obligations to foster international collaboration in promoting MSR, in line with the principle of the common heritage of humankind (Yu, 2019). The principle of freedom prevails on the high seas, where no consent is necessary for conducting MSR activities. Figure 1 illustrates the consent regime in each maritime zone.



Source: National Oceanography Centre, Southampton, at: <https://www.unclosuk.org/noc-and-unclos>.

Figure 1 Illustration of the Consent Regime for MSR

At the time of the Convention's adoption, the consent regime garnered acceptance from both coastal and researching States. It provided coastal States with a certain level of control over activities conducted in AWNJ as well as capacity-building opportunities, while ensuring stability for researching States in conducting MSR. However, over time, there has been a scarcity of information on the global implementation of Part XIII (Yankov, 1983). Concurrently, the limited participation of developing countries in MSR projects persists and is well-documented (IOC-UNESCO et al., 2017; Tolochko & Vadrot, 2021; Zitoun et al., 2020). Consequently, it is unclear whether or not the commitment established by the consent regime remains in place. Moreover, there is no information about whether and how States have interpreted the consent regime in light of changing circumstances that have impacted MSR.

To provide context for the reader, the following subsection elucidates the circumstances considered for this study.

1.3. The Changing Circumstances Promoting the Development of the Consent Regime

A heated debate among scholars revolves around the LOSC's flexibility to respond to changing circumstances that come with the passage of time (Heidar, 2020). Some contend that identified gaps within the Convention necessitate legal reform or the formulation of new laws (Bork et al., 2008; Kraska et al., 2015; Yoon, 2011). Others

maintain that, as a “living instrument” (Separate Opinion of Judge Lucky, in Request for Advisory Opinion submitted by the Sub-Regional Fisheries Commission, Advisory Opinion, April 2, 2015, ITLOS Reports 2015, p. 92), UNCLOS is equipped with mechanisms to address changing circumstances (R. McLaughlin, 2020, p. 133; also see, Boyle, 2013; Buga, 2018; R. J. McLaughlin, 2015). Though these perspectives are not inherently contradictory, such debate is relevant to this dissertation to the extent that it calls attention to the impact of societal and geopolitical changes in developing and reframing the LOSC.

Amidst the array of changes, this study examines the implications for the consent regime of two prominent factors that emerged during the analysis of the information gathered: the use of new technologies in MSR projects and legal advances within ocean governance, environmental law, and parallel regulatory frameworks. New technologies prompt questions about the Convention’s fitness for purpose to regulate the operational aspects of new technologies as well as the status of activities facilitated by such technologies (for instance: Bork et al., 2008; Hofmann & Proelss, 2015; Klein et al., 2020; Veal et al., 2019). For example, a recent discussion involved the rules governing the deployment of floats in the high seas, as part of the Argo Program, with the potential to drift into AWNJ occasionally. The issue was resolved within IOC-UNESCO through the adoption of Practical Guidelines establishing a notification system, but without reaching a definitive determination regarding whether the activity falls within the purview of Part XIII (Bork et al., 2008; Mateos & Gorina-Ysern, 2010). Furthermore, technological advancements have enabled new at-sea activities, such as ocean upwelling and research involving access to marine genetic resources (MGRs), the classification of which remains ambiguous (Matz-Lück, 2017; Proelss & Hong, 2012). Observing the State practice of SIDS has the potential to provide guidance on the ways in which the use of new technologies in marine research has been interpreted.

Another influential factor impacting SIDS' implementation of the consent regime pertains to legal developments within the law of the sea and parallel regimes subsequent to the adoption of the LOSC. During UNCLOS III, States anticipated that economic, social, political, and legal transformations would challenge the Convention's adaptability by inserting a number of mechanisms for development (Heidar, 2020). Scholars have stressed that, while the LOSC lacks the structure of the Conference of the Parties, and the amendments procedure under Articles 312 and 313 remains unutilized, the 1994, 1995, and 2023 implementing agreements advanced and introduced new concepts in the Convention⁵ (Boyle, 2013; Churchill,

⁵ Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea 1994/1996. Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of December 10, 1982, relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, 1995/2001. Agreement

2015; Heidar, 2020). For instance, the 1994 and 1995 agreements refined the obligation of Article 206 to undertake an Environmental Impact Assessment (EIA), and introduced the ecosystem and precautionary approaches (Churchill, 2015; Harrison, 2011; Tladi, 2014). International tribunals have contributed to LOSC development through its jurisprudence in contentious and advisory proceedings, for instance applying the precautionary approach, expanding the scope of Part XII beyond pollution, and clarifying the scope of due diligence obligations (Boyle, n.d.; Churchill, 2015; Tanaka, 2013). Institutions established under the Convention and international organizations have evolved the Convention by establishing guidelines, and procedures (Buga, 2015; Coelho & Rogers, 2023; Heidar, 2020; for instance, DOALOS, 2010). Alternative avenues for evolving the Convention beyond the “more law” approach (Boyle, 2013; Buga, 2018; R. McLaughlin, 2020, p. 133) encompass the evolutionary interpretation of generic terms (Tanaka, 2013; Yu, 2022a; Zhang, 2021), conduciveness (McLaughlin, 2020), and by means of rules of reference (Buga, 2015; Nguyen, 2021). In a less formal manner, nonstate actors have assumed a significant role in adapting LOSC provisions to novel technologies used in MSR by formulating soft-law instruments, technical standards, and guiding principles (Hubert, 2011; Coelho & Rogers, 2023; for instance, Breslin et al., 2007; InterRidge, 2006; Maritime UK, 2020). Beyond the legal realm, ocean science diplomacy is a discipline gaining heightened prominence for facilitating an understanding of the science-policy interface in matters related to the ocean, with potential implications for the implementation of the Convention (Cormier et al., 2021; Polejack & Coelho, 2021).

Since the LOSC is not a self-contained regime, the interplay between the Convention and various international legal frameworks and both hard- and soft-law instruments have been the subject of growing scholarly interest (Coelho, 2016; Coelho & Tavonvunchai, 2022; Trevisanut, et al., 2020; Young, 2009, 2011, 2012). One of the strongest connections pertains to environmental instruments, which is unsurprising given that MSR provides the data and information essential to the establishment of conservation and management measures (Matz-Lück, 2017). Another similarity that justifies an interface relates to the fact that both the LOSC and environmental instruments—including on biodiversity and climate—oversee global commons experiencing threats, that usually require shared responses.

The 1992 United Nations Conference on Environment and Development (UNCED) is a landmark in starting a new rationality toward the environment, one that balances economic growth with long-term environmental preservation (Birnie et al., 2009, pp. 50–51). Directly influencing the 1995 agreement and international jurisprudence on the law of the sea, Agenda 21 and the Rio Declaration, adopted during UNCED,

under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction, 2023.

introduced the integrated and precautionary approaches to marine environmental protection (Birnie et al., 2009, p. 384). In a less formal iteration, these instruments established a link between the LOSC and sustainable development; recognized that developing countries' ability to fulfill their legal and policy commitments is contingent upon their technological, human, and financial capacities; and underscored intergenerational and intragenerational equity as considerations within the economic system (Birnie et al., 2009, pp. 55 and 745–746; for a critical view see Natarajan, 2023a).

The 1992 Convention on Biological Diversity (CBD)(1992/1993) and its subsequent protocols hold significant potential to influence the interpretation of the consent regime. The CBD introduces a holistic approach to biodiversity conservation, which is a direct consequence of scientific and technological progress since the use of genetic resources was not envisaged during UNCLOS III. Furthermore, it reflects a sociopolitical process of recognizing the ethical and cultural value of traditional and Indigenous knowledge.

Formally, the relationship between the CBD and the LOSC is governed by Articles 22 and 311, with a perceived predominance of the Convention (Birnie et al., 2009). But their interaction can also occur through less formal channels, including administrative measures and the day-to-day implementation of these instruments by state officials (Dunoff, 2012). In this sense, the CBD introduced several concepts pertinent to MSR, such as “biodiversity,” “genetic resources,” and “ecosystems” (Warner, 2008). Additionally, in conjunction with the 2010 Nagoya Protocol (Nagoya Protocol [NP] on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization to the Convention on Biological Diversity, 2010/2014), it acknowledged the nexus between the environment, sustainable development, and the protection of Indigenous and traditional lifestyles, knowledge, and practices. This recognition compelled countries to adopt measures for their preservation and the regulation of benefit-sharing stemming from the use of genetic resources and traditional knowledge associated with genetic resources (Morgera & Tsioumani, 2010). Of particular relevance, the CBD and the Nagoya Protocol established a framework for promoting the fair and equitable sharing of benefits resulting from the utilization of genetic resources, encompassing both nonmonetary and monetary measures, based on terms mutually agreed upon between the concerned States.

The last juridical development pertinent to this dissertation is the 1992 United Nations Framework Convention on Climate Change (UNFCCC) (1992/1994) along with its subsequent protocols. This instrument emerged in the context of mounting scientific evidence showcasing significant anthropogenic impact on the Earth's climate system. The UNFCCC calls upon States to adopt a precautionary approach, aiming to anticipate, prevent, and minimize the causes of climate change, while

encouraging cooperation in the exchange of scientific information. Similar to preceding instruments, it underscores the critical link between promoting intragenerational and intergenerational equity and reaching the treaty's goal of stabilizing greenhouse gas concentrations in the atmosphere at sustainable levels (Birnie et al., 2009, p. 55). Moreover, it acknowledges that developing countries are disproportionately vulnerable to the effects of climate change and face additional constraints in adopting adaptive measures, even though they are responsible for just a small fraction of the historical emission of greenhouse gases. Consequently, provisions related to training, capacity-building, technology transfer, funding mechanisms, and the principle of common but differentiated responsibilities are not peripheral but central to realizing the framework's objectives.

Another noteworthy aspect of the UNFCCC and Agenda 21, particularly relevant to this study, is their introduction at the global level that any negotiations aimed at the progressive development of international law pertaining to sustainable development and climate must consider the special circumstances and needs of each region (Chapter 39 [1][f], UNGA Res. A/RES/47/191). These instruments went further to identify that SIDS are a special case for sustainable development and ocean governance (Slade, 2003), which is a premise underlying this dissertation.

While these legal developments have drawn attention to earth system changes, the specific challenges faced by SIDS, and the interconnectedness of sustainability and development, they have not been immune to criticism. Critical legal scholars have frequently assumed a skeptical position regarding international environmental law, contending that the ascendance of environmentalism since the 1960s tends to universalize a Western view of nature, one that regards the Earth as an external entity, open to anthropogenic control and stewardship (Natarajan & Khoday, 2014). This dissertation acknowledges the validity of such criticism, all the while considering the influence exerted by these laws and societal changes in reframing the consent regime for MSR, as discussed in Section 5.

The subsequent topic explores in more detail the process that culminated in the recognition of SIDS' special status in ocean governance matters.

1.4. Understanding the Emergence of Small Island Developing States as Active Protagonists in Ocean Governance

The acronym for Small Island Developing States, "SIDS," refers to States located in the Caribbean, Pacific, and Atlantic, Indian Ocean and South China Sea (AIS) linked by four special circumstances: "Small populations and geographies,

remoteness, and acute exposure to external shocks” (AOSIS submission of proposal related to Article 5 of the further revised draft text of the BBNJ agreement). These circumstances, coupled with their colonial history, account for their limited engagement in the global economy, limited capacity to cope with environmental and climate changes, and special connection with the ocean (Firth, 1989; Macdonald, 1986; Scobie, 2019; Storr, 2020). Therefore, knowledge about the marine environment in a format that can inform the necessary tools and processes to prepare for and respond to environmental changes are of utmost importance in preserving the livelihoods of these populations and ensuring their continued existence.

The representation and influence of SIDS in international negotiations and legal instruments has undergone significant transformations from their almost absent representation at the 1958 UNCLOS I, up until their recent active and joint participation in the IGC-BBNJ and the recent campaigns of SIDS advisory opinions of the International Court of Justice (ICJ), International Tribunal for the Law of the Sea (ITLOS), and Interamerican Court of Human Rights (IACtHR) on existing international obligations compelling States to address climate change. A pivotal juncture to assess their impact dates back to the 1960s–1970s when discussions on the right to development during negotiations on the NIEO laid the groundwork for considering a special legal treatment for Developing Island Countries (DICs) in international law (Grote, 2010; Hume et al., 2021). While resolutions were adopted by the UN General Assembly (UNGA) in 1976 and 1982, momentum for these efforts subsequently waned (Grote, 2010). SIDS found more success in the environmental sphere, where they established the Alliance of Small Island States (AOSIS)—bringing together members of the Caribbean Community (CARICOM), Indian Ocean Commission, and Pacific Island Forum (PIF)—and wielding greater influence in the UNCED and UNFCCC⁶ (Chasek, 2005).

The recognition of SIDS as a special case for sustainable development and ocean governance triggered cross-regional conferences on sustainable development, focused on addressing the unique realities and challenges faced by SIDS (see UN Docs. A/CONF.167/9, A/CONF.207/11, A/CONF.223/10). Subsequently, nearly all global policy and legal instruments pertaining to oceans and the environment have incorporated provisions acknowledging the special circumstances of SIDS, and these countries have increasingly articulated their interests through unilateral declarations. A concrete illustration of this trend is found in their successful campaign for the adoption of SDGs addressing ocean and climate change with detailed targets (Quirk & Hanich, 2016). Other examples include: (i) the attention to climate change and sea-level rise at the UNGA level (UN Docs A/75/70,

⁶ The PIF was established in 1971 to represent the Pacific islands. However, in the present day the PSIDS is the group advocating and speaking on behalf of the Pacific SIDS at the UN level (see Manoa, 2015).

A/64/350); (ii) the 2019 decision of the International Law Commission (ILC) to include “sea-level rise in international law” in its program of work (UN Docs. A/74/10); (iii) the 2021 PIF Declaration on Preserving Maritime Zones in the Face of Climate Change-related Sea-Level Rise (PIF, 2021); and (iv) the full recognition of the special circumstances of SIDS and least developed countries as a principle or approach under the BBNJ agreement (Harden-Davies, Lopes, Coelho, et al., 2024).

Throughout these legal and policy instruments, as well as in the statements of SIDS, the development of national and regional marine scientific and technological capacities has consistently emerged as relevant means to support addressing their unique challenges. This emphasis substantiates the significance of the current research and warrants further investigation in Subsection 1.5.

1.5. Contextualizing the Significance of MSR for SIDS

The pivotal role assumed by SIDS in the environmental and ocean agendas underscores the pressing need for support to enhance their scientific knowledge and technology as a prerequisite to improving the well-being of their citizens, promoting sustainable development, exercising sovereignty over natural resources, and fulfilling international obligations (Anderson, 2021, p. 175; Ker-Lindsay, 2016; Long, 2007; Slade, 2003). For instance, the effective management of environmental challenges like the sargassum influx in the wider Caribbean and marine litter in the Caribbean and Pacific garbage patch demands reliable and continuous scientific input (Alleyne et al., 2023; Ambrose, 2021; Graham, 2022; Lachmann et al., n.d.; Lovell, 2023). Additionally, the application of scientific knowledge and cutting-edge technology is critical for contingency planning, preparedness, response, and compensation in cases of oil spills, such as the M/V *Wakashio* incident in Mauritius in 2020 (Hebbar & Dharmasiri, 2022; Rajendran et al., 2021). However, only a limited number of SIDS have the capacity to undertake MSR in areas beyond national jurisdiction (ABNJ) (Long, 2022). Moreover, it plays a pivotal role in boosting blue economic sectors such as fisheries, tourism, and bioprospecting (Cisneros-Montemayor et al., 2019; Harden-Davies et al., 2020; Hassanali, 2020; Patil et al., 2016; Roberts & Ali, 2016). Lastly, given their vulnerability to the triple planetary crisis—climate change, pollution, and biodiversity loss, SIDS urgently require science and technology to support ecosystem-based adaptation measures (Coelho & Tavonvunchai, 2022; Mackay et al., 2019; Sanders, 1997; Schofield & Freestone, 2019). Thus, promoting MSR tailored to the priorities of these countries becomes imperative.

Policy and legal commitments have the potential to boost the scientific and technological capacity of SIDS. In the policy realm, international cooperation has

been the main tool used to this end, as exemplified by the adoption of specific targets in SDG 14 (Quirk & Hanich, 2016), the actions of the Ocean Decade directed to SIDS, and projects like the Containerized Autonomous Marine Environmental Laboratory (CAMEL) (Coelho & Rogers, 2023). However, the participation of SIDS in programs of international cooperation regarding marine biodiversity remain modest (Tolochko & Vadrot, 2021), and the recent backlash against practices coined as “parachute science” or “colonial science” reveals that cooperation programs do not always promote genuine engagement of local communities or tailor projects toward their priorities.⁷

Against this backdrop, at the 2022 UN Ocean Conference, AOSIS launched a *Declaration for the Enhancement of Marine Scientific Knowledge, Research Capacity and Transfer of Technology to SIDS* (2022) in which they called for partnerships that are genuine, durable, equitable, responsive to their needs, codeveloped, complemented, based on mutual learning, adjustable to changing circumstances and needs, aiming at long-term sustainability and capacity retention, inclusive and transparent, and subject to monitoring and review (Rajendran et al., 2021). Aligned with such a requests, the UN has recognized the prerogative of SIDS to self-determine their scientific agenda, build national capacity and research infrastructure, and foster international cooperation, as evidenced by UNGA's yearly resolutions on oceans and law of the sea (UN Docs. A/RES/70/235*) and reports from the UN Secretary-General (e.g., UN Docs. A/65/69, A/74/70, A/77/311) (Golitsyn, 2007).

In the legal realm, the BBNJ agreement seems to consider the requests of SIDS to enhance marine scientific knowledge and technology as aligned with promoting the conservation and sustainable use of marine biodiversity of areas beyond national jurisdiction (UNDocs. A/CONF.232/2023/4*) (Harden-Davies, Lopes, Coelho, et al., 2024). Notably, it includes a dedicated chapter focused on promoting capacity-building and the transfer of technology, incorporating rules for special treatment of SIDS. Furthermore, the agreement articulates the methods through which capacity should be developed and technology should be transferred, employing language similar to that found in the declaration launched by AOSIS. However, it is important to note that the scope of the BBNJ agreement is mostly areas ABNJ, with limited provisions opening for its application to AWNJ. The LOSC contains provisions to promote the scientific and technological capacities of SIDS within the framework applicable to areas governed by the principle of the common heritage of humankind (Articles 143 and 144) and the voluntary obligations to transfer technology under Part XIV. The consent regime for MSR under Part XIII appears to be the only legal

⁷ Colonial science refers to practices when researchers from developed countries undertake research in developing countries without involving the local community in the planning or execution stages or sharing the findings (Asha de Vos, 2020; Stefanoudis et al., 2021; also see Coelho, 2022).

mechanism with explicit obligations aimed at fostering opportunities to support local capacities in AWNJ. The relative lack of scholarly focus on this particular topic, coupled with the vulnerability experienced by SIDS, serves as the impetus for this research.

Following this introduction contextualizing the main underpinning topics, the subsequent section reviews the framework and the literature about the consent regime for MSR under the LOSC.

2. A Literature Review of the Consent Regime for Marine Scientific Research under the LOSC

The LOSC is often represented as having the dual potential of providing legal stability while also functioning as a “living instrument,” adapting to new circumstances (Barnes, 2016; Buga, 2015, p. 46; Heidar, 2020; Tanaka, 2008). Considering this, a systematic examination of the framework governing MSR in areas within national jurisdiction (AWNJ) as delineated in the LOSC constitutes a preliminary phase, setting the stage for the subsequent analysis and discussion about the State practice of SIDS on the consent regime. This section undertakes such a preliminary task, reviewing the classical and contemporary academic literature pertaining to Part XIII. It begins by examining the challenges associated with defining MSR. Subsequently, it examines the literature on the provisions essential to strike a balance within the MSR consent regime under UNCLOS III (Articles 245, 246, 248, and 249) highlighting gaps and shortcomings. This analysis encompasses the jurisdictional claims of coastal States regarding MSR and the relevant provisions governing the rights and obligations before, during, and after applying for a MSR consent and undertaking an in situ research into the marine environment.

After that, the section examines the literature that has contributed to understanding prevailing trends in the subsequent practice of the State pertaining to the contemporary interpretation of the consent regime for MSR.

Before moving ahead, it is worth elucidating that, for the purpose of this study, subsequent practice refers to any conduct of a State in the application of the LOSC, following its conclusion, encompassing activities related to the exercise of executive, legislative, judicial, or other functions (ILC, 2018, A/73/10, conclusion 5). The subsequent practice of States serves several crucial functions within international law: it can confirm the authentic interpretation of the Convention; modify the LOSC's provisions by replacing, adding, or rejecting existing legal norms; or demonstrate a shared understanding for a specific interpretation or application of the Convention (Buga, 2015, 2018; Goodman, 2021, p. 16; ILC, 2018, A/73/10; Tladi, 2014). It can be derived from a variety of sources, including

domestic laws and regulations, as well as the actions of state officials when applying the treaty at the national level (Buga, 2018, p. 13; ILC, 2018, A/73/10, conclusion 6). Additionally, it is important to note that there is no fixed duration requirement for a practice to be considered relevant in the context of international law, as long as it remains consistent and affords other States a reasonable opportunity to raise objections (Buga, 2018, p. 152).

2.1. Definition of the Term “Marine Scientific Research”

The contours of the definition of MSR have persistently provoked disagreement since UNCLOS I, and remain an unresolved concern to the present day. The establishment of an authoritative definition for MSR held the promise of conferring legal certainty, thwarting the strategic use of this framework in research for nonscientific purposes (see Whaling in the Antarctic [*Australia v. Japan: New Zealand intervening*], Judgment, I.C.J. Reports 2014, p. 226; Coelho, 2015). Conversely, by freezing the meaning of this term, the legal text could also become anachronistic with the passage of time (Chircop, 2007, p. 600).

During UNCLOS III, a broad consensus emerged concerning the qualifications of MSR; however, the notable absence of discriminating criteria to effectively evaluate the intrinsic purpose of research—thus discerning between research intended to further marine environmental knowledge and that propelled by economic, military, and security motives—posed a considerable impediment to reaching a definition (Gragl, 2014; Jennings & Watts, 2008; Soons, 1982, pp. 118–125; Stephens & Rothwell, 2015; Wegelein, 2005, pp. 66–77). In the absence of an established authoritative definition, the Convention establishes principles and guidelines applicable to MSR projects spanning all maritime zones. These serve the dual purpose of outlining the contours of the framework and potentially excluding certain activities from its purview. Accordingly, MSR activities must have peaceful purposes, use of appropriate means and methods, abstain from interfering with other uses of the sea, comply with relevant regulations including for the protection of the marine environment, and refrain from constituting the legal basis for claiming parts of the marine environment and its resources (Articles 240–241) (Jarmache, 2003; Nordquist et al., 1985, p. 444; Soons, 1982, pp. 5–8, 118–125; Tanaka, 2019, pp. 433–434; Treves, 2008).

Part XIII of the LOSC regulates two forms of MSR, by consequence, providing a basis to exclude a set of activities from its purview. The first form of regulated MSR refers to activities that are exclusively dedicated to furthering knowledge about the marine environment for the benefit of all humankind—identified as “pure” MSR (Article 246 [3]). The second is MSR conducted for development purposes—known

as “applied” research. The outcomes of such research may hold economic significance for the exploration and exploitation of natural resources, often being confidential (Gragl, 2014; Mukherjee, 1981; Wegelein, 2005, p. 71). The LOSC mandates international organizations to establish criteria and guidelines to ascertain the nature and implications of MSR (Article 251).

Scholars and States have interpreted certain activities that fall beyond the purview of Part XIII, exhibiting varying degrees of global acceptance. Foremost among these is marine archaeology, which is governed by Article 303 of the Convention (Roach, 2021, p. 500; Soons, 1982; Treves, 2008, p. 8; Wegelein, 2005, pp. 214–219; for a different perspective, see, Dromgoole, 2010). Similarly, activities involving the collection of data *ex situ*, *in silico*, or *in vitro* are beyond the purview of Part XIII (Stephens & Rothwell, 2015)—although Part II of the BBNJ Agreement governs the utilization of MGRs and digital sequence information in these formats (see: Coelho & Harden-Davies, forthcoming).

Interpretations of military research diverge, particularly during peaceful periods, as some countries, like the United States and the United Kingdom, abstain from invoking Part XIII, while other, like China and India, require prior consent for such activities (Bateman, 2005; Bork et al., 2008, p. 305; Gragl, 2014, pp. 404–405; Haiwen, 2006; Matz-Lück, 2017, p. 1610; Roach, 2021, pp. 493–495). Treves (2008) proposes a reasonable third perspective in which consent for military research should be requested but with limited scope to withhold.

Furthermore, certain interpreters exclude the application of Part XIII to “scientific research” or “research,” suggesting that the principle of freedom would be employed for regulating activities not studying aspects of the marine environment (Stephens & Rothwell, 2015; Wegelein 2005, pp. 78–80). In this sense, and drawing on the definition of the marine environment developed in the seabed context (see glossary of definitions), atmospheric and astronomical observations would be out of the scope of Part XIII (Stephens & Rothwell 2015, p. 563). The distinction between applied MSR and research with economic ends is more controversial. At the center of the divergence is the meaning of “direct significance,” which is when the research findings enable locating, assessing, and monitoring the status and availability of resources for exploitation (Caflisch & Piccard, 1978; DOALOS, 2010, p. 10). As observed by Stephens and Rothwell (2015, p. 569), the direct significance test might have been successful by the time of UNCLOS III, but in the present, with the evolution of technology, one measurement initially collected for pure MSR can later develop commercial applications. Likewise, considering the high costs of conducting MSR, one project can serve multiple purposes—including pure, applied, and commercial ends (Mossop, 2016a).

Given the varying perspectives on the classification of activities under the guide of Part XIII and considering the limitation imposed by Article 297 (2)(a) on

challenging coastal State consent denials in international courts, the determination of an activity's nature and definition is contingent upon individual coastal State assessments (Salpin, 2013; Salpin et al., 2018, p. 364). Against this backdrop of contention, the present inquiry assesses the interpretations of SIDS regarding three specific activities that have garnered global attention: ocean observation, hydrographic surveys, and research involving the collection of genetic resources for scientific purposes (Beckman & Davenport 2012; Gragl, 2014; Huh, & Nishimoto, 2017a, pp. 1656–1657; Mossop, 2016a; O’Connell, 1988, p. 1028; Soons, 1982, pp. 118–125).

Ocean observation encompasses the continuous measurement of aspects of the physical environment in the ocean space on an ongoing basis either for public interest, like weather forecasting, or research and development purposes (Coelho & Rogers, 2023; Davidson et al., 2019). Some States and a substantial portion of the literature exclude ocean observation from the ambit of the MSR framework (Beckman & Davenport, 2012; Roach, 2021, p. 395; Wegelein, 2005, p. 116). This perspective gains support from the assertion by the chair of UNCLOS III's Third Committee that the MSR regime would not “create any difficulties or obstacles hindering adequate meteorological ‘coverage’” (Doc. A/CONF.62/C.3/SR.46, para. 5). Yet, doubts shroud the nature and legal weight of the chairman's pronouncement (Bork et al., 2008, p. 306; Jarmache, 2003, p. 303). Additionally, the question looms whether such activities are exempt from Part XIII's purview or if the collection of meteorological data aligns with either Article 246 (3) or the implied consent within Article 247 (Bork et al., 2008, p. 306). Furthermore, the scope of “routine observations and data collection for meteorological coverage” remains undetermined (Yu, 2022b). In effect, divergent interpretations of ocean observation significantly influenced the deliberations surrounding guidelines for Argo Floats (Beckman & Davenport, 2012; Coelho & Rogers, 2023; Franckx, 2011; Harden-Davies, 2015; Huh & Nishimoto, 2017a, pp. 1656–1657; Mateos & Gorina-Ysern, 2010; Treves, 2008). Given the ambiguities surrounding the precise regulatory regime applicable for ocean observation (Bourtzis & Rodotheatos, 2012), this study delves into the subsequent practices of SIDS concerning this activity, to elucidate trends in their interpretations and general conclusions.

An additional relevant activity concerns the bathymetric survey, a specific variant of the hydrographic survey primarily focused on charting underwater topography. The legal classification of bathymetric surveys has assumed pronounced significance in the context of the 2030 Seabed Survey initiated in 2016 by the Nippon Foundation, in collaboration with the General Bathymetric Chart of the Oceans (GEBCO). The objective of this project is to produce a precise map of the entire ocean floor by the year 2030 (Jakobsson et al., 2017). Yet, its proponents express concerns that seeking consent from coastal States might hinder its realization (Jakobsson et al., 2017). Application-wise, bathymetric surveys initially

served navigation and military objectives, but evolved to include broader roles such as enhancing knowledge about benthic species, studying tectonic plate dynamics, monitoring seafloor changes and ocean circulation, forecasting tsunamis, characterizing areas for seabed mining, and delineating extended continental shelves—particularly for resource-limited nations (Wöfl et al., 2019). Scholars and certain State interpretations suggest hydrographic and bathymetric surveys lie beyond Part XIII, citing language from Articles 19 (2)(j) and 40 (Huh & Nishimoto, 2017a, pp. 1656–1657; Roach, 2021, pp. 26, 37, 452; Soons, 1982, p. 7; Tanaka, 2019, p. 435; Wegelein, 2005, p. 160). Thus, beyond territorial waters, hydrographic surveys would be under the principle of freedom of navigation (Roach, 2021, pp. 492–493; Stephens & Rothwell, 2015, pp. 570–572). Nonetheless, given the bathymetric survey's evolving applications, countries like China and India challenge this interpretation and request consent in all cases (Bateman, 2005; Franckx, 2011; Gragl, 2014, p. 417; Harden-Davies 2015, p. 220; Roach, 2021, pp. 452–453; Tanaka, 2019, pp. 442–443; Xue, 2009).

The last group of activities are represented by research collecting marine genetic resources (MGRs) for scientific purposes, which gained international attention with the BBNJ negotiations. Bioprospecting has been understood as the search for biological components with potential applications, in particular commercial⁸ (UN Doc. A/62/66, para. 150). Whereas it is clear that bioprospecting is regulated by the 1992 Convention on Biological Diversity (CBD) and the 2010 Nagoya Protocol (CBD, 1992/1993; Nagoya Protocol 2010/2014), there exist varying opinions regarding whether it also falls within the scope of Part XIII (Broggiato et al., 2014; Glowka, 2012; Gorina-Ysern, 2006; Gorina-Ysern & Tsamenyi, 1997; Harden-Davies, 2015, p. 223; Mossop, 2016a; Salpin, 2013; Scovazzi, 2004; Stephens & Rothwell, 2015, p. 569; Warner, 2008). Both frameworks are compatible, according to Articles 22 of CBD and 311 of the LOSC, but a closer look into each reveals that under the LOSC coastal States possess greater discretion to deny access to MGRs, whereas access to MGRs under the CBD regime requires mutually agreed terms (Mossop, 2016a). Also, the CBD includes provisions regarding traditional knowledge associated with the research (Article 7, Nagoya Protocol), which are absent from the LOSC. Consequently, an examination of State practice could yield valuable insights into how these regulatory regimes interact and how non-State parties to one or other treaty have acted.⁹ However, as observed by Gorina-Ysern

⁸ This study acknowledges the proposal of the term "biodiscovery" to accentuate the scientific dimension of bioprospecting. Nevertheless, it opts to employ the term "bioprospecting" due to its broader recognition and utilization (UN Doc. A/62/66, para. 150) (see also Matz-Lück, 2017, p. 1611).

⁹ Among the 31 SIDS subject to analysis, those that are also Parties to the Nagoya Protocol are Antigua and Barbuda, Bahamas, Cuba, Dominican Republic, Fiji, Guyana, Kiribati, Marshall

(2006), there is a paucity of studies on the integration between the agreements of access and benefit-sharing under the CBD and the clearance procedure under the LOSC.

In conclusion, while the LOSC offers greater clarity compared to the CSC in identifying activities requiring coastal State consent for MSR in AAWN, the absence of a legal definition for MSR in the LOSC itself remains a critical gap. In this sense, examining the subsequent practice of SIDS concerning the MSR consent regime, particularly activities identified in the scholarship as posing classification challenges, offers valuable insights on evolving trends in MSR's definition, especially in light of changing circumstances. Building on this exploration of the MSR definition, the following subsections analyze the characteristics of the unprecedented expansion of coastal State jurisdiction over MSR established by the LOSC.

2.2. Jurisdiction of Coastal States concerning MSR in Areas within National Jurisdiction

Jurisdiction is an operational concept, which emerges from the sovereignty (SS *Lotus*, *France v. Turkey*, 1927, PCIJ) and sovereign rights of a State, constituting a foundational element of international law (Crawford, 2019, p. 433; Ventura, 2020, p. 91). In concise terms, it signifies the “lawful power of a State to define and enforce the rights and duties, and control the conduct, of natural and juridical persons” (Oxman, 1987, p. 277). Notably, jurisdiction is neither limitless nor a uniform concept; it may take different shapes, encompassing prescriptive and/or enforcement powers, linked to executive, legislative, or judicial competencies, and entailing territorial or extraterritorial dimensions, as per its allocation (Gavouneli, 2007, pp. 5–7; Goodman, 2021, pp. 3–8). In the law of the sea, the attribution of jurisdiction is intertwined with the zonal and functional approaches of the LOSC, and its exercise is under wide discretion in the absence of explicit limitations (Goodman, 2021, pp. 10–12; Gragl, 2014, p. 417).

Accordingly, the scope of coastal State jurisdiction over MSR varies across the maritime zones. Within internal waters, the territorial sea, and archipelagic waters, coastal States exercise almost absolute jurisdiction over MSR with exclusive rights to regulate, authorize, and conduct research. Additionally, coastal States have discretion to set forth any conditions to be complied with before, during, and after the MSR activity (Article 245) (Gragl, 2014, p. 417). Unauthorized data collection

Islands, Mauritius, Micronesia, Palau, Samoa, St. Kitts and Nevis, St. Lucia, Seychelles, Solomon Islands, Tonga, Tuvalu, and Vanuatu.

within these zones, in the absence of prior explicit consent from the coastal State, constitutes a violation and could potentially render a passage as noninnocent (Articles 19, 40, and 245). As a direct outgrowth of the authority vested in coastal States within these zones, the requirement of clearance is obligatory for all activities construed as MSR, irrespective of prior regulatory actions undertaken by coastal States. Moreover, there is no case of implied consent within these zones (Shaw, 2021, pp. 556–575; Stephens & Rothwell, 2015; Treves, 2008; Wegelein, 2005, p. 181). In the exercise of enforcement jurisdiction within the territorial sea, coastal States possess the authority to undertake requisite measures in response to noninnocent passage or the violation of conditions upon which the consent for MSR was granted (Article 25 [1][2]). These measures encompass actions such as requesting the cessation of activities, the vessel's departure, boarding, inspection, and in extreme cases, the apprehension and detention of the vessel itself (Tanaka, 2019; Wegelein, 2005, p. 233). Nevertheless, according to Caflisch and Piccard (1978, pp. 883–884), the principle of sovereign immunity restricts the enforcement measures applicable to MSR activities conducted by a State or competent international organization to request the vessel's departure from the zone and the removal of devices.

In the EEZ and on the continental shelf, the coastal State's authority regarding MSR is limited in comparison with the previous zones. Within these areas, the coastal State's prerogative is not one of full sovereignty, but rather it entails the exercise of sovereign rights concerning activities associated with the exploration, exploitation, conservation, and management of natural resources (Article 56). Since the jurisdiction over MSR within these areas is a corollary of the sovereign rights, a nuanced interplay between the two is suggested, whereby the jurisdiction over MSR is confined within the parameters set forth by the LOSC (Gavouneli, 2007, p. 65; Yu, 2022a, p. 69). In practical terms, the authority to regulate, authorize, and conduct MSR within the EEZ and on the continental shelf is not exclusive (Article 246 [1]). While consent must be solicited in all cases (Article 246 [2]), the scope for withholding it is limited, and it might even be deemed implied if the coastal State remains silent within a four-month interval following the consent request (Articles 246 [3] and 252). Furthermore, the obligations that researching States must comply with before, during, and after conducting MSR would not be subject to discretion but are explicitly stipulated within the LOSC.

The main enforcement measure exercisable by coastal States within these zones, in cases where the terms of provided consent are transgressed, involves the request for the suspension and cessation of the research activity, coupled with listing the vessel as delinquent (Article 253) (Pavliha & Martínez Gutiérrez, 2010, p. 131; Wegelein, 2005, p. 238). A compelling question arises as to whether the enforcement provisions stipulated under Article 73—which encompass boarding, inspection, arrest, and judicial proceedings—would be applicable to activities that straddle the

boundary between MSR and exploration involving living resources that violate fisheries laws and regulations (Wegelein, 2005, p. 187). Notably, in the exercise of enforcement jurisdiction, it has been proposed that States adhere to a reasonability test, upholding the overarching duty to promote and facilitate MSR activities and refraining from actions that might constitute an abuse of that right (Articles 239, 255, and 300) (Wegelein, 2005, p. 187).

This analysis reveals a complex structure of coastal State authority over MSR, which varies with distance from the coastline. As an effect of their sovereignty, coastal States possess near-absolute regulatory and enforcement powers regarding MSR within internal waters, the territorial sea, and archipelagic waters. However, within the EEZ and on the continental shelf, where coastal States enjoy sovereign rights, striking a balance between their rights and obligations, and those of researching States, becomes a nuanced and currently underinvestigated topic. Scrutinizing the subsequent practice of SIDS in claiming jurisdictional powers over MSR in AWNJ offers valuable insights for the academic, legal, and scientific communities. First, it allows for a deeper understanding of how SIDS claim jurisdiction over MSR, particularly concerning the newly established maritime zones. Second, it facilitates the identification of practices potentially incongruent with the text, objective, and purpose of the consent regime for MSR under the LOSC. Third, it enables determining if such incongruencies may have cascading effects on the exercise of jurisdiction and balance maintenance. Building upon this analysis, the next subsection delves into the delineation of rights and obligations pertinent to the consent regime in the EEZ and on the continental shelf. This includes examining the actual exercise of prescriptive and enforcement jurisdictions over MSR by SIDS.

2.3. Coastal State's Obligation to Grant Consent in Normal Circumstances and the Right to Withhold Consent

In light of the expanded jurisdiction of coastal States over MSR, the foundational tenet underpinning the consent regime posits that these States possess a certain level of authority to provide approval prior to any activity categorized as MSR within the EEZ and on the continental shelf. This principle aligns with the expanded jurisdiction granted to coastal States by the LOSC; however, the authority of the coastal State is circumscribed by a complex array of obligations and requisites (Huh & Nishimoto, 2017a, p. 1654). First, the coastal State's authority is balanced by the obligation to grant consent, in normal circumstances, for projects aiming exclusively to “increase scientific knowledge of the marine environment for the

benefit of all [hu]mankind” (Article 246 [3]). While the term “normal circumstances” remains inherently open to interpretation, the Convention specifies that the absence of diplomatic relations must not be considered abnormal (Article 246 [4]), and the literature mentions the imminent threat of an armed conflict involving the coastal State or research activities taking place within contested regions as examples of abnormal circumstances (DOALOS, 2010, p. 41). Second, the obligation to grant consent is supplemented by the duty to promulgate regulations aimed at preventing unreasonable delays or denials of consent (Articles 246 [3] and 255). Third, if the coastal State remains unresponsive to an MSR request four months after receiving it, the project can proceed on the basis of implied consent (Article 252). Another circumstance for presuming consent is when the research is conducted by a competent international organization that counts the coastal State a member, and which it has not voiced objection to within four months of being notified of the research (Article 247) (Doussis, 2017).

Article 248 of the LOSC prescribes the information a researching State shall submit to obtain consent for MSR activities. This information, provided through official channels at least six months before research begins shall include a detailed depiction of the research’s nature and objectives; the means and methods used along with an inventory of utilized equipment, including Marine Autonomous Systems (MAS); the geographical area; information regarding the research vessel’s initial appearance, final departure, and the scheduled equipment removal; identification of the sponsoring institution, its director, and the individual overseeing the project; and information regarding the extent of the coastal State’s participation (Article 248) (DOALOS, 2010, pp. 29, 40–45). Scholars generally consider this list under Article 248 to be exhaustive in the case of pure MSR (Huh & Nishimoto, 2017b, p. 1676; Soons, 1982, p. 184). However, changing circumstances, like growing awareness of the potential environmental impact of MSR activities (Hubert, 2011), have led to the acceptance of additional requirements over time. These additional requirements will be explored in the following subsections.

Coastal States are endowed with discretionary powers over granting the MSR consent in a restricted set of situations listed under Article 246 [5], enabling them to either deny or grant it with conditions beyond those listed in the Convention. Those situations include when the MSR project holds direct significance for the exploration and exploitation of living or nonliving natural resources; involves drilling into the continental shelf, employing explosives, or introducing harmful substances into the marine environment; necessitates the construction, operation, or utilization of artificial islands, installations, and structures; contains imprecise information concerning the project’s nature and purpose; lacks a peaceful purpose or the objective to enhance knowledge for the broader benefit of humankind; unjustifiably disrupts activities performed by coastal States in the exercise of their sovereign rights and jurisdiction, in circumstances deemed abnormal; and if the

researching State carries outstanding obligations from prior projects (Article 246 [3][5][8]). Notably, on the continental shelf beyond 200 nautical miles, the coastal State's authority to withhold consent for MSR with economic significance is contingent upon a prior public designation of areas earmarked for exploration or exploitation within a reasonable time frame (Article 246 [6]).

In this regard, while some scholars contend the exhaustive nature of the list of activities under Article 246 (5), in which the prerogative to withhold consent is permissible (Soons, 1982, p. 169; Wegelein, 2005, p. 299), certain considerations from scholars warrant thoughtful examination. In general, it has been raised that the open wording used could give margins for an expansive interpretation of the situations under paragraph five (Nordquist et al., 1985). Wegelein (2005, p. 300) emphasizes that the absence of a definitive definition for “normal circumstances” could potentially result in coastal States overexercising the authority to deny clearance during “abnormal” circumstances. Similarly, the challenge of ascertaining which MSR activities hold direct significance for the exploration and exploitation of natural resources may be interpreted as granting the coastal State flexibility when assessing consent requests (Huh & Nishimoto, 2017a). Moreover, Gorina-Ysern (2003, pp. 334–335) asserts that opportunities for coastal State participation in the research project has crystallized as a right under customary international law. Consequently, consent could potentially be denied based on grounds of insufficient participation.

The foregoing analysis reveals that several key terms and expressions within the LOSC framework governing the coastal State's duty to grant consent under normal circumstances, its discretion to withhold consent, and the researching State's obligation to share information during the preconsent phase require interpretative guidance from the subsequent practice of States. For instance, State practice can provide insights into how terms like "normal circumstances" and "direct significance" have been interpreted when the law is in action. Additionally, the practice of SIDS can clarify whether they have considered the list of pre-cruise information or the grounds for withholding consent to be exhaustive or exemplificative. If considered exemplificative, State practice can provide insights into the interpretative methods employed by States to introduce new considerations under Articles 246 (5) and 248. Furthermore, examining the practice of SIDS can reveal whether the LOSC's MSR consent regime has effectively maintained the intended balance between coastal State interests and the freedom of scientific research. Continuing the literature review, the ensuing subsection examines the framework and literature regarding the obligations that become operative after consent is granted.

2.4. Researching States' Obligations during and after the MSR Project

In tandem with the coastal State's duty to grant consent, the researching State must comply with a number of conditions outlined in Article 249 and/or stipulated by the coastal State, both during the execution of the research project and in its immediate aftermath (Jarmache, 2003; Nordquist et al., 1985; Soons, 1982, p. 406; Tanaka, 2019, p. 438). The measures outlined in Article 249 serve the purpose of providing coastal States with assurances regarding the bona fides of the activity; to ensure that the activity does not compromise matters of security, defense, or national interests; to mandate the implementation of measures for the protection and preservation of the marine environment, and to guarantee that the activity brings about benefits for the coastal State (Coelho, 2022; DOALOS, 2010, p. 38; Gorina-Ysern, 2003, pp. 324–328; Salpin, 2013; Verlaan, 2007).

In cases where consent is to be granted under normal circumstances, Article 249 specifies that researching States are required to ensure the coastal State's participation or representation at no cost, particularly aboard vessels, crafts, or installations, upon the coastal State's request and when feasible. Additionally, upon the request of coastal States, researching States must share preliminary reports and final results; allow access to data and samples; and provide assessment or assistance in assessing data, samples, and research findings. As soon as practically viable and unless otherwise arranged, researching States must ensure the international accessibility of research findings. They also have the obligation to inform the coastal State of any significant changes in the research program and, unless otherwise agreed, remove scientific installations and equipment when the research concludes.

The right to participate in the research project without the requirement of contributing to its costs stands as a significant component, not only enabling the oversight of research activities but also fostering training and capacity-building opportunities, particularly for countries with limited scientific capabilities, like SIDS (Coelho, 2022). Gorina-Ysern (2003, p. 335) observes that this right was already recognized within the 1958 Geneva Convention on the Continental Shelf, was backed by the *opinio juris* of various States including Australia, Brazil, Gabon, Japan, Sweden, Tonga, the United States, and Venezuela, and it has been incorporated into the domestic legislation of multiple countries over time. Out of this observation, she proposes that this right has crystallized into customary international law, and, as a consequence, the provision of coastal States' participation should be extended irrespective of a prior request.

The sharing of preliminary reports and final results represents yet another fundamental obligation to attest the bona fides of the activity's scientific purpose and to strengthen the coastal State's knowledge about the marine environment in

AWNJ. The dissemination of preliminary reports can also potentially shed light on whether changes encountered during the research cruise would warrant a reevaluation of the conditions under which consent was initially granted (Gorina-Ysern, 2003, p. 336). Inasmuch as the LOSC does not specify a time frame for meeting these obligations, coastal States may propose it within their national laws, guidelines, or in the administrative forms granting consent (DOALOS, 2010, p. 45). Scholars propose 30 days as a reasonable time for sharing the preliminary reports, although they are cautious in recommending a deadline for the dissemination of research findings, recognizing that the necessary period for analyzing acquired data and reaching conclusions may vary (Gorina-Ysern, 2003, p. 335). Nevertheless, the fulfillment of this obligation only materializes upon the submission of final results (Gorina-Ysern, 2003, p. 336).

The obligation to grant access to data and samples could potentially hold the potential in equipping SIDS with the requisite knowledge and capacity to safeguard and preserve the marine environment of AWNJ. Nonetheless, it is framed in voluntary language (“undertake to provide”), thereby impeding effective monitoring of compliance and enforcement. This language has been rationalized on the basis that research institutes, rather than the State itself, possess ownership of the data and samples (Soons, 1982, p. 190). However, as underscored by Huh and Nishimoto (2017c, p. 1687), preliminary findings and final reports are likewise retained by the scientific community, yet the obligation is phrased in direct language. Similarly, the obligation of ensuring the dissemination of research results lacks major details, making it difficult to monitor compliance.

The obligation to furnish or facilitate the assessment of data and samples serves a triple function: advancing knowledge, bolstering capacity-building, and empowering developing countries to utilize the materials garnered in the project (Huh & Nishimoto, 2017c, pp. 1687–1688). Additionally, the removal of installations and equipment stems from their potential to impact the marine environment and other oceanic uses, including navigation. The duty to inform coastal States of major changes to the research project is the only “absolute obligation” incumbent upon the researching State (Nordquist et al., 1985, p. 551). While the term “major” remains undefined, suggestions posit its linkage to alterations that compromise integral aspects of the research, such as transitioning from pure research to applied (Huh & Nishimoto, 2017c, p. 1688). However, major changes would not concern the research's nature and objectives, as these would signify a new research project (DOALOS, 2010, p. 43).

Analogous to the categories discussed in Subsection 2.3, scholars regard this list of postconsent obligations as exhaustive (Huh & Nishimoto, 2017b, p. 1684; Soons, 1982, p. 188). Contrariwise, when coastal States have the discretion to withhold consent, additional conditions to be complied with during and after the MSR project

is performed may be established. Among these conditions, the Convention lists the requirement for prior agreement regarding the publication of information relating to resource-related research (Article 249 [2]). Such conditions should preferably be included beforehand in domestic laws and regulations; they could include the sharing of monetary benefits, but be under a reasonability test (Huh & Nishimoto, 2017c, p. 1681; Salpin, 2013; Soons, 1982, p. 188; Stephens & Rothwell, 2015, p. 571). Should these obligations and the ones under Article 249 be neglected or not fulfilled, coastal States are entitled to exercise the prerogative to pursue the suspension of the activity and/or withhold consent for future applications.

The aforementioned discussion highlights that the postconsent obligations incumbent upon researching States serve a twofold purpose: ensuring the bona fides of the research activity and fostering capacity-building opportunities for the coastal State. However, it also exposes gaps and ambiguities in interpreting these obligations, which an examination of SIDS practice may help clarify. For instance, analyzing State practice can shed light on whether the obligation to share data and samples is fulfilled, despite the voluntary language used. Additionally, it can reveal any trends toward establishing deadlines for sharing preliminary findings and final results of the research. Furthermore, examining the practice of SIDS can inform us about the extent to which States consider the list under Article 249 exhaustive. If the list is interpreted as exemplificative, State practice can offer insights into the tools employed to introduce new obligations under Article 249. Moreover, examining the practice of SIDS can reveal whether the LOSC's MSR consent regime has effectively maintained the balance sought by the consent regime for MSR. To close this analysis of the legal framework, the provisions governing the consequences of breaching the terms of MSR consent will be explored.

2.5. The Right to Request the Suspension or Cessation of the Research Project

The enforcement measures available to coastal States for safeguarding their jurisdiction over MSR varies depending on the maritime zone where noncompliance with the consent terms occurs. Within internal waters, the territorial sea, and archipelagic waters, coastal States retain near-absolute enforcement authority stemming from their sovereignty. This authority encompasses measures such as requesting the cessation of the activity, boarding and inspecting the research vessel, and apprehending or detaining the vessel (Tanaka, 2019; Wegelein, 2005, p. 233). However, within the EEZ and on the continental shelf, the coastal State's enforcement powers are limited to request the suspension or cessation of the

noncompliant activity and/or withhold consent for future consent requests from the same researching State.

The invocation of a suspension request emerges as an initial recourse when the executed research deviates from the stipulated description provided during the precruise phase or in instances of noncompliance with the obligations delineated under Article 249 (Article 253 [1]). This measure is intended to be of a temporary nature and guided by principles of good faith, with the underlying objective of minimizing any detrimental impact on ongoing research activities (Wegelein, 2005, p. 187) (Article 300). Consequently, the suspension order is to be rescinded and the activity reinstated once the circumstances justifying the measure have been appropriately rectified (Article 253 [5]).

The right to request cessation of MSR activity arises when the researching State neglects to rectify the circumstances that prompted the suspension of the research within a reasonable time frame or fails to comply with the obligation outlined in Article 248, thereby undermining the foundational basis upon which consent was granted (Article 253 [2][3]) (Huh & Nishimoto, 2017d, p. 1705). Of note, the decision to seek suspension or cessation of the project can only be challenged through the process of conciliation as stipulated in Annex V (Article 297 [2][b]).

The ability to exercise the lawful enforcement measures available in each maritime zone is a critical consideration for the balance envisioned by the MSR consent regime. However, this assumes that the coastal State possesses the means to effectively monitor MSR activities and ensure compliance with consent terms. In this sense, examining the subsequent practice of SIDS regarding the suspension and cessation of MSR projects can inform about the obstacles faced by coastal States in monitoring compliance with the consent regime. This, in turn, is directly relevant to maintaining the balance struck by the consent regime. The information on subsequent practice can also assist on the interpretation of open-ended expressions within Article 253. This includes how States have interpreted "major changes" in research projects and what constitutes a "reasonable period of time" for rectifying situations prompting suspension requests. Furthermore, analyzing State practice can reveal States consistently acting against the terms of the consent or the hurdles encountered by researching States while fulfilling their obligations under the consent regime.

Although a complete lack of information regarding the interpretation and application of the MSR consent regime would be an overstatement, this research identifies a critical need for up-to-date and more comprehensive information on State practice. To contextualize this need, the following subsection will review the existing information on the implementation of Part XIII of the LOSC.

2.6. Existing Information concerning State Practice on the Consent Regime for MSR

The catalogue of information on the implementation of the consent regime for MSR encompasses official studies commissioned by the UN, opinion of scholars, and the records produced by individual States. In all of those cases, the information about SIDS tends to be either outdated or confined in scope to a specific subset of states (Salpin et al., 2018; Tirpak, 2005, 2008). This subsection begins by reviewing the process of cataloguing the practice of States developed by IOC-UNESCO, which is mandated to oversee the implementation of both Parts XIII and XIV of the LOSC (IOC/INF-1148, Articles 2 and 3 [1]; IOC/EC-XXVII/15) (Ehlers, 2018; Soons, 2007). It then looks into the examination of State practice reported by scholars and official State reports.

IOC-UNESCO, since 1997, has been fulfilling its mandate concerning Parts XIII and XIV through its Advisory Body of Experts on the Law of the Sea (ABE-LOS). This body actively gathered and analyzed information on the practices of its Member States in the implementation of these provisions until 2005, and in 2008 this activity was suspended (IOC-XIX/3, IOC Resolutions XXII-12, IOC Resolution XIX-19). In its inaugural session in 2001, ABE-LOS addressed the outcomes of an initial questionnaire distributed among its Member States, seeking insights into their priorities pertaining to Part XIII. These priorities encompassed guidelines for discerning the nature and implications of MSR, capacity-building to formulate laws and regulations concerning MSR, and training to facilitate the implementation of the LOSC (IOC/ABE-LOSI/6).

The 2002 meeting of ABE-LOS saw Mr. Roland Rogers (United Kingdom) report on the results of a second questionnaire distributed to IOC-UNESCO Member States (IOC/ABE-LOSII/3; A/RES/56/12, para. 23). This survey aimed to assess challenges and practical issues encountered during the implementation of Part XIII, ultimately aiding States in formulating criteria and guidelines for MSR (Long, 2012). Discussions at ABE-LOS acknowledged the questionnaire's potential, although States noted the limited response rate as a hindrance to a far-reaching analysis (IOC/ABE-LOSII/3, IOC Res. EC-XXXV.7 and A/RES/57/141, para. 23). In response, Ms. Elizabeth Tirpak (United States) coordinated the development of an updated questionnaire (Q3) to capture State practices concerning MSR. Results from Q3, reported in 2005 (IOC Res. EC-XXXVII.8, IOC/ABE-LOS V/3 and IOC/ABE-LOS V/7) and 2008 (IOC/ABE-LOS-IX/3 Rev. and IOC/ABE-LOS VIII/8), however, continued to suffer from low participation and incomplete responses. For instance, only seven out of the 31 Small Island Developing States (SIDS) under analysis submitted responses (see Table 4). Despite these limitations, discernible trends emerged. Notably, a significant number of States expressed a

need for legal assistance in implementing both Parts XIII and XIV of UNCLOS. Furthermore, the findings regarding the consent regime for MSR activities painted a specific picture: clearance approval rates were predominantly high, requests for suspension or cessation of research projects were infrequent, and coastal States consistently emphasized the importance of national observer participation and data and sample sharing (Tirpak, 2005, 2008).

The pieces of information collected in Q3 informed the 2010 revised edition of the guide published by the United Nations Division for Ocean Affairs & Law of the Sea (DOALOS/OALOS) seeking to improve the implementation of Parts XIII and XIV of the LOSC (DOALOS, 2010). The guide systematizes overarching trends within State practice concerning the consent regime for MSR. Among the applications, it provides assistance in interpreting open terms within Part XIII, such as "normal circumstances," "direct significance for the exploration and exploitation of natural resources," and "reasonable period of time." Furthermore, the guide informs about a general acceptance among States to include information about the potential environmental impact of research in the precruise phase as a new requirement. Additionally, it acknowledges the acceptability of imposing stricter limitations on MSR activities conducted in areas governed by special management tools (DOALOS, 2010, pp. 31 and 40). Notably, the Guide acknowledges that States have typically addressed potential intellectual property concerns related to data and sample sharing through bilateral agreements (DOALOS, 2010, p. 32). Finally, while not yet a widespread practice, the Guide encourages researching States to bear the costs of transporting coastal State scientists from the shoreline to the research platform and to facilitate their participation in the research from the project's early stages (Coelho & Rogers, 2023; DOALOS, 2010, p. 28; Gorina-Ysern, 2003, p. 335).

Preceding the work of IOC-UNESCO, Plesmann and Röben (1991) investigated the situations experienced by German research vessels when applying for MSR consent during the 1990s. They compared this practice with the Convention's legal provisions and found widespread compliance with Part XIII, even among nonmember States. However, they listed as unreasonable conditions imposed by coastal States: prior bilateral agreements, publication restrictions, requirements to determine the research location, and ownership of scientific results. More positively, they highlighted examples in which these conditions were mitigated through negotiation. Furthermore, the authors noted the trends of seeking consent when MSR activity classification was uncertain and engaging with coastal State scientists before making formal consent requests. Lastly, they proposed that consent should be interpreted as "notification."

In a pioneer study, Gorina-Ysern (2003) undertook a comprehensive assessment of the worldwide implementation of Part XIII, drawing upon information retrieved

from records of the US State Department, legislation disseminated by DOALOS, and information shared by oceanographers and research institutes. She concluded that several gaps remained regarding coastal State legislation on MSR, the classification of MSR, and “what issues arise during the conduct of MSR activities by foreign vessels within areas under coastal State sovereignty, sovereign rights, and jurisdiction, and what measures are taken by coastal and researching States with regard to those issues” (Gorina-Ysern, 2003, p. 599). Concerning SIDS in the Caribbean and Pacific regions, she concluded that these nations have adroitly embraced a flexible stance in the clearance of MSR activities, even in the face of limited capacities to conduct and monitor research (Gorina-Ysern, 2003, p. 600). Gorina-Ysern proposes that the consent regime should use official channels until the compliance stage to maintain an official record of all relevant information, and enforce compliance (Article 250) (Gorina-Ysern, 2003, p. 341).

A few years later, Wegelein (2005) published a far-reaching study on the operation and status of research vessels and platforms in international law in light of the literature on the topic and the general development of international law, validated by the subsequent State practice of the parties. Pertaining to the global State practice concerning the consent regime since 1989, Wegelein's (2005, pp. 276–277) findings indicate that States have exhibited a twofold approach: some have transcribed the language of the LOSC into their domestic legislation, while others have enacted divergent legislation either altering the terminology or even the substantive elements of the rights and obligations stipulated within the Convention. In his examination, he concluded some States within Europe have not adhered to the principle of prior consent as articulated in the Convention's terms, although such deviations would not amount to breaches of their international obligations (Wegelein, 2005, p. 282). Significantly, among his general conclusions, he identifies the conditions and prerogatives bestowed upon coastal States through the consent regime as a potential avenue for fostering renewed cooperation in international engagement with developing countries, encompassing elements such as the inclusion of their own scientists in research expeditions, capacity-building for their scientific community, the sharing of data and samples, delineation of research zones, and temporal restrictions on research activities (2005, p. 358).

Following his 1982 study of the framework for MSR, Soons reflects on the operationalization of this framework two decades after the Convention's adoption, concluding that “overall the new regime seems to be working without great problems” (Soons, 2007, p. 162). He also noticed strategies that have been adopted to streamline the consent procedure, such as the establishment of bilateral and regional agreements between States, creating a simplified form of consent. However, he noted that the limited available information on the implementation of the consent regime hinders a far-reaching assessment.

Long (2012) analyzed the practice of the European Union on MSR until 2012, concluding that “the principal weakness in the current regime appears to be the absence of harmonization regarding the administrative and procedural requirements governing foreign vessel-based MSR projects” (2012, p. 468). In response to this insight, the author proposed a set of measures that EU Member States could undertake to enhance efficiency and promote the implementation of the ecosystem approach. These measures include standardizing the process and timing for scientists to submit clearance requests, and requisite information to be included; establishing direct communication channels between research institutes; and establishing a centralized MSR office to oversee request processing and compliance monitoring (Long, 2012). On a similar perspective, Oral (2014) argues for the adoption of a regional framework for MSR between coastal states bordering the Black Sea and Mediterranean Sea; harmonizing consent procedures; and collaborating to share information, data, and participation opportunities.

More recently, Yu (2022a) undertook an examination of the subsequent practices of States in relation to the regulation of contemporary ocean data collection endeavors. Her assessment revealed that States often resort to ad hoc arrangements to navigate practical challenges, demonstrating a willingness to seek resolutions even in instances of divergent interpretations regarding the classification of particular activities. Yu (2022a, p. 134) identifies two principal determinants guiding States' propensity to seek harmonious solutions: the existence of a common interest among States in the data collected and the consideration of the sensitivity of the research's object, purpose, means, and methods. She also underscores a shared understanding among States that data collection associated with the parameters enumerated in the World Meteorological Organization's (WMO) 2019 Resolution 45 (Cg-18)—concerning marine meteorological and oceanographic observations geared toward navigation safety and the safeguarding of life and property within coastal and offshore regions—does not fall under the purview of MSR (Yu, 2022a, p. 133).

Remarkably, the only study focused on the practice of SIDS regarding MSR emerged in 2018. Geographically confined to the PSIDS, Salpin's assessment posited that “most of the MSR legislation in force in PSIDS appears to be restricted in scope and sometimes outdated” (2018, p. 266). Furthermore, her analysis underscored a fragmentation concerning the authority responsible for the processing and issuance of clearance in national contexts. Moreover, the PSIDS' ability to fully capitalize on the benefit-sharing prospects furnished by Part XIII has been hampered by antiquated infrastructure, constrained human resources, and financial constraints. Salpin also observed positive developments such as the approval by the Pacific Community (SPC) of the 2010 Pacific Oceanscape Framework and of two frameworks, the African, Caribbean and Pacific (ACP) States Regional Legislative and Regulatory Framework for Deep Seabed Mining (DSM) exploration and

exploitation, and the Pacific ACP States Regional Scientific Research Guidelines for DSM. These frameworks bear the potential to streamline regional practices concerning deep-seabed mineral activities. Additionally, Salpin demonstrated instances of successful cooperation, encompassing both North-South and South-South collaborations, on MSR.

In conclusion, this examination of State practice concerning the MSR consent regime under the LOSC suggests a general compliance with the consent regime for MSR. However, the existing data suffer from two limitations. First, they are outdated, potentially reflecting practices that are no longer current. Second, the data exhibit a geographical bias. For instance, Q3 only captured responses from seven of the 31 SIDS under consideration, and Salpin's study focused solely on the Pacific region. This limited scope underscores the pressing need for more comprehensive and up-to-date information on State practice, particularly concerning developing States and especially SIDS. Beyond its value in interpreting the LOSC text, a nuanced understanding of the subsequent practice of SIDS on the consent regime for MSR can reveal their often-overlooked contribution to reframing and developing the law of the sea. This knowledge is significant not just for interpreting the LOSC text, but also for understanding whether the regime remains capable to balance the social relations it was designed to maintain in the face of changing circumstances. Given these limitations, the next section explores how this research sought to address these gaps and pave the way for future inquiries that can provide a more accurate picture of international law in practice.

3. Research Design

The introduction highlighted the limited autonomous capacity of SIDS to conduct MSR, despite the potential benefits such marine scientific inputs could offer. The LOSC was negotiated and adopted with the optimistic expectation of fostering capacity-building in marine science and facilitating technology transfer for developing countries. However, a critical knowledge gap exists regarding the implementation of Part XIII, particularly the MSR consent regime by SIDS. This lack of information hinders comprehension of why these initial aspirations haven't materialized. This, coupled with concerns regarding the flexibility of the LOSC for regulating new technologies and incorporating principles on the conservation and sustainable use of marine biodiversity and ecosystems conservation established in other international legal frameworks, underscores the importance of examining the subsequent practice of SIDS within the MSR consent regime.

This section examines the research framework employed to address this research problem. It outlines the research objectives and questions that guide the investigation. Additionally, it explains the methodology utilized to gather and analyze evidence necessary to answer these research questions. Finally, the section defines the research's scope and its potential significance to the field of study.

3.1. Research Objectives

The overarching objective of this dissertation is to analyze the influence of SIDS in developing and reframing the consent regime for MSR under the LOSC, particularly in light of changing circumstances.

Four distinct subobjectives contributed to this goal:

- Investigate the subsequent practice of SIDS concerning the consent regime for MSR under the LOSC between 2005 and 2020, with a focus on identifying prevailing trends, good practices, and challenges encountered in its implementation.
- Identify any dissonances between predominant interpretations of the consent regime for MSR, as proposed by legal scholars and international organizations, and the subsequent practice of SIDS in this regard.

- Examine whether researching States have expressed opposition or support for the State practice of SIDS in relation to the consent regime for MSR.
- Propose recommendations to maintain the balance envisioned within the consent regime for MSR over time.

3.2. Research Questions

Responding to the following questions will assist in reaching the objectives presented above:

- What is the objective and purpose of the consent regime for MSR under the LOSC?
- What was the State practice of SIDS regarding the consent regime for MSR under the LOSC between 2005 and 2020?
- What were the tools and techniques used by SIDS to adapt the consent regime for MSR under the LOSC to changing circumstances between 2005 and 2020?
- What principles and concepts can maintain the balance sought in the consent regime for MSR under the LOSC in light of changing circumstances?

3.3. Research Methodology

Drawing inspiration from Pahuja (2021), the methodology pertains to the articulation of the procedural steps adopted in conducting research; this subsection begins by elucidating the approaches employed to collect information to address the research questions. It then delves into the interpretive framework that guided the research design and was employed to analyze the information obtained.

3.3.1. Methods

This study employed a variety of methods, including reviewing documents and literature, questionnaires, and case studies, to gather information to address the research questions.¹⁰ Specifically, to assess the key elements of the MSR consent regime and its potential flexibility to incorporate changing circumstances, information was sourced from the text of the LOSC, contextualized by the opinions of scholars; historical records, contextualized with perspectives from Third World

¹⁰ The term "methods" refers to how the information to address research questions was located and organized (Lieblich, 2020).

Approaches to International Law (TWAIL); documents and guidelines from international organizations and private entities; as well as case studies explored in Papers IV and V. Information on the State practice of SIDS was acquired from (i) domestic laws, guidelines, policies, and consent templates; (ii) responses to questionnaires distributed to representatives of SIDS and representatives from researching States; and (iii) secondary sources such as academic publications and websites. The recommendations aimed at restoring and sustaining the envisioned balance within the MSR consent regime were influenced by insights from scholars on the law of the sea and ocean governance, further enriched by perspectives from TWAIL.

The subsequent subsections provide a detailed account of the stepwise approach adopted to locate and organize the information from historical documents, legal texts, and questionnaires.

Historical Documents

This segment of the study concentrated on SIDS located in the Caribbean and Pacific regions, chosen as representative examples. Throughout the year 2020, the pronouncements of these SIDS during UNCLOS I in 1958 and UNCLOS III held between 1974 and 1982 were scrutinized. This scrutiny was based on meticulous analysis of *travaux préparatoires*, accessible through the United Nations Codification Division's website. This investigation aimed at elucidating the broader context, objective, and purpose, and the ordinary meaning attributed to the terminologies employed within the consent regime for MSR in both conventions. An integral aspect of this examination involved determining the extent of participation by SIDS in the formulation of Articles 5 (1) and (8) of the CSC and 245–255 of the LOSC.

The information pertinent to UNCLOS III was primarily derived from official records detailing the engagement of SIDS within the third committee. However, certain recorded interventions made by SIDS during plenary meetings and the second committee were also taken into account to ensure comprehensiveness. In the context of UNCLOS I, the review encompassed all interventions made by SIDS, as documented on the official website. This research encompassed a total of 100 documents, including 10 associated with UNCLOS I and the remaining documents linked to UNCLOS III.

The information was analyzed with the support of insights from the TWAIL scholarship in Paper I.

Legal Documents

The process of collecting domestic laws, guidelines, and research templates commenced at the onset of 2020, and was completed during the latter half of 2022

(refer to Table 1). This endeavor resulted in the compilation of 154 legal statutes, policy instruments, guidelines, and template forms pertinent to MSR across 31 SIDS located in the Caribbean, Pacific, Atlantic and Indian Ocean regions.

The instruments were identified through inputs from stakeholders of the respective SIDS and were also procured from the official websites of these countries. Additionally, a search across a spectrum of platforms, including Ecolex, Global Lex, FAO Lex, the Division for Ocean Affairs and the Law of the Sea (DOALOS) of the United Nations, the United States Department of State, the Commonwealth Caribbean Law Research Guide, the Digital Library of the Caribbean, the Pacific Islands Legal Information Institute, Lexadin, and the University of Hamburg, was conducted. The search was executed using the search tools available on these platforms, employing a set of strategically chosen keywords. The range of keywords included “marine scientific research,” “scientific research,” “scientific permit,” “research permit,” “marine collection permit,” “bioprospecting,” “genetic resources,” “hydrographic survey,” “ocean observation,” and “bathymetric survey.”

Table 1 Legislative Database

Country	Legislation/Policy instrument	Authority responsible to provide consent for MSR
Antigua and Barbuda	Environmental Protection and Management Act, 2019	
	Fisheries Regulations, 2013	
	Fisheries Act, 2006	Minister of Agriculture, Fisheries, and Barbuda Affairs
	The Maritime Areas Act, 1982	
	Application for Access to Genetic and Biological Resources in Antigua and Barbuda	Department of Environment
Application to Conduct Marine Research in Antigua and Barbuda	Minister of Agriculture, Fisheries, and Barbuda Affairs (approved by the Chief Fisheries Officer)	
Bahamas (The)	Biological Resources and Traditional Knowledge Protection and Sustainable Use Act, 2021	Department of Environmental Planning & Protection and Department of Marine Resources
	Environmental Planning and Protection Bill, 2017	
	The Bahamas National Maritime Policy, 2015	
	Fisheries Resources (Jurisdiction and Conservation) Regulations, 2009	Minister of Agriculture and Marine Resources
	Marine Mammal Protection Act, Chapter 244A, 2008	Minister responsible for Wild Animals

	Archipelagic Waters and Maritime Jurisdiction Act, 1993	
	Fisheries Resources (Jurisdiction and Conservation) Act, 1977	
	Bahamas Guide for Applicants for Research and ABS Permits, 2021	Department of Environmental Planning and Protection (DEPP)
	Application to Conduct Scientific Research, Survey, or Experimental Projects in the Bahamas	
Barbados	Coastal Zone Management Act, Chapter 394, 1998	The Coastal Zone Management Unit
	Marine Boundaries and Jurisdiction Act, 1995	The Cabinet
	Fisheries Act, 1993	Minister responsible for fisheries
	Marine Areas (Preservation and Enhancement) (Restricted Areas) Regulations, 1981	
Belize	Fisheries Resources Act, 2020	Fisheries Department
	High Seas Fishing Act, 2013	
	Coastal Zone Management Act, Chapter 329, Revised Edition 2000	
	Maritime Areas Act, Chapter 11, Revised Edition, 2000	
	Guidelines for writing a marine scientific research project proposal	Belize Fisheries Department
	Scientific Research Permits Administrative Requirement	
Cabo Verde	Legislative Decree 2 regulating fishing activities in national waters and the high seas, 2020	
	Decree-Law 59, 2021 Establishes the Ministry of the Sea	
	Legislative Decree 14, 2010	Maritime Authority
	Law 66/IV, 1992	
	QA	Ministry of Foreign Affairs
Cook Islands	Guiding principles for research in the Cook Islands, 2022	National Research Committee after authorization by the Secretary of Ministry of Marine Resources and by the Research Ethics Committee
	Maritime Zones Act 1, 2018	
	Marae Moana Act, 2017	

	Research Policy and Supporting Documents, 2015	
	Marine Resources Act, 2005	The Minister of Marine Resources
	Seabed Minerals Act, 2009	Seabed Minerals Authority
Cuba	Law 129 on Fisheries, 2019	
	Decree 1, regulating Law 129, 2019	Ministry of Food Industry, with previous authorization by the Ministry of Science, Technology, and Environment
	Resolution 17 on Procedures for Granting Fishing Licenses, 2022	Fisheries Director
	Resolution 111, about the Access to Biological Diversity, 1996	Minister of Science, Technology, and Environment
	Maritime, River, and Lake Navigation Act 115, 2013	Minister of Defense
	Decree 317, regulating the Maritime, River, and Lake Navigation Act 115, 2013	
	Decree-Law 2, on the EEZ, 1977	
Dominica	National Ocean Policy, 2019	
	Climate Change, Environment, and Natural Resource Management Bill, 2016	Biodiversity and Conservation Authority
	Fisheries Act, 1987	Minister responsible for Fisheries
	Territorial Sea, Contiguous Zone, Exclusive Economic and Fishery Zones Act, 1981	
Dominican Republic	Law 573 on the Territorial Sea Contiguous Zone, EEZ, and Continental Shelf, 1977	
	Act 219 on Biotechnology Security, 2015	Minister of Environment and Natural Resources
	Act 333 on Biodiversity, 2015	Minister of Environment and Natural Resources
	Guidelines on Research in Marine Protected Areas (MPAs) and Biodiversity	Subsecretary of MPA and Biodiversity
	Act 307, which establishes the Council for Fishing and Aquaculture (CODOPESCA), 2004	CODOPESCA
	Template to request consent for research activities in the coastal zone	Minister of Environment and Natural Resources
Fiji	Offshore Fisheries Management Decree, 2012	Permanent Secretary of Fisheries

	Fiji Offshore Fisheries Management Regulation, 2014	Permanent Secretary of Fisheries
	Continental Shelf Act, 1970	Minister of Foreign Affairs
	Marine Spaces Act, 1978	Minister of Foreign Affairs
	Republic of Fiji National Ocean Policy 2020–2030	
Grenada	Draft National Ocean Policy of 2019	
	Integrated Coastal Zone Management Act, 2019	Minister responsible for the Environment
	Integrated Coastal Zone Management Policy for Grenada, Carriacou, and Petite Martinique, 2015	
	Grenada Territorial Sea and Maritime Boundaries Act, 1989	
	Fisheries Regulations, 1987	
	Fisheries Act, 1986	Minister of Fisheries
	Environmental Protection (Bioprospecting) Regulations, 2001	
Guyana	Maritime Zones Act, 2010	
	Fisheries Act, 2012	Minister of Fisheries
	Environmental Protection Act, 1996	
Jamaica	Endangered Species (Protection, Conservation and Regulation of Trade) Act, 2000	National Environment and Planning Agency
	Toward Ocean and Coastal Zone Management in Jamaica, 2000	
	Maritime Areas Act, 1996	
	Exclusive Economic Zone Act, 1991	Minister of Agriculture and Fisheries
	Beach Control Act, 1956	
	Mining Act, 1947	Minister with responsibility for Mining
	Guidelines for conducting Marine Scientific Research in Areas under Jamaica's Maritime jurisdiction	
	Wildlife Research Application Form	Natural Resources Conservation Unit
Kiribati	Seabed Minerals Act, 2017	Ministry responsible for Seabed Minerals
	Marine Zones (Declaration) Act, 2011	

	Environment Act, 1999	
	Environment (Amendment) Act, 2007 and Regulations, 2017	
	Fisheries Act, 2010	Director of Fisheries
	Fisheries (Amendment Act), 2021	Director of Fisheries
	QA	Marine Scientific Research Coordinating Committee
	Application to Conduct Environmental Scientific Research (Environment [Amendment] Act, 2007)	
	Application for Consent to Conduct MSR	
Marshall Islands	Fishing Access And Licensing Act, 2014	Director of the Marine Resources Authority
	Marine Zones Declaration Act, 2016	
	Marine Resources Act, 1997	Director of the Marine Resources Authority
	Fisheries Regulation of 1998	
Mauritius	Maritime Zones (Conduct of Marine Scientific Research) Regulations, 2017	
	Maritime Zones (Amendment) Act, 2012 Joint Agreement between Seychelles and Mauritius to Govern the Mascarene Plateau Region	
	Maritime Zones Act, 2005	Prime Minister
	Application for consent to conduct MSR by States or Competent International Organizations	Department for Continental Shelf, Maritime Zones Administration, and Exploration (CSMZAE)
Micronesia	Seabed Resources Act, 2014	National Seabed Resources Authority (territorial sea) and National Oceanic Resource Management Authority (continental shelf)
	Maritime Boundaries Act, 2017	
	Marine Resources Act, 2002	National Oceanic Resource Management Authority
	Research Permit Application Form*	
	Yap Research Permit Application Form	
Nauru	Seabed Resources Act, 2014	
	Fisheries Regulations, 1998	Nauru Fisheries & Marine Resources Authority

	International Seabed Minerals Act, 2015	Nauru Fisheries & Marine Resources Authority
Palau	Marine Protection Act, 1994	Bureau of Oceanic Fishery Management
	Palau National Marine Sanctuary Act, 2015	President
	Environmental Quality Protection Act, 1981	President
Papua New Guinea	Conditions and Guidelines for Overseas Researchers in PNG	
	National Ocean Policy 2020–2023	MSR Committee
	Maritime Zone Act, 2015	MSR Committee
St. Kitts and Nevis	Fisheries Management Act 1998	
	Draft National Ocean Policy	Minister responsible for fisheries, aquaculture, and marine resources
	Fisheries Aquaculture and Marine Resources Act, 2016	
	National Maritime Policy and Action Plan, 2015	
	Maritime Areas Act, 1984	Minister of Fisheries
	Fisheries Act, 1984	Department of Marine Resources
	Application to Conduct Marine Scientific Research in St. Kitts and Nevis	
St. Lucia	Fisheries Act, 1984	Minister of Fisheries
	Draft National Ocean Policy, 2019	
	Maritime Areas Act, 1984	
	Scientific Research Proposal Permit Application	Fisheries Division
Saint Vincent and the Grenadines	Maritime Areas Act 1984	
	Scientific Research Proposal Permit Application	Biosafety Board
	National Ocean Policy and Strategic Action Plan, 2018	Minister of Fisheries
	Biosafety Act, 2012	
Samoa	Fisheries Management Act, 2016	Chief Officer of the Ministry of Fisheries
	Samoa Maritime Zones Act, 1999	
	Marine Wildlife Protection Regulation, 2009	Chief Executive Officer of the Ministry of Natural Resources and Environment

Samoa Ocean Strategy 2020–2030		
Seychelles	Fisheries Act, 2014	Seychelles Fishing Authority after approval by the Minister of Fisheries
	Maritime Zones Act, 1999	
	Seychelles Coastal Management Plan 2019–2024	
	Maritime Zones (Continental Shelf) Order, 2012: Joint agreement between Seychelles and Mauritius to Govern the Mascarene Plateau Region	Department of Blue Economy
	QA	Seychelles Bureau of Standards
	Application to carry out research work in Seychelles	Seychelles Bureau of Standards
	Application for entry into Seychelles by air and sea	Public Health Authority
Solomon Islands	Fisheries Management Act, 2015	Minister of Fisheries
	Delimitation of Marine Waters, Chapter 95, (Marine Scientific Research) Regulations, 1994	Minister of Foreign Affairs
	Research Application Form	
	Guidelines for Research in the Solomon Islands	Ministry of Education and Human Resources Development
Timor-Leste	Decree-Law 2, 2020, on Biodiversity Protection and Conservation	
	Law 7, 2002, Maritime Borders of Timor-Leste	
	Decree-Law 5, 2004 Regulates the Management of Fisheries and Aquaculture	Minister of Fisheries
	Decree-Law 6, 2004 General Rules of Fisheries	Minister of Fisheries
Tonga	Maritime Zones Act, 2009	Prime Minister
	Seabed Minerals Act, 2014	Tonga Seabed Minerals Authority
	Fisheries Management Act, 2002	Minister of Fisheries
	Tonga Government Research Permit (TGRP) Requirements, 2021	Prime Minister
	Application for MSR Consent	Ministry of Land and Natural Resources
Trinidad and Tobago	Draft National Maritime Policy and Strategy	
	The Fisheries Management Bill, 2020	Director of Fisheries
	Archipelagic Waters and Exclusive Economic Zone Act, 1986	The President

Tuvalu	Seabed Minerals Act, 2014	Minister of Natural Resources and Fisheries
	Maritime Zones Act, 2012	
	Marine Resources Act, 2006	Minister of Natural Resources and Fisheries
	Research Application Form	
Vanuatu	Maritime Zones Act, 2010	The Minister responsible for the Maritime Zones
	Fisheries Act, 2014	Director of the Fisheries Department
	Fisheries Regulation, 2009	Director of the Fisheries Department
	Vanuatu National Ocean Policy, 2016	

Source: Prepared by Author.

Note: MSR = Marine scientific research. *The research permit in Micronesia was updated on January 3, 2024; nevertheless, this alteration will not be included in the dissertation as it occurred after the analysis was finished.

Questionnaires

Inspired by a growing body of scholars employing qualitative empirical methods to examine how international law is expressed in the material world through the day-to-day administrative practice of state officials, research vessel operators, and scientists (Eslava & Pahuja, 2012; Verdier & Versteeg, 2015), this study complemented the data extracted from regulatory instruments with insights gathered through questionnaires. Using this method facilitated the capture of the informal practice concerning the consent regime, which may not be entirely evident within domestic norms alone, thereby offering a more holistic perspective of its implementation.

Scholarly literature emphasizes that questionnaires are a valuable tool for collecting both quantitative and qualitative data, particularly in cases where required information is not readily available or when conducting specialized surveys to supplement existing data (De Vaus, 2014; Fowler, 2014). Questionnaires offer the advantage of standardized measurements and enable meaningful comparisons. Nonetheless, it is important to acknowledge the potential drawback of low response rates (Fowler, 2014; Wengrzik et al., 2016), which is particularly pertinent when dealing with countries lacking infrastructure. Balancing the merits and limitations, the decision to employ this method for data acquisition took into consideration several factors: (i) the existence of a previous instrument developed by IOC-UNESCO, allowing comparisons with existing information in the case of Questionnaire A (QA); (ii) the innovative application of this approach to the study of State practice; (iii) the nature of the objects being measured—primarily a standardized set of official data as opposed to personal viewpoints; and (iv) the

substantial number of States and ship operators involved, which makes interviews less feasible. The limitations associated with surveys as a method of data collection were mitigated by incorporating information from other sources, for example, documents.

In the following subsections, a brief introduction to IOC-UNESCO Questionnaire 3 (Q3) is followed by a detailed explanation of the process encompassing the design, approval, stakeholder engagement, sampling, and data collection for both QA and Questionnaire B (QB).

IOC-UNESCO Questionnaire 3 (Q3)

The IOC-UNESCO has the mandate to oversee the implementation of Parts XIII and XIV of the LOSC (Nordquist et al., 1985, p. 437). As will be expounded in Section 3, from 1997 to 2008, its Advisory Body of Experts on the Law of the Sea (ABE-LOS) fulfilled this mandate by disseminating questionnaires to its Member States, seeking inputs concerning their practices. The objective of ABE-LOS was to aggregate and disseminate information on global adherence to Parts XIII and XIV, assess challenges encountered during the implementation of the framework governing MSR, and support the development of criteria and guidelines to enhance the transfer of marine technology.

The last iteration of the questionnaire—the third version—was divided into two sections and primarily designed to acquire quantitative data. The first section solicited information concerning the execution of marine MSR in waters under the sovereignty or jurisdiction of a coastal State. The second section collected data relating to the transfer of marine technology and associated capacity-building activities. Despite the endeavors of ABE-LOS and the insights gleaned from the accumulated data, the initiative was discontinued in 2008.

Given these considerations, Section 1 of Q3 served as the template for the development of a customized questionnaire for this study, as elaborated upon subsequently. A copy of Q3 can be found in Appendix 3.

Questionnaire A (QA)

QA was designed to solicit responses from state officials within SIDS who bear the responsibility of interpreting and applying the consent regime for MSR under the LOSC. It was initially conceptualized to mirror Q3, since the latter already offered a dataset pertaining to a subset of SIDS, thereby facilitating comparative analysis. Nevertheless, it later became necessary to include additional questions to effectively answer the research questions. Consequently, while QA retained certain components from Q3, it also introduced novel inquiries intended to accommodate

the evolving dynamics of MSR and enable the collection of qualitative information. The QA template is provided in Appendix 2.

The development and approval of QA spanned the time frame between July 2020 and July 2021. The inception of this process involved reaching out to Ms. Elizabeth Tirpak (US Department of State) and Mr. Roland Roger (United Kingdom National Oceanography Centre [NOC]), both instrumental in the creation and analysis of Q3. Their involvement aimed to harness their experiential insights, glean lessons learned, and understand the nuanced articulation of each question. The first draft of QA underwent an internal assessment, steered by the contributions of Professors Ronán Long, Clive Schofield, Francis Neat, and Zhen Sun. This preliminary phase was succeeded by an external evaluation involving Dr. Harriet Harden-Davies, Ms. Tirpak, and Mr. Rogers. Then, stakeholders from Kiribati and Micronesia participated in the pilot phase. Lastly, the instrument secured ethical approval from WMU in decision # REC-21-22(P) of June 9, 2021.

The process of collecting and aggregating responses to QA for the purpose of generating statistically sound inferences ran from August 2021 to August 2022, encompassing a series of interconnected stages. This temporal extension was necessitated by the prolonged constraints imposed by the COVID pandemic on the feasibility of conducting in-person meetings. The initiation of this process involved the migration of the questionnaire onto *FormSite*, the online platform offered by WMU. The next steps were to reach out to stakeholders from SIDS via the Ministry of Foreign Affairs, targeted email correspondence, and leveraging trusted intermediaries. These communications extended invitations both to provide responses and to engage in scheduled meetings. To facilitate this outreach, a bespoke invitation was meticulously crafted and designed to enhance participation and commitment to the survey (see Figure 2). Likewise, a tailored slogan for the research was designed. In the ensuing phase, a series of meetings were orchestrated with those stakeholders who responded affirmatively to the invitation. These interactions held significant import, serving not only to introduce the research but also to foster a foundation of trust. Social media was harnessed as an additional tool to disseminate information about the survey, thereby promoting transparency, engagement, and credibility of the initiative. Aligned with recommendations from the academic literature (Dillman et al., 2014), a strategic approach of biweekly follow-up emails was adopted, facilitated through the employment of *MergeMail* software. This approach aimed to maintain momentum and ensure sustained involvement from the respondents.

Questionnaire on State Practice of Small Island Developing States in the field of Marine Scientific Research in support of a PhD research

Dear Participant,

I am writing to invite you to kindly participate in a survey, reflecting on your country's practice, to support my PhD research entitled "An analysis of the State Practice of Small Island Developing States on the Consent Regimes for Marine Scientific Research (MSR) under the United Nations Convention on the Law of the Sea" (Articles 245-255c, LOSC). By identifying best practices and specific challenges faced by Small Island Developing States (SIDS) in the implementation of these provisions, the research examines options to strengthen the legal framework for MSR.

My doctoral studies are conducted at WMU-Sasakawa Global Ocean Institute, World Maritime University under the supervision of Professor Ronan Long and Dr. Zhen Sun. This survey is being conducted in line with the WMU Research Ethics Committee and high standard protection of data security and privacy. Your personal data will not be published. Additional information regarding the data security can be found on the 'Consent form' on the link below.

Given your knowledge and extensive experience with marine scientific research, I would be grateful if you could assist me in my PhD research. Moreover, should you grant the courtesy of an interview, I would be happy to investigate further some practices of your country and provide details on my project by means of a video call or by email (w1903592@wmu.se).

To participate, please click on the link below.

Yours sincerely,

Luciana Fernandes Coelho
Malmö, 2021

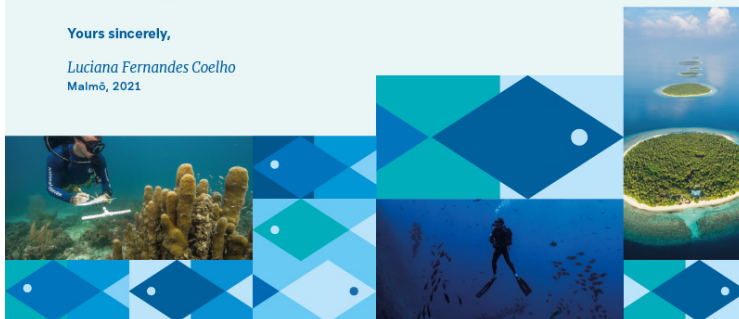


Figure 2 Invitation to Fill Questionnaire A
Source: Prepared by Author.

An additional step to collect responses to QA involved engaging the international, cross-regional, and regional organizations listed in Table 2 through official letters of endorsement issued by WMU, soliciting their collaboration in garnering support from the respective Member States (refer to Appendix 5 for sample correspondence). Notably, the role played by the Pacific Community (SPC) proved to be particularly pivotal in attaining commendable response rates from the Pacific region.

Table 2 Organizations and Groups Contacted

Multilateral organizations	Knowledge groups	Regional organizations	Cross-regional organizations and groups	Nongovernmental organizations
DOALOS	World Maritime University (WMU) Alumni	IOCaribe	Commonwealth Secretariat	Nature Conservancy
International Seabed Authority (ISA)	DOALOS Alumni	Organization of Eastern Caribbean States (OECS)	Archipelagic and Island States Forum	Oceana
IOC-UNESCO	International Foundation for the Law of the Sea (IFLOS) Alumni	Caribbean Community (CARICOM)	Alliance of Small Island States (AOSIS)	
	Rhodes Academy Alumni	Economic Commission for Latin America and the Caribbean (ECLAC)	UN Environment Programme	
	Organization of the American States Alumni network	Pacific Community (SPC)		
	University of West Indies (UWI)	Secretariat of the Pacific Regional Environment Programme (SPREP)		
	The Institute of Marine Affairs (IMA)	Pacific Islands Forum (PIF)		
	Caribbean Natural Resources Institute (CANARI)	Pacific Islands Forum Fisheries Agency (FFA)		
	University of South Pacific (USP)			

Source: Prepared by Author.

Note: DOALOS = UN, The Division for Ocean Affairs and the Law of the Sea; IOC-UNESCO = Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization.

With the resumption of social gatherings, the engagement in various events further facilitated the response collection process. Specifically, participation in a regional workshop in Dominica, co-hosted by the WMU-Sasakawa Global Ocean Institute in partnership with OECS, in April 2022, the UN Ocean Conference in June 2022, and the fifth session of the IGC-BBNJ in August 2022 presented valuable occasions for interacting with stakeholders and garnering additional responses to QA. For an overview of the procedural framework encompassing the drafting, collection, and analysis of information related to QA, refer to Table 3.

Table 3 Stepwise Data Collection and Analysis for Questionnaire A

	July– Aug 2020	Sept– Oct 2020	Nov– Dec 2020	Jan– Feb 2021	Mar– Apr 2021	May– June 2021	July– Aug 2021	Sept– Oct 2021	Nov– Dec 2021	Jan– Feb 2022	Mar– Apr 2022	May– June 2022	July– Aug 2022	Sept– Nov 2022
Step 1: Study IOC Questionnaire 3														
Step 2: Identify network														
Step 3: Engage network														
Step 4: Design and WMU's approval														
Step 5: Share questionnaire														
Step 6: Contact regional mechanisms														
Step 7: Collect responses														
Step 8: Analysis														

Source: Prepared by Author.

Note: IOC = Intergovernmental Oceanographic Commission; WMU = World Maritime University.

As a result of these concerted endeavors, QA successfully elicited 11 responses from the Caribbean (constituting 78 percent of the targeted participants), 11 responses from the Pacific (also 78 percent of the target), and achieved full participation from the AIS SIDS. This distribution is detailed in Table 4.

Table 4 Participating SIDS

Caribbean	Q3	QA	Pacific	Q3	QA	Atlantic and Indian Oceans	Q3	QA
Antigua and Barbuda		✓	Cook Islands*	✓	✓	Cabo Verde		✓
Bahamas (The)	✓	✓	Timor-Leste			Mauritius	✓	✓
Barbados		✓	Micronesia**		✓	Seychelles	✓	✓
Belize		✓	Fiji*		✓	Rate of responses to QA (AIS): 100%		
Cuba		✓	Kiribati		✓			
Dominica		✓	Marshall Islands					
Dominican Republic	✓		Nauru		✓			
Grenada			Palau		✓			
Guyana		✓	Papua New Guinea*		✓			
Jamaica	✓	✓	Samoa*		✓			
St. Kitts and Nevis*		✓	Solomon Islands		✓			
St. Lucia	✓		Tonga		✓			
Saint Vincent and the Grenadines		✓	Tuvalu					
Trinidad and Tobago		✓	Vanuatu*		✓			
Rate of responses to QA (Caribbean): 78%			Rate of responses to QA (Pacific): 78%					

Source: Prepared by Author.

Note: *Partial responses.**Micronesia's contribution took place in the piloting stage of QA, before ethical clearance by WMU.

Questionnaire B (QB)

QB was designed to gather insights into the practical implementation of the consent regime for MSR as perceived by ship operators and research institutions engaged in research activities within SIDS waters. The genesis of formulating and

disseminating a survey aimed at ascertaining the experiences of scientists and research vessel operators when seeking consent from SIDS emerged organically during interactions with members of the International Research Ship Operators (IRSO) forum. This concept was subsequently broadened to encompass other research institutes and networks, including the Pink Flamingo Society and the Philanthropic Ocean Research Vessel Operators.

Structured with both closed and open-ended questions, QB facilitated a combination of quantitative and qualitative analysis, thereby enabling comparison to the responses garnered through QA. The time line for the development, approval, and data collection for QB commenced in April 2021 and concluded in December of the same year. This process unfolded in a more streamlined manner compared to QA (as detailed in Table 5). QB underwent internal review by Professors Ronán Long and Zhen Sun, while the piloting phase involved collaboration with an operator from the Royal Netherlands Institute for Sea Research (NIOZ).

Table 5 Stepwise Data Collection and Analysis for Questionnaire B

	Apr 2021	May 2021	June 2021	July 2021	Aug 2021	Sept 2021	Oct 2021	Nov 2021	Dec 2021	Jan– June 2022
Step 1: Meeting with operators	█									
Step 2: Identify network		█								
Step 3: Engage network		█								
Step 4: Design and WMU's approval						█				
Step 5: Share questionnaire							█			
Step 6: Collect responses									█	
Step 7: Analysis										█

Source: Prepared by Author.

Note: WMU = World Maritime University.

Questionnaire B received 21 complete and 2 partial responses from the 28 research institutes and networks contacted, described in Table 6. For an account of the questions inserted in QB, please see Appendix 3.

Table 6 Research Vessel Operators and Research Institutes Contacted

RevOceans, Norway	Woods Hole Oceanographic Institution, US	National Institute of Water and Atmospheric Research (NIWA), New Zealand	Finnish Environment Institute*
Caladan Oceanic, US	Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER)	NIOZ	University of Washington, US
Nekton Mission, UK	Institut de Recherche pour le Développement (IRD)	Tara Expedition*	International Research Ship Operators' Forum
Schmidt Ocean Institute, US	Helmholtz Centre for Ocean Research Kiel (GEOMAR), Germany	Institute of Marine Research, Norway	Pink Flamingo Society
National Oceanography Centre (NOC), UK	Fisheries and Oceans Canada (DFO)	Chinese Academy of Science	Philanthropic Ocean Research Vessel Operators
National Oceanic and Atmospheric Administration (NOAA), US	Irish Marine Institute	The International SeaKeepers Society	

Source: Prepared by Author.

Note: NIOZ = Royal Netherlands Institute for Sea Research. *Incomplete response.

Subsequent to elucidating the methodology employed for information gathering and compilation, the ensuing subsections elucidate the ethical principles underpinning the study and delineate the process by which the amassed information was structured and analyzed.

3.3.2. Ethical Considerations

QA received ethical approval from the WMU Research Ethics Committee in Decision # REC-21-22(P) dated June 9, 2021. QB obtained clearance from the WMU Research Ethics Committee in Decision # REC-21-70(P) dated September 24, 2021. In terms of their structure, both instruments contained information about the research's intent and the utilization of the respondents' inputs while incorporating provisions enabling respondents to choose anonymity. Additionally, while the papers and thesis analysis eventually do refer to the names of countries, diligent measures have been taken to not disclose respondents' identities.

In recognition of the criticisms surrounding colonial and parachute science practices (Asha de Vos, 2020; Stefanoudis et al., 2021; also see Coelho, 2022), the researcher conducted a series of online and in-person engagements with stakeholders to expound upon the research's objectives and the envisioned use of the information. Furthermore, the research's findings and outcomes have been shared with the participants, in order to gather their insights and feedback on the matter.

3.3.3. Theoretical Framework

Building on the framework proposed by Pahuja (2021), the information collected is analyzed through the prism of TWAIL. TWAIL stands for a movement, a sensibility, and a network of legal scholars who challenge the dominant narratives of international law and the hierarchical relations that it can reinforce, and present alternative perspectives to enable the transformative potential of international law into a system based on justice, rather than on power (Eslava, 2019; Mutua, 2000). Its genesis traces back to the mid-1990s, germinating within the broader New Approaches to International Law movement (Gathii, 2011) — a collective of legal scholars with diverse theoretical backgrounds, united by a shared sensibility and desire to expose the exclusions created and sustained by international law (Eslava & Pahuja, 2011)—and amplifying subaltern voices (Bendel, 2021). TWAIL’s fundamental premise is that legal institutions and norms are neither objective nor impartial (Gathii, 2020; Mutua, 2000).

Instead, this scholarship asserts that the law has historically operated as a conduit for the furtherance of conquest and exclusion, a trajectory that persists (Anghie, 2006, p. 742; Mutua, 2000). In this sense, a fundamental claim of these scholars is the centrality of the colonial encounter between “civilized” and “uncivilized nations” for the genesis of international law (Anghie, 2006, p. 742). Aligned with this assertion, the very use of the term “third world” carries profound significance as it reinforces this dynamic of differentiation. On the one hand, it harkens back to the geopolitical landscape that prevailed when a majority of countries across Latin America, Asia, and Africa gained “independence”—a time when countries refraining from alignment with either the Western or Eastern blocs during the Cold War were categorized as “third world” (Mickelson, 1998). On the other hand, transcending geographical or historical confines, this term also alludes to a “subaltern epistemic location” (Gathii, 2020, p. 166) or as the “most of the world” (Eslava, 2019).

Certain commonalities unite the TWAIL movement, despite its deliberate avoidance of a monolithic stance, aimed at acknowledging the inherent diversity within the third world itself. A first shared thread is the use of a “historically aware methodology” predicated from the assumption that “it is not possible to isolate modern forms of domination such as governmentality, from the older modes of domination” (Gathii, 2011, p. 34; for instance, Anghie, 2004; Rajagopal, 2003). A second common attribute involves an attitude of resistance to the various forms of oppression and mainstream narratives within international law, all while maintaining faith in the legal order. This resistance extends beyond colonialism, endeavoring to untangle “encounters of difference along many axes—race, class, gender, sex, ethnicity, economics, trade, etc.—and in interdisciplinary ways—social, theoretical, epistemological, ontological and so on” (Gathii, 2011, p. 37). In

this vein, the TWAIL movement accommodates critiques even aimed at third world governments and other exclusions brought about by hegemonic discourses within the third world, such as those grounded in gender considerations. However, such a deconstructive perspective does not neglect the normative force of international law, or reduce it to an apology for power; instead, many TWAIL scholars hope for reforms that address the concerns of marginalized communities (Eslava & Pahuja, 2011; Gathii, 2011; for instance, Pahuja, 2005). A third tenet of TWAIL is the recognition that international law constitutes a “process of engagement or interaction of different cultural and political values that are often in conflict but that at times overlap and reinforce each other” (Gathii, 2011, p. 41), thereby rejecting the idea of universalism (Mutua, 2000). Consequently, these scholars contend that an approach centered solely on the textual provisions of the law is inadequate to rectify “epistemic injustices” stemming from the failure to encompass non-Western perspectives (Gathii, 2020). Instead, they propose a method of analyzing international law produced by actors and in places beyond the traditional centers of production, and theorizing and engaging with international law grounded in a third world vantage point (Eslava, 2021, 2019; Gathii, 2020).

Like any intellectual movement, TWAIL is not immune to criticism. One prominent critique pertains to its perceived nihilistic stance, wherein despite the promise, the denunciation of biases within the existing legal order lacks a corresponding constructive vision for how international law should be reconfigured (Gathii, 2011). Linked to this is the claim of excessive academic abstraction, implying that TWAIL might be estranged from the practical world and thus unable to furnish international legal practitioners with actionable tools to redress injustices (Modirzadeh, 2023). Moreover, calls for a “Fourth World Approach to International Law” have brought to the forefront concerns regarding the limited attention given by TWAIL to certain marginalized groups, such as Indigenous peoples and traditional communities, who continue to experience present-day exclusion within the first and third worlds (Bhatia, 2012). Similarly, the specific needs of SIDS have not been adequately addressed within the TWAIL movement, as it has primarily focused on the marginalization experienced by Latin American, African, and Asian peoples, with little attention to other marginalized States and groups within the group of “third”—with the exception of the pioneering study of Storr (2020), who revisited the history of Nauru through the lens of TWAIL. Another shortcoming within the movement concerns the limited attention given to the law of the sea and environmental law. While there have been a few studies on the law of the sea from a TWAIL perspective, including the works of Anand (1977, 1982), Galindo (2006), Esmeir (2017), Natarajan (2023b), and Enyew (2022), Natarajan (2017) has observed that, aside from the contributions of Mickelson (2014, 2019), TWAIL scholars have only recently started to acknowledge international environmental law as another arena for challenging the status quo and shaping new “environmentalities” (e.g., Natarajan

& Dehm, 2022). Significantly, there is a notable absence of reflections within the TWAIL movement regarding the exclusions perpetuated by the framework governing MSR under the LOSC and on how changing circumstances, including new philosophical and theoretical perspectives on the intersection between the environment and law reflected in the practice of SIDS, can challenge the status quo.

This research journey has been significantly influenced by the insights offered by TWAIL scholars. Among the noteworthy contributions, first, the decision to study the role of SIDS in developing and reframing international law was motivated by TWAIL's imperative to amplify the voices of the subalterns and alleviate the democratic deficit in information on the practice of third world States (Chimni, 2018; Galindo & Yip, 2017; Otto, 1996). Second, the critical approach taken by TWAIL scholars toward the historical underpinnings of international law prompted an analysis of the negotiations surrounding the consent regime during UNCLOS I and III, based on primary sources, challenging prevailing opinions within the scholarship. Furthermore, the critical analyses offered by TWAIL scholars regarding an anticolonial project during the 1970s, encompassing the NIEO, the permanent sovereignty over natural resources, and the common heritage of humankind principle (Anand, 1977, 1982; Anghie, 2004, 2006; Bedjaoui, 1979; Natarajan, 2017; Salomon, 2013), proved instrumental in contextualizing the circumstances surrounding the negotiation of the consent regime. This conceptual lens facilitated a nuanced interpretation of historical documents, thereby enabling a novel perspective on the key elements involved in the balance envisioned within the consent regime for MSR under the LOSC. Third, the proposition by TWAIL scholars to perceive international law as a set of practices in the material world, intertwined with normative and ideological dimensions (Eslava & Pahuja, 2012, p. 20), challenged the conventional notion of the consent regime as a static legal tool.

Consequently, the analysis of the subsequent practice of SIDS moved beyond the binary classification of "compliant and noncompliant" toward a more nuanced investigation, visualizing international law as a dynamic process of resistance and reform susceptible to modifications through the practice of States located in the periphery of the development of international law. Lieblich's (2020) categorization of legal research questions proves useful in comprehending the fourth contribution of TWAIL to this study. Accordingly, while descriptive questions can be addressed by solely referencing the formal sources of law, the response to normative and critical questions necessitates theoretical frameworks providing concepts and values conducive to articulating benchmarks regarding how the law should be. Therefore, reflections from TWAIL scholars about the meaning of justice and equity for the Global South (Chimni, 2006; Eslava & Pahuja, 2012; Mutua, 2000), alternative modes of considering the interface between international law and the environment (Natarajan & Dehm, 2022), and the role and process of customary international law (CIL) creation (Chimni, 2018; Galindo & Yip, 2017) guided the response to the

fourth research question on how the consent regime should be based on the subsequent practice of SIDS.

After elucidating the methodology used for accessing, organizing, and interpreting the information, the subsequent subsection explains the process followed to determine the countries to be subjected to investigation as well as other elements contributing to the research.

3.4. Scope of the Research

This study is centered upon an examination of the practice of 31 SIDS, a grouping that encompasses four nations classified as Least Developed Countries (LDCs), as delineated in Table 7. The nations comprising the SIDS category exhibit a set of distinct characteristics: “(a) size, defined both in terms of land area and population; (b) remoteness or “islandness”; (c) a limited supply of natural resources; (d) a limited supply of human resources; and (e) vulnerability to economic and/or natural shocks, including impacts of climate change” (Hume et al., 2021, p. 2; Fialho & Van Bergeijk, 2017; Quirk & Hanich, 2016). Nevertheless, the selection of States encompassed by this research was not straightforward.

An initial predicament encountered during the scoping process arose from the existence of divergent listings of SIDS, characterized by varying membership tallies. Accordingly, the roster proffered on the official portal of the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UN-OHRLLS) comprises 57 sovereign entities, encompassing both UN and non-UN Members, alongside Associate Members affiliated with the Regional Commissions (OHRLLS, n.d.). In contrast, the record curated by the United Nations Department of Economic and Social Affairs (UNDESA) has 58 Member States (UNDESA, n.d.). Moreover, the compilation maintained by the United Nations Educational, Scientific and Cultural Organization (UNESCO) includes 39 Member States identified as SIDS, complemented by an additional cadre of nine associate members (UNESCO, n.d.). Concurrently, the Alliance of Small Island States (AOSIS) encompasses a constituency of 39 nations (AOSIS, n.d.), while the World Bank operationalizes its engagements utilizing the roster of SIDS eligible for official development assistance advanced by the Organisation for Economic Co-operation and Development, which notably encompasses 35 jurisdictions (OECD, 2018). Consequently, to illustrate, Bahrain procures classification as SIDS within the purview of UN-OHRLLS, yet fails to garner analogous recognition within the ambit of UNESCO and AOSIS. Peculiarly, all categories incorporate Belize, Guinea-Bissau, Guyana, and Suriname,

despite their characterization as low-lying coastal developing States, not strictly island States.

In navigating the intricate array of divergent lists and remaining aware of the impediments inherent in establishing communication across these geographically dispersed domains—a challenge further compounded by the burdens brought forth by the COVID-19 pandemic—the process of delineating the scope of this research unfolded through a series of stages. It commenced with the classification set propounded by UN-OHRLLS. Subsequently, a process of refinement was employed, excluding non-United Nations member States and non-self-governing SIDS. This course of action was driven by the complexities intrinsic to the distinct devolved competencies, which vary in each case. An exception was the Cook Islands, which remained in the scope of the research, due to its submission of a response to Q3.¹¹ Furthermore, there was a focus on the practice of the Caribbean and Pacific SIDS because these regions have the largest number of SIDS. Additionally, their proclivity toward fostering regional cooperative mechanisms stood out in comparison to other regions, for example, the Atlantic and Indian Oceans and the South China Sea, which, by virtue of their geographic proximity, maintain closer ties to their continental counterparts. The scope was further restricted based on difficulties in contacting authorities and gathering legal information pertinent to Haiti and Suriname. However, throughout the process of drafting the second publication and engaging with stakeholders, the practice of Cabo Verde, Mauritius, and Seychelles on the consent regime emerged as significant for the analysis, leading to their inclusion within the scope of research. An additional consideration in the scoping process was the aim to, as far as possible, account for the array of linguistic and legal traditions across SIDS. This tenet was facilitated by the author’s adeptness in Portuguese, Spanish, French, and English. Following this explanation, Table 7 lists all the countries under the scope of analysis of this study.

¹¹ Notably, in 2022, the United States formally recognized the sovereignty of the Cook Islands during a summit held in Washington with leaders from the Pacific Islands Countries (PIC) (Ligaiula, 2022).

Table 7 Group of States Considered for This Study

Caribbean	Pacific	AIS
Antigua and Barbuda	Cook Islands	Republic of Cabo Verde
Commonwealth of the Bahamas	Republic of Fiji	Republic of Mauritius
Barbados	Republic of Kiribati*	Republic of Seychelles
Belize	Republic of the Marshall Islands	
Republic of Cuba	Federal States of Micronesia	
Commonwealth of Dominica	Republic of Nauru	
Dominican Republic	Republic of Palau	
Grenada	Independent State of Papua New Guinea (PNG)	
Republic of Guyana	Independent State of Samoa	
Jamaica	Solomon Islands*	
Saint Christopher and Nevis (St. Kitts and Nevis)	Democratic Republic of Timor-Leste*	
Saint Lucia (St. Lucia)	Kingdom of Tonga	
Saint Vincent and the Grenadines (SVG)	Tuvalu*	
Republic of Trinidad and Tobago	The Republic of Vanuatu	

Source: Prepared by Author.

Note: AIS = Atlantic, Indian Ocean and South China Sea. *Also listed as Least Developed Countries (LDCs).

The principal focus of the research pertains to MSR conducted, endorsed, and sponsored by States. Occasional considerations are extended toward scientific projects conducted by competent international organizations; however, a wide-ranging exploration of the special procedure applicable therein falls beyond the purview of this research.¹² Moreover, this inquiry refrains from exploring research undertaken by private entities and philanthropic organizations, despite the inclusion of some of these entities within the respondents of the QB. Additionally, this study excludes consideration of the domain of citizen science.

¹² The term “competent international organizations” pertains to governmental and nongovernmental entities endowed, pursuant to their constitutive instruments, with the authority to engage in, advance, and/or facilitate the development of MSR. There exists a consensus that the subsequent entities constitute “competent international organizations” for the purposes delineated within Part XIII: the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO), Food and Agriculture Organization of the United Nations (FAO), the UN Environment Programme (UNEP), the International Hydrographic Organization (IHO), the World Meteorological Organization (WMO), the International Maritime Organization (IMO) (Nordquist et al., 1985, p. 437).

Fisheries research is commonly perceived as an offshoot of coastal States' sovereign rights over natural resources, thereby falling beyond the purview of Part XIII (DOALOS, 2010; Soons, 1992). Nonetheless, its inclusion in the current study is warranted due to the fact that the consent regime for MSR is under the scope of fisheries laws and bodies in several of the SIDS.

During the negotiation phase of the LOSC, participating States already recognized the imperative of anticipating the challenges emanating from scientific and technological evolution, as well as the dynamics of political, economic, environmental, and legal progress, which collectively would scrutinize the robustness of the LOSC's temporal relevance (Heidar, 2020). Against this backdrop, the present dissertation focuses on MSR operations undertaken by both conventional maritime vessels and five distinct classes of MAS: marine autonomous surface ships (MASS), unmanned underwater vehicles (UUVs), remotely operated vehicles (ROVs), profiling floats (PFs), seabed observatory (SO), and remotely piloted aircraft (RPA).

A critical clarification pertains to the focus of this study, which centers on investigating State practice as a tool for developing and reframing the LOSC. In more details, as elucidated by Tladi (2014) in reference to Articles 31 (3)(b) and (c) of the Vienna Convention on the Law of Treaties (VCLT), State practice concerning an existing treaty serves multiple purposes. These include crystallizing a treaty provision into CIL, establishing a competing norm within a treaty-governed area, or demonstrating an agreement among States regarding the interpretation of the treaty. Given the limited number of States under investigation, this study does not seek to identify customary norms based on the subsequent practice of SIDS. Nonetheless, it recognizes a significant contention made by scholars from various critical theoretical movements, including TWAIL, regarding the undemocratic nature of the law-making process of CIL (Byers, 2001; Carty, 2018; Chimni, 2018; Galindo & Yip, 2017). This contention is supported by arguments indicating that (i) CIL tends to uphold the status quo, which often favors a select group of developed States, rather than fostering systemic reforms; (ii) (powerful) States have more influence in the formation of CIL, sustained by the doctrines of specially affected States and persistent objector; (iii) unequal access to science and technology hinders the majority of countries from establishing international practice (Tladi, 2014; Long, 2022); and (iv) practical obstacles, including limited human and financial resources, language barriers, and a shortage of expertise in international law, impede the collection and public availability of information regarding the State practice of developing countries. In this context, the research aspires to contribute to the increased accessibility of information concerning the State practice of SIDS. Additionally, by shedding light on trends and shared cross-regional approaches to the consent regime, the findings may suggest the emergence of norms and interpretations that are gradually evolving into customary law.

3.5 Significance of the Study

Recognizing the asymmetries within and promoted by international law, Eslava and Pahuja (2011) suggest that, instead of rejecting the legal order, a postcolonial lawyer must adopt a continuous critical standing, resisting exclusions promoted by the dominant legal order and continuously requesting reforms. Upholding the faith in international law as proposed by Eslava and Pahuja, this study aims to trigger changes within the legal system by focusing on the subsequent practice of States historically located on the margins of the development of international law—the SIDS.

As previously mentioned, one of the intended contributions of this dissertation is to provide practitioners and scholars with empirical information regarding the State practice of SIDS on the consent regime for MSR. As newcomers in international relations—when considering the paradigm of sovereignty—the influence of SIDS in international law-making and interpretation is restricted by time and their special circumstances. Therefore, by analyzing their practices, this study sheds light on trends, good practices, and challenges faced by SIDS when implementing the consent regime for MSR. In doing so, it serves to diversify the protagonists in the development of the LOSC. Secondarily, the trends may indicate the emergence of CIL, particularly if such trends encounter no opposition from other States.

Evidence about the practice of States can be gleaned from a multitude of sources, including historical archives, public statements by government officials, local legislation, domestic court rulings, governmental responses to General Assembly Resolutions, and the drafts put forth by the International Law Commission (ILC) (Shaw 2021, pp. 82–83). In this sense, the study contributes to the scholarship by exploring the expressions of international law in the administrative practice of State officials, research vessel operators, and scientists (Eslava & Pahuja, 2012; Verdier & Versteeg, 2015). Despite not being featured in many international law manuals as a source to obtain evidence of State practice, the insights and anecdotes acquired through responses to questionnaires from officials involved in implementing the consent regime for MSR have proved to be enlightening regarding its practical application. Furthermore, it is anticipated that the ethical standards employed in the collection of information set a commendable precedent for future research endeavors in this field.

The dissertation also contributes to the scholarship on international law of the sea by assessing the consent regime for MSR and the subsequent practice of SIDS in light of the insights drawn from the TWAIL movement. As will be elaborated upon in subsequent sections, this critical perspective has facilitated the proposition of a novel interpretation of the objective and purpose underlying the consent regime. Specifically, this reinterpretation recognizes the advancement of scientific and

technological capacities in developing countries as key elements of the compromise achieved at UNCLOS III. Through this reinterpretation, the study underscores that the calls for the development of scientific and technological capacities of SIDS, as emphasized by the SDGs and the Ocean Decade, find their roots in mechanisms embedded within the LOSC. Also inspired by lessons from TWAIL scholars, this dissertation proposes a novel perspective for the consent regime for MSR and offers recommendations for streamlining the procedures for obtaining consent while enhancing the benefits accruing from foreign MSR to SIDS.

Through the examination of best practices, challenges encountered in implementing the consent regime for MSR, and the proposition of a novel approach, this study endeavors to make a meaningful contribution to the realization of the objectives outlined in SDGs 14A and 14C, which aim to diminish global disparities in marine sciences and technology while strengthening the implementation of the LOSC. Furthermore, this research aspires to lend support to initiatives within the Ocean Decade, specifically those seeking to promote equitable access to data, information, technology, and innovation in the realm of marine sciences. Lastly, given the interconnectedness of marine biodiversity and ecosystems within national jurisdiction and those beyond national jurisdiction, the dissertation also strives to advance the objectives of the BBNJ Agreement.

Following the analysis of the dissertation's design, the next section engages in an analysis of the scholarly papers that constitute this thesis and discusses their individual contributions toward addressing the research questions posed.

4. Findings and Research Impact

This section provides a concise overview of the five distinct and self-contained publications that constitute this dissertation. To a significant extent, these papers share a common thread, as they delve into various aspects associated with the practices of SIDS in relation to the consent regime and explore mechanisms that have been used or hold potential to adapt the consent regime to changing circumstances while assuring the balance intended in the consent regime.

The preceding section undertook an exploration of the provisions governing the consent regime for MSR within the LOSC. Building on this foundation, the first paper delves into the historical context of these provisions, emphasizing the participation of SIDS in the negotiation process. This analysis aims to elucidate the key elements of the compromise established through the consent regime and whether the framework has provisions to promote capacity-building for SIDS. The subsequent two papers adopt an inductive approach to examine how SIDS have operationalized the consent regime in light of changing circumstances. They identify trends, best practices, and implementation challenges, underlining whether and how the core elements of the consent regime have been safeguarded. Notably, the third paper also assesses whether the practices of SIDS have faced opposition from other states or have deviated from the prevailing interpretations regarding the consent regime. The fourth paper analyzes the applicability of the consent regime to novel technological devices used in MSR. It investigates instances where informal mechanisms and cooperative arrangements have facilitated the use of new technologies while attempting to maintain the balance intended in the consent regime. Lastly, the fifth paper explores the potential of ocean science diplomacy as a nonlegal instrument to address legal gaps and support the fulfillment of obligations related to the transfer of marine technology and the enhancement of research infrastructure in light of changing circumstances and local realities.

4.1. Paper I




Coelho, L. F. (2022). Marine scientific research and Small Island Developing States in the twenty-first century: Appraising the United Nations Convention on the Law of the Sea, *The International Journal of Marine and Coastal Law*, 37(3), 493–528. doi: <https://doi.org/10.1163/15718085-bja10099>.

The paper investigates the core elements of the balance envisioned within the consent regime for MSR and whether the framework regulating MSR in the LOSC has the potential to strengthen SIDS' scientific and technological capacities. An initial step in responding to these questions examined whether support for science and technology was a claim of SIDS during UNCLOS I and UNCLOS III and how their voices were expressed during the negotiations, in particular taking into account that many were not sovereign States at the time of the negotiations.

Initially, the paper examines the emergence of SIDS as a negotiating group in ocean affairs, including their participation in negotiating the rules on MSR at UNCLOS I and III. Based on historical records of the negotiations read through the lens of TWAIL, the interest and potential needs of SIDS related to MSR at UNCLOS I were within the positions taken by the Latin American group. At UNCLOS III, they followed the positions of the G77 on this particular topic, although a more proactive role of the Caribbean SIDS was observed. It was noticed that the lack of a negotiating group to advocate solely for the interests of SIDS might have impinged on the adoption of bespoke provisions at the LOSC. At this stage, it was found that enhancing scientific and technological capacities was a strong request of developing countries, including SIDS, during UNCLOS III as part of broader discussions on adopting an NIEO, an international code on the transfer of technology, the principle of the common heritage of humankind, and promoting the rights to development, self-determination, and permanent sovereignty over natural resources.

A second step was to investigate how developing countries' claims to reduce scientific and technological asymmetries were integrated into the Convention. By examining the historical negotiations of UNCLOS III, it became evident that the inclusion of provisions aimed at enhancing the scientific and technological capabilities of developing nations played a pivotal role in reaching consensus and concluding the negotiations of Parts XIII and XIV of the LOSC (see discussion in Section 6.1). Subsequently, the legal text was scrutinized in light of this discovery, enabling classification of the potential benefits resulting from the implementation of these provisions into four categories: training and capacity-building; access to data, samples, information, and knowledge; improvements in research infrastructure; and the establishment of a legal and policy framework (see Table 8).

Table 8 Modalities of Benefits to Strengthen Scientific and Technological Capacities of SIDS

	Articles
	Consent regimes
	Participate or be represented on board of vessels, crafts, or installations 249 (1)(a)
	Receive support to assess and interpret data, samples, and information 249 (1)(d)
Training and capacity-building	International cooperation
	Training and capacity development 244 (2)
	Create favorable conditions for MSR and integrate the efforts of scientists 243
	Strengthen the MSR capabilities of developing States 244 (2)
	Promote studies and programs on scientific research about marine pollution 200
	Promote programs of scientific, educational, technical, and other assistance to developing States for the protection and preservation of the marine environment, preparation of environmental assessment, and prevent pollution 202 (a) (c)
	Training and education of nationals of developing States 268 (d)
	Promote the exchange of scientists and experts 269 (c)
	Consent regimes
Access to data, samples, information, and knowledge	Access data, samples, information, and knowledge 249 (1)(b) (c)
	International cooperation
	Promote the flow of data and information, including preventing and controlling damage to the health and safety of persons and the marine environment 242 (2)
	Disseminate on proposed major programs and their objectives 244 (1)
	Encourage the exchange of data and information on marine pollution 200
	Facilitate the acquisition, evaluation, and dissemination of marine technological knowledge, information, and data 268 (a)
	International cooperation
Enable research infrastructure	Supply developing States with equipment, facilities, and capacity to manufacture thereof, to protect and preserve the marine environment and minimize the effects of major incidents 202 (a) (b)
	Preferential treatment for developing States in the allocation of funds and technical assistance for the prevention, reduction, and control of pollution 203 (a)
	Preferential treatment for developing States to utilize the specialized services of international organizations 203 (b)
	Development of marine technology and technological infrastructure 268 (b) (c)
	Establishment and strengthening of national marine scientific and technological research centers 275
	Establishment of regional marine scientific and technological research centers 276
	Consent regimes
Establish legal and policy framework	Establishment of general criteria and guidelines to assist in ascertaining the nature and implications of MSR 251
	International cooperation
	Elaborating agreements to create favorable conditions for MSR projects 243



Establish rules, standards, procedures, and recommended practices for the prevention, reduction, and control of pollution of the marine environment	201
Conclude contracts and agreements under equitable and reasonable conditions for the acquisition of marine technology	269 (b)
Establish guidelines, criteria, and standards for the transfer of marine technology	271

Source: Coelho, 2022.

Note: SIDS = Small Island Developing States; MSR = Marine scientific research.

Significantly, through a comparative analysis of the prospective benefits outlined in Parts XIII and XIV of the Convention with both the underlying reasoning and the specific measures within the access and benefit-sharing (ABS) mechanisms established in numerous contemporary environmental treaties, including the BBNJ agreement, this paper posits that Part XIII can be regarded as a precursor to ABS mechanisms. This perspective enhances the relevance of complying with such provisions and is substantiated by existing scholarly literature (Salpin, 2013; Von Kries & Winter, 2015).

In the paper's final analytical step, the flexibility of the framework to evolve and adapt to changing circumstances was examined over time. A combination of legal analysis and scholarly insight highlighted two obligations that could drive the incorporation of the time element within the consent regime. The first pertains to the overarching obligation among States to promote and facilitate MSR (Articles 239, 245, 250, and 251), which encourages States to collaborate in finding solutions to promote the activity even when, for instance, the operational aspects of a device used in the research project pose challenges in complying with legal obligations. The second concerns the general obligation of coastal States to establish rules and procedures for regulating MSR, access to harbors, and the criteria for granting or withholding consent (Articles 246 [1][3], 249 [2], and 255). Like the first obligation, the second also implies that provisions of international law can be tailored to accommodate local and regional realities and changing circumstances.

The paper was designed and drafted while undertaking a literature review on the consent regime for MSR and on the emergence of SIDS as a negotiating group in international negotiations, providing an opportunity to scrutinize the mainstream scholarship with a critical lens. It aspires to add to a series of outputs that explore national and regional participation in the making of the law of the sea (for instance, Anderson, 2021; Franssen, 1973; Garcia-Amador, 1974; Rangel, 1982).

This paper was mentioned in a piece of written evidence submitted in the context of a public inquiry launched by the UK House of Lords (HL Paper 159, 2022, UNC0020). Additionally, it was presented at the Seventh Global Meeting of the Law and Society Association Conference: “Rage, Reckoning, & Remedy” on July 16, 2022, and at the V Conference of the Brazilian Institute for the Law of the Sea.

4.2. Paper II

Coelho, L. F. (2024). The practice of the Caribbean SIDS on the consent regime for marine scientific research under UNCLOS: Trends, gaps, and recommendations. *Ocean Development and International Law*, 55(1). <https://doi.org/10.1080/00908320.2024.2332304>.

The paper analyses the practice of the Caribbean SIDS on the consent regime for MSR under the LOSC with the purpose of identifying trends, best practices, and implementation gaps in the interpretation and adaptation of the consent regime. The State practice related to 73 domestic laws, policy instruments, and guidelines of the Caribbean SIDS in addition to responses to QA and Q3. The investigation examined (i) how SIDS have exercised jurisdictional claims regarding MSR; (ii) different countries' approaches to the definition of MSR; (iii) in which manner they have fulfilled the obligation to grant consent in normal circumstances and exercised the right to withhold consent and request the suspension and/or cessation of a given MSR project; (iv) which conditions researching States are required to comply with during and after the MSR activity; and (v) to what extent the Caribbean SIDS are benefiting from foreign MSR.

In sum, the analysis concludes that the Caribbean SIDS are generally supportive of promoting MSR, with high consent approval rates and the adoption of procedures to prevent unreasonable delays or denials. These countries have developed the framework by introducing new requirements for researching States, such as providing information on potential benefits for the host States beyond participation, as well as submitting EIA and risk assessments. They have also sought assurances of meaningful participation before granting consent. Nonetheless, their legislative framework for the consent regime is typically outdated and, in most cases, sector-specific. Following an analysis of the Caribbean SIDS practice, which will be elaborated in the next section, the paper presents recommendations as outlined in Table 9.

Table 9 Recommendations in a Nutshell

Caribbean SIDS should	Researching States should
Ensure their domestic laws align with the jurisdiction powers established in UNCLOS	Request information regarding the need to obtain consent for at-sea research activities
Adopt and publicize domestic laws to implement Part XIII	Provide detailed information about the project, including its implications for traditional knowledge and the marine environment
Establish guidelines concerning the application for consent to conduct MSR	Maximize efforts to include the Caribbean SIDS in all stages of research
Establish dedicated points of contact to handle consent requests	Consider the MSR project as a two-way avenue benefiting all participating States
Create databases about the consent regime	Monitor compliance with postcruise obligations, listing noncompliant institutes and adopt remedies for noncompliance practices
Make use of regional and cross-regional mechanisms as platforms to share practices, enhance cooperation, and exchange knowledge	

Source: Forthcoming, Coelho, L. F. (2024).

Note: SIDS = Small Island Developing States; UNCLOS = United Nations Conference on the Law of the Sea; MSR = Marine scientific research.

A preliminary version of it was presented in the regional workshop in Dominica organized by the Nippon Foundation – World Maritime University Closing the Circle Program on Marine Debris, Sargassum and Marine Spatial Planning between April 4 and 7, 2022. It was also presented in the side event for the UN Ocean Conference “Educating Ocean and Maritime Leaders: A Legacy of Excellence and Future Plans at the World Maritime University” on June 27, 2022. Furthermore, it was discussed on a webinar promoted on September 26, 2022, by the International Relations Committee of the Brazilian Bar Association on the occasion of the 40th anniversary of the adoption of the LOSC. This paper’s final version was discussed in a lunch seminar organized by the Centre for International Law and Governance of the University of Copenhagen on March 3, 2023. Even before the paper’s publication, one of its main impacts has been the trust and connection established and awareness raised with a large group of stakeholders, constituted by trusted introducers, regional organizations, and the respondents to QA.

4.3. Paper III

Coelho, L. F. (forthcoming) Developing and reframing UNCLOS in changing circumstances: The Practice of Small Island Developing States on the consent regime for marine scientific research [*revised, accepted with minor revisions*].

This paper investigates the practice of SIDS on the consent regime for MSR under the LOSC as a cross-regional group with the purpose of identifying trends, best practices, and implementation gaps. It builds upon the findings of the previous paper, expanding the geographical scope to include information from all 31 SIDS. An additional feature of this paper is that the information obtained through the

analysis of documents and responses to questionnaires by officials from SIDS is compared and contrasted with responses provided by researching States about their experience when conducting research in SIDS waters. This comparative exercise supported a more accurate perspective on the State practices of SIDS and of verifying whether researching States have opposed any of the SIDS requirements, during and after consent is granted.

The State practice examined was obtained from 154 domestic laws, policy instruments, and guidelines in addition to responses to Q3, QA, and QB. The analysis was structured following a similar division of the previous paper, namely: (i) approaches to the definition of MSR; (ii) the exercise of jurisdiction on MSR; (iii) the obligation to grant consent in normal circumstance and the right to withhold it for applied research; (iv) compliance with obligations and enjoyment of rights during and after the research; and (v) the exercise of the right to request the suspension and cessation of a foreign research project.

Even though a more detailed discussion of the findings is provided in the subsequent section, it is noteworthy that both SIDS and researching States have adopted a favorable and cooperative approach toward promoting MSR. SIDS have developed the consent regime by incorporating various requirements influenced by legal advancements in other regulatory frameworks. These additions encompass the need for meaningful participation; access to data, samples, information, and reports as conditions for granting consent. They also involve fee payments, disclosure of the research benefits for the host country, information on potential impacts and use of Indigenous and traditional knowledge, assurance of transferring technology, and adherence to best practices in marine environment and resource conservation. This includes the submission of an EIA or risk assessments, applying a precautionary approach, and using the best available scientific information. Interestingly, unlike the observations made in the previous publication, several SIDS in the Pacific and Indian Oceans have already enacted dedicated legislation on MSR. Table 10 replicates the recommendations outlined in the paper.

Table 10 Recommendations to Support Achieving the Consent Regime Purpose

SIDS	Researching State
Adjust the laws asserting jurisdiction over MSR	Promote meaningful participation of local scientists and share data, information, and reports in a user-friendly format
Adopt dedicated laws, guidelines, and procedures (best practices: Cook Islands, Jamaica, Mauritius, Papua New Guinea, and Solomon Islands)	Improve coordination with local scientists and authorities before sending the formal request to discuss other forms of benefit
Designate a dedicated institution or committee to handle the consent requests	Maintain a list of noncompliant researchers and consider adopting stringent measures to avoid noncompliance
Legislate or consider including other conditions for MSR under the discretion to withhold consent	Provide precruise information for SIDS at least six months in advance, considering the human resources limitations
Inform the researching State about the motivation for withholding consent, allowing the possibility to rectify the request or to negotiate other conditions	Consider existing scientific needs assessments in the research's proposal
Develop and share information about priority needs in MSR	

Source: Paper III, preprint accepted for publication with minor revisions.

Note: SIDS = Small Island Developing States; MSR = Marine scientific research.

The manuscript is presently under review and has already received acceptance for publication with minor revisions from the reviewers. The preliminary findings of this paper have been discussed in the panel “Mobilising Ocean Science for Large Ocean Island States: Challenge and Opportunities” at the Island Summit on September 27, 2022. Similar to the above, the process of collecting the information analyzed in this paper, creating trust and connection with a larger group of stakeholders from SIDS, regional organizations, research vessel operators, and research institutes was another great achievement of this paper, although not measurable in numbers. As an example, following meetings to introduce the research and collect responses to the survey, two of the participating SIDS mentioned they would consider revising the national framework on MSR, and a regional organization communicated it is adopting measures to coordinate MSR within the region.

4.4. Paper IV

Coelho, L. F., and Rogers, R. (2023). The use of Marine Autonomous Systems in the delivery of marine scientific research under UNCLOS: Resuming balance and sharing benefits. In T. Johansson, D. Dalaklis, J. E. Fernández, A. Pastra, & M. Lennan (Eds.), *Smart ports & robotic systems: Navigating the waves of technology & governance* (Vol. 2). Palgrave Macmillan. <https://doi.org/10.1007/978-3-031-2529696>.

The chapter explores two intricate aspects related to the framework governing MSR in light of changing circumstances, namely, the compatibility of Marine Autonomous Systems (MAS) with the consent regime and the absence of a clear definition for MSR. Rather than proposing a classification for ocean observation, this study employs Part XIII as a reference point to assess its applicability in regulating the use of MASS, UUV, ROV, PF, SO and RPA in activities under the umbrella of ocean observation. In this context, the chapter investigated the potential of evolutionary interpretation and informal law-making instruments to align the operational aspects of new technologies with the legal provisions of the consent regime for MSR, all while preserving the balance between the rights of coastal and researching States. It also examined two case studies where the provisions of Part XIII were applied in projects using new technologies to the benefit of all involved States.

Overall, the chapter underscores the significance of effective communication between official channels and scientists from concerned countries. This, coupled with the flexibility within the framework governing international cooperation in MSR, played a pivotal role in elucidating the circumstances requiring dedicated consent for the employment of MAS, instances where consent could be withheld, and how to fulfill benefit-sharing obligations. Among the informal law-making instruments identified, the guide published by DOALOS in 1991 and revised in 2010 to support the implementation of Parts XIII and XIV and the guideline elaborated in 2007 by IOC-UNESCO regulating MSR undertaken under the auspices of international organizations (Article 247) hold particular significance. Although the latter has never been employed, the former provides valuable guidance by emphasizing the importance of sharing detailed information about MSR projects in consent requests, particularly those involving MAS, and by promoting meaningful participation of scientists from coastal States to foster collaboration and ensure mutual benefits among all involved countries. The first case study examines the informal instrument adopted to govern the use of Argo profiling floats in the marine environment. This instrument, while reflecting the provisions of the consent regime, customizes them to suit the operational characteristics of this specific device. The second case study explores the CAMEL project, offering an illustration of how international collaboration can be harnessed to facilitate MSR while concurrently bolstering the scientific and technological capabilities of SIDS.

The chapter was published in the edited collection *Smart Ports and Robotic Systems: Navigating the Waves of Techno-regulation and Governance*. It is a result of an important engagement between the coauthors exchanging information about Q3 and the work of ABE-LOS and entailed a fruitful fieldwork trip to visit the facilities of the National Oceanography Centre (NOC) and better understand the functions of the MAS. The chapter's findings were discussed at the VI Conference of the Brazilian Institute for the Law of the Sea on October 28, 2022.

4.5. Paper V

Polejack, A., & Coelho, L. F. (2021). Ocean science diplomacy can be a game changer to promote the access to marine technology in Latin America and the Caribbean. *Frontiers in Research Metrics and Analytics*, 6 (April), 34–36. <https://doi.org/10.3389/frma.2021.637127>.

The paper explores how ocean science diplomacy, a burgeoning nonlegal tool in ocean governance, can help meet the LOSC's obligation for special treatment, aiming to develop autonomous MSR infrastructure and enhance human capabilities in marine sciences, for developing countries in Latin America and the Caribbean.

The paper initially outlines some of the specific challenges faced by scientists in Latin America and the Caribbean when conducting MSR. These obstacles encompass limited budgets that do not cover fluctuating exchange rates; high expenses associated with importing, calibrating, and securing certified services for scientific equipment; as well as intense competition and costs related to shipping time. It goes on to examine whether the provisions outlined in Parts XIII and XIV of the LOSC could effectively address these challenges. It suggests that obligations mandating special treatment for developing countries, particularly regarding the sharing of data, information and knowledge, capacity-building and training, access to research equipment and infrastructure, and fostering scientific cooperation could potentially serve this purpose (see Figure 3). However, the paper also acknowledges the generic language and the relatively weak implementation of these legal obligations.

Special rules for developing States in part XIII	Art 244.2
	<ul style="list-style-type: none"> • Autonomous MSR capabilities • Education and training
Special rules for developing States in part XIV	Art 266: MS and technological capacity of States with regards to exploration, conservation and management
	Art 268: States + IO + ISA shall promote the development of HR through training and education
	Art 269: States + IO + ISA shall endeavour: establish programmes of technical cooperation - own technological capacity
	Art. 272: Global or regional programmes taking into account interests and needs
	Art. 273: Skills and marine technology with regards to activities in the Area
	Art. 275.1 States + IO + ISA shall establish national marine scientific and technologic research centres
Art. 276 Establishment of regional marine scientific and technological research centres to stimulate and advance the conduct of MSR and foster the TMT	

Figure 3 Provisions in Part XIII (Marine Scientific Research) and Part XIV (Development and Transfer of Marine Technology) of the LOSC Specifically Dealing with Developing Countries

Source: Polejack and Coelho 2021. Note: MSR = Marine scientific research; IO = Intergovernmental organization; ISA = International Seabed Authority.

Subsequently, the paper discusses the multiple facets of the concept “ocean science diplomacy.” First, “diplomacy for science” seeks to foster international cooperation between States and private sector entities within diplomatic negotiations, bridging gaps that may not be explicitly addressed in legal instruments to align with local realities. This might involve crafting specialized provisions for research vessel calibration and scientific equipment. Second, from the standpoint of “science in diplomacy,” ocean science diplomacy offers a platform to deliberate upon and surmount specific barriers to sharing technology and knowledge that arise from the implementation of legal provisions. Lastly, “science for diplomacy” advocates for international scientific initiatives aimed at addressing urgent global scientific imperatives to transcend diplomatic obstacles.

In the next step, the paper analyzes two case studies where this tool was utilized by state officials and in peer-to-peer initiatives to facilitate the implementation of obligations for providing special treatment to developing countries under Parts XIII and XIV, as well as to address specific local challenges encountered to conduct MSR. The first case study examines the collaboration under the auspices of the IOC’s Global Ocean Observing System (GOOS) between the National Oceanic and Atmospheric Administration (NOAA) and the University of São Paulo in Brazil to produce Atlas-B buoy. The second case study investigates the establishment of the Ocean Science Center Mindelo, a project initiated through collaboration between the GEOMAR Helmholtz Center for Ocean Research and Cape Verde’s Instituto do Mar – IMar. In conclusion, the paper asserts that ocean science diplomacy plays a valuable role in the law-science-policy interface.

This paper was drafted while undertaking the literature review on the framework regulating MSR and its connection with Part XIV. The process of conceptualizing and designing this piece involved a number of discussions with the coauthor, a scientist, offering valuable opportunities to engage with diverse epistemologies and terminologies. It also equipped the researcher with interdisciplinary skills, which have been further explored in Paper IV and in Coelho & Tavonvunchai (2022). By examining the obligations necessitating special treatment for developing countries under Parts XIII and XIV, this paper contributes to the understanding that the enhancement of national scientific and technological capacities in developing countries, including SIDS, falls within the purview of Part XIII.

Following this overview of each individual paper, the subsequent section is dedicated to a discussion on how these papers collectively address the research questions posed in this study.

5. Discussion

This section engages with the research questions outlined in Subsection 3, drawing upon the evidence established in the analyzed papers. Papers I and V hold particular relevance to research question 1. These papers explore the key elements of the compromise embedded within the consent regime for marine scientific research (MSR). Papers II, III, and IV collectively contribute to addressing research question 2. Each of these papers delves into various aspects of State practices employed by Small Island Developing States (SIDS) within the MSR consent regime from 2005 to 2020. The five papers that comprise this thesis all discuss facets of the consent regime's flexibility in adapting to evolving circumstances. This analysis directly informs research question 3. Finally, the discussions presented in Papers I, II, III, and IV provide a foundation for proposing principles and measures that could guide a novel approach to MSR governance in light of changing circumstances. This directly addresses research question 4.

Before proceeding, it is worth reiterating the topics that are outside the scope of this study. Since the dissertation aims to analyze the contribution of SIDS to the development and reframing of the law of the sea through their interpretation and application of the consent regime for MSR, it abstains from discussing State practice in terms of compliance and noncompliance. Moreover, the determination of whether SIDS' subsequent practice establishes CIL norms lies outside the scope of this dissertation, although it may point to significant trends. Instead, the focus here is on assessing how SIDS' subsequent practices have influenced the filling of legal gaps, the evolution of the Convention, and even potential modifications to the law, particularly in light of emerging technologies and legal developments in other areas of international law. In this sense, the focus of the analysis remains within the context of treaty law.

It is also crucial to acknowledge the difficulty of distinguishing precisely between treaty modification, interpretation, and adaptation. This differentiation holds legal significance, as modifying a treaty alters its substance, whereas agreed-upon interpretations have effects within the confines of parties and particular contexts (Buga, 2015). Buga suggests that “the “threshold” required for a practice to constitute agreement to a modification will depend on the type and scope of the envisioned modification and the nature of the treaty and provisions in question” (2018, p. 193). Consequently, discerning whether State practice solely interprets a

provision or modifies it necessitates a case-specific analysis. Additionally, not all treaty provisions can be modified, since the treaty's overarching objectives, obligations *erga omnes* or *erga omnes partes*, and nonreciprocal obligations shall remain (Buga, 2015, p. 66). In the context of the LOSC, States must also refrain from compromising their foundational principles, particularly the principle of the common heritage of humankind, the harmonious enjoyment of rights and fulfillment of obligations under the Convention, and the intrinsic equilibrium crafted therein (Buga, 2018, p. 65). This forms a delicate balance of rights and duties, which was an intrinsic feature of the package deal.

Taking this information into account, the discussion suggests potential modifications to the provisions of the consent regime when the subsequent practice of SIDS faces no opposition from researching States and gains general acceptance in the practice of other States, as well as within jurisprudence and scholarship.

5.1. What Is the Objective and Purpose of the Consent Regime for MSR under the LOSC?

The first research question investigates the elements that factor into the balance envisioned within the MSR consent regime. This analysis is achieved by examining the objectives and purposes of both the LOSC itself and the consent regime specifically. The objective and purpose of a treaty encapsulate its very essence. It reflects the rights and obligations expressed by the instrument (normative content) and the desired state of affairs that the parties envisage upon the adoption and implementation of the legal instrument (*telos*) (Linderfalk, 2007, pp. 205–206). In other words, the object and purpose of a treaty refer to social relations sought by the parties, to be maintained or changed by a given legal instrument. Not by coincidence, the LOSC—and subsequently Part XIII—shall be interpreted in good faith, considering the ordinary meaning of the terms in their context, which includes the preamble and annexes, and the Convention's objective and purpose (Article 31 [1], VCLT).

The *telos* and normative content of the consent regime for MSR are examined mostly in Papers I and V. This process is initiated by discerning the objective and purpose of the consent regime based on the history and context of the negotiations to identify the intention of the negotiating parties. The provisions concerning the consent regime for MSR were analyzed successively in light of the demonstrated intention of negotiators to verify whether the intended objective and purpose can be promoted within the current context of the instrument.

As noted by scholars, the objective and purpose of the framework governing MSR in AWNJ involves balancing the interests of coastal States and other States—researching States and geographically disadvantaged States (Nordquist et al., 1985, p. 433; Soons, 2007, p. 142). Accordingly, other States aspire to undertake MSR without unreasonable restrictions, while coastal States seek to safeguard their sovereignty and sovereign rights in AWNJ (Huh & Nishimoto, 2017a, p. 1652). Considering that the coastal State jurisdiction under the Convention is more intricate than a binary balance of rights and duties (Goodman, 2021, pp. 347–348), it has been suggested that collective rights and the conservation of global commons, such as the marine biodiversity and ecosystems, are elements of this balance (Doussis, 2017; Hubert, 2011; Tanaka, 2005; Verlaan, 2007). A few scholars emphasize the importance of capacity-building, including training, data and sample sharing, information exchange, and the development of research infrastructure, as integral components of the negotiated compromise. (Matz-Lück, 2017, p. 1606; Salpin, 2013; Von Kries & Winter, 2015).

To elucidate the elements balanced within the MSR framework, Paper I analyzed the intentions of developing and developed countries. This analysis draws upon 89 official statements made during the *travaux préparatoires* for UNCLOS I and III, alongside a consideration of the broader historical context surrounding the negotiations.¹³ The work of TWAIL scholars, particularly Bedjaoui (1979), Anand (1977, 1982), Anghie (2004), Grote (2010), Salomon (2013), Mickelson (2019), and Frere et al. (2020), was instrumental to move beyond a siloed approach and connect the MSR framework negotiation under UNCLOS III to the decolonization process and discussions aimed at addressing economic inequalities between States—issues less prominent during the UNCLOS I negotiations. As Paper I argues:

The proposal of a prior consent introduced by Indonesia in Article 5(8) aimed at satisfying the coastal State with the bona fides of a proposed MSR project. Hence, the parties intended to preserve the freedom of scientific research while providing coastal States with safeguards to protect national security and rights over resources.

Scholars agree that participation should occur at every stage of an MSR project, including during the preparatory work and when accessing raw data for the analytical phase. Nevertheless, slim consideration has been paid to the purpose of this participation or to the legal consequences of breaching such obligation.

¹³ Paper I informs that “only Cuba, the Dominican Republic, and Haiti represented SIDS at UNCLOS I” (p. 10) while “of the 29 States members of the group of [Caribbean and Pacific] SIDS, 18 were at the concluding meeting of UNCLOS III. Some territories, notably SIDS located in the Pacific, participated as UN Trust Territories, achieving a certain degree of representation” (p. 10).

(...) Therefore, based on the *travaux préparatoires* and subsequent practice, coastal State consent served the sole purpose of attesting that no exploratory or military aims were in the background of a proposed scientific research project.

(p. 24)

Looking back at the historical records, developing States went beyond concerns over security and resource-related activities, requesting researching States to consider national scientific and technology needs when proposing MSR projects in maritime areas under their jurisdiction.

On another occasion, the representative of Nigeria proposed that “the coastal State whose territory was involved could participate in the research and share in the benefits of the data obtained therefrom.”

Developed States took into account such requests and, to an extent, accepted them.

(p. 25)

In this vein, the telos, or guiding purpose, of negotiating not only Part XI but also Parts XIII and XIV intertwined with discussions related to the NIEO, the formulation of a technology transfer code, the principle of the common heritage of humankind, and the recognition of fundamental rights, including the right to development, self-determination, and permanent sovereignty over natural resources.

Paper I extends this teleological interpreting by interpreting Part XIII in conjunction with the preamble and Annex VI of the Final Act of UNCLOS III (United Nations Convention on the Law of the Sea, 1982/1994, Annex VI). The preamble juxtaposes the promotion of “the equitable and efficient utilization of [the seas and oceans] resources” with the fostering of “the study, protection, and preservation of the marine environment”; therefore, equipping all States with the capability to harness ocean resources holds comparable significance to advancing MSR. Annex VI tabulates a resolution on the development of national marine science, technology, and ocean service infrastructure, underscoring that reinforcing scientific and technological capabilities among developing countries entails a bilateral commitment among State parties (a similar point is raised in Tanaka, 2005). This finding suggests that enhancing the scientific and technological capacities of developing countries, including SIDS, was not a peripheral or accidental consideration, but rather a central component of the changes pursued by the negotiating parties with the LOSC, and Part XIII.¹⁴

¹⁴ As stated in Paper I: “Science and technology capacities entail (i) training and capacity development; (ii) national and regional techno-logical infrastructure, including equipment and

Papers I and V further corroborate that enhancing the marine scientific capability of developing States is an objective envisioned in Part XIII through an interpretation of the legal provisions therein. Paper I analyzes the legal provisions, making three key arguments. First, it highlights the similarity between the obligations under Article 249 and those under the label of “benefit-sharing” in Annex I of the Nagoya Protocol and the categories of capacity-building and marine technology transfer delineated in Annex II of the BBNJ agreement (p. 27). Also, it states that, despite the open language used in the obligations under Article 249, existing State practice demonstrates consensus on the binding nature of the obligation to provide coastal State participation in foreign research (p. 28). Second, it underscores that the provisions under Section 2 of Part XIII, which regulate international cooperation in marine scientific research (MSR), clearly aim to mutually benefit all collaborating States and create favorable conditions for conducting research and building the autonomous science and technology capacities of developing States (pp. 28–30). Third, it analyzes the correlations and ripple effects between the obligations under Part XIV and Part XIII (pp. 30–31).

Conversely, Paper V builds on the connection between Parts XIII and XIV, analyzing the stand-alone obligations in these frameworks that confer special treatment to developing countries concerning science and technology. It asserts that the textual interpretation of such obligations leaves no ambiguity regarding the “special obligation for States, alone or in collaboration, to promote the flow of scientific data and information, as well as the transfer of knowledge resulting from MSR and transfer of marine science and technology to developing countries” (p. 4). Furthermore, the text of the Convention informs that States agree on the necessity of providing developing countries with additional support from the international community to enhance their marine science and technological capacities. This support extends to critical areas such as human resources, strengthening research infrastructure, and acquiring expertise and technology for marine resource exploration, exploitation, conservation, environmental preservation, and activities in the Area (p. 4). Consequently, strengthening the scientific and technological capacities in developing countries aligns with the object and purpose of Part XIII, rather than existing incidentally within it. This alternative interpretation diverges from the mainstream reviews of Part XIII.

Overall, by interpreting the text of Part XIII systemically—considering the preamble of the Convention, Annex VI of the Final Act of UNCLOS III, and the obligations of special treatment to developing States regarding strengthening autonomous marine scientific capabilities—one can conclude that promoting capacity-building is an expected outcome of implementing Part XIII and the consent

platforms; (iii) access to data, information, and knowledge; and (iv) legal and policy frameworks enabling the fulfilment of international obligations and preventing colonial science” (p. 5).

regime for MSR. Furthermore, through a teleological interpretation of Part XIII, based on the official statements of negotiators, particularly representatives of SIDS, during UNCLOS I and III, and the historical context of these negotiations, it becomes evident that the objective and purpose of the consent regime aim to balance the right to conduct MSR without unwarranted interference, the rights afforded within coastal States' jurisdiction, the protection of the marine environment, and the promotion of opportunities for capacity-building in marine sciences and the transfer of marine technology. While this finding is significant, the practical implementation of the consent regime following the LOSC's entry into force ultimately determines whether and how this balance has been sustained.

5.2. What Was the State Practice of SIDS regarding the Consent Regime for MSR under the LOSC between 2005 and 2020?

Having established the objective and purpose of the consent regime, Papers II and III shift focus to examine the subsequent practice of SIDS within this framework. This analysis aims to elucidate how the regime has been interpreted in contemporary practice. Paper IV builds upon this foundation by exploring the potential application of the consent regime to regulate the use of new technologies, such as MAS, and activities with uncertain classifications, like ocean observation. The following discussion adopts a structure similar to that employed in Papers II and III, encompassing a review of the definition of MSR, jurisdictional assertions over MSR, the obligation to grant consent in ordinary circumstances, the prerogative to withhold consent, the rights and duties during and after the research endeavor, and the entitlement to request the suspension or termination of the MSR project.

5.2.1. Activities Considered MSR

The omission of an authoritative definition of MSR within the LOSC was a deliberate choice intended to leave this term open to evolutionary interpretation, as noted by Yu (2022a, pp. 37–39). Representative of the sentiment among developing countries and SIDS was the view expressed by the representative of Trinidad and Tobago that “marine scientific research is of such a nature as to preclude any clear or precise distinction between pure scientific research and industrial or other research conducted with a view to commercial exploitation or military use” (UN Docs. A/CONF.62/C.3/SR.17) (Coelho, 2022, pp. 15–16). The decision to not adopt a legal definition was fundamental to craft a balance between developed and developing States and close the negotiations of Part XIII. Despite the absence of a

formal definition, Part XIII of the LOSC outlines minimum requirements applicable to all MSR activities. These include the requirement that activities must have peaceful purposes, employ appropriate means and methods, avoid interference with other uses of the sea, adhere to relevant environmental protection regulations, and not form a basis for claims to parts of the marine environment or its resources (Articles 240 and 241). Scholars have proposed various activities that may fall outside the scope of Part XIII (Roach, 2021), yet consensus remains elusive in individual cases.

Papers II and III observe that both, the SIDS in the Caribbean and Pacific, and in the AIS, have adopted an inclusive approach when interpreting which activities require prior consent, a stance that reflects their position during the UNCLOS III negotiations (see Coelho, 2022, p. 16; Coelho, 2024, p. 13; Coelho, forthcoming, pp. 17–18). Notably, this perspective appears to have received acknowledgment and encountered almost no opposition from researching States (Coelho, forthcoming, p. 17). In fact, it has influenced researching States to also embrace a broad approach when ascertaining which activities require formal clearance. Nevertheless, it is essential to recognize that there is no uniform consensus among SIDS regarding this approach. Some SIDS limit the scope of MSR to research living resources or fisheries while others restrict it to research conducted exclusively by research vessels.

To further investigate the consequences of not having a shared definition of MSR, this research scrutinized the interpretations applied by SIDS to activities frequently discussed by scholars as having controversial classifications, namely ocean observation, bathymetric survey, and research projects aimed at collecting marine genetic resources (MGRs) for scientific purposes (Beckman & Davenport, 2012; Gragl, 2014; Huh & Nishimoto, 2017a, pp. 1656–1657; Soons, 1982, pp. 118–125; Treves, 2008). Drawing on the analyses conducted in Papers II and III, a discernible trend emerges among SIDS wherein there is a proclivity to seek consent for activities categorized as “ocean observation” (50 percent in Paper II and 42 percent in Paper III of respondents) (see Coelho, 2024, pp. 12–13; Coelho, forthcoming, p. 17). Paper IV posits that this trend can be attributed to the evolving capabilities of modern ocean technologies, which have expanded the range of parameters that each device can measure (Coelho & Rogers, 2023, pp. 7–8), as well as to concerns about potential infringements on rights associated with the use of MAS, as exemplified in discussions surrounding the adoption of guidelines for the deployment of profiling floats under the auspices of the Argo Program (IOC/ABE-LOS VIII/3) (Mateos & Gorina-Ysern, 2010).

Analysis of the practice related to bathymetric surveys reveals a distinct pattern. Approximately one-third of participating SIDS request previous clearance to undertake such activity (28.5 percent in Paper II and 25.0 percent in Paper III) (see

Coelho, 2024, p 12; Coelho, forthcoming, p. 17). One possible explanation may be found in the text of the LOSC itself, since MSR and hydrographic surveys could be interpreted as separate activities by the language in Articles 19, 21, and 40. Additionally, hydrographic and bathymetric surveys primarily serve the purpose of providing data for safety of navigation, a function that may not align seamlessly with the consent procedure—which often depends on the discretionary authority of the coastal State and may entail a lengthy review (Huh & Nishimoto, 2017a, pp. 1656–1657; Roach, 2021, pp. 26, 37, 452; Soons, 1982, p. 7; Tanaka, 2019, p. 435; Wegelein, 2005, p. 160).

Similarly, a reduced number of respondents, comprising less than one-third (21 percent in Paper II and 25 percent in Paper III) opted to apply both the CBD and the LOSC to research activities aimed at collecting in situ MGRs in AWNJ (see Coelho, 2024, p. 13; Coelho, forthcoming, p. 17). This finding holds significance because, despite the compatibility between both frameworks, the LOSC affords greater discretion to deny access to MGRs, while the CBD requires access to MGRs on mutually agreed terms (Mossop, 2016a). Consequently, future investigations could look into how these instruments have been concurrently applied by these countries and compare them with the obligations under the BBNJ agreement in relation to ABNJ.

5.2.2. Jurisdictional Claims over and Regulation of MSR

Moving to discuss the ways in which SIDS have claimed coastal State jurisdiction over MSR, three distinct perspectives were discernible, as evidenced by Papers II and III. These categories align with observations made by Wegelein (2005, pp. 276–277). First, a group of SIDS assert jurisdiction over MSR in accordance with the LOSC (e.g., Belize, Cook Islands, Cuba, Dominica, Dominican Republic, Kiribati, Marshall Islands, Mauritius, Micronesia, Tuvalu, and Vanuatu). This group further divides into those replicating the LOSC verbatim without further elaborating the rights and obligations involved (e.g., Belize, Cuba, Dominica, and the Dominican Republic) and those differentiating their claims across maritime zones (Cook Islands, Mauritius, and Vanuatu). Second, another group of SIDS departs from the terminology and/or the substance of rights and duties delineated in the LOSC. This category includes Antigua and Barbuda, Cabo Verde, Grenada, Guyana, Papua New Guinea, St. Kitts and Nevis, St. Lucia, Seychelles, Tonga, and Trinidad and Tobago. Third, the legislation of a final group of SIDS remains silent on the issue of jurisdictional claims over MSR in all or some maritime zones. This includes Bahamas, Barbados, Cuba, Dominica, Dominican Republic, Fiji, Jamaica, Nauru, Palau, Saint Vincent and the Grenadines, Samoa, Solomon Islands, and Timor-Leste (see Coelho, 2024, p. 14; Coelho, forthcoming, p. 18).

Notably, with the exception of the Cook Islands, Mauritius, and Vanuatu, a common trend is the absence of differentiation between the coastal State's authority concerning MSR in the territorial sea from other maritime zones. Only two SIDS demonstrate an awareness of the need to identify areas for future exploration and exploitation within the extended continental shelf as a prerequisite to exercising the right to withhold consent therein (Mauritius and PNG) (see Coelho, forthcoming, p. 22). Therefore, the findings indicate a lack of precision in the articulation of jurisdictional entitlements, which may be attributed to the outdated nature of legislation governing MSR jurisdiction in many SIDS, as noted by Salpin (2018, p. 366) and others.

This ambiguity may restrict the enjoyment of rights or impede compliance with obligations concerning MSR. In this context, aligning SIDS' jurisdictional claims with the language of the LOSC could enhance transparency and clarity for the authority in charge of granting consent and monitoring research activities. Within the territorial sea, archipelagic waters, and internal waters, SIDS could leverage prescriptive jurisdiction under Article 21 (1)(g) as an avenue to anticipate supplementary obligations imposed on foreign-flagged research vessels concerning the protection of the marine environment, the respect for traditional and Indigenous knowledge and practices, and the strengthening of scientific and technological capacities. Similarly, the introduction of dedicated legislation governing MSR in the EEZ and on the continental shelf could serve to clarify the consent process, fostering an environment of trust and collaboration.

The results indicate that SIDS have typically regulated MSR through sectoral legislation, often related to fisheries, biodiversity, and seabed mineral exploration (see Coelho, 2024, Table 1, pp. 6–8; Coelho, forthcoming, Table 1, pp. 4–9). Some of these laws elaborate the procedure to obtain consent. However, the drawback of this sectoral approach lies in its limited scope, making it inapplicable to all forms of MSR. Another common approach has been the adoption of detailed guidelines and consent templates, which partially fill the legal gaps and shortcomings but provide limited legal clarity and stability see Coelho, 2024, Table 1, pp. 6–8; Coelho, forthcoming, Table 1, pp. 4–9). Consequently, there is a compelling case for enacting dedicated legislation that governs all forms of MSR that could be complemented by guidelines and templates. Such legislation could standardize the designated channels for submitting consent requests, and SIDS may consider the establishment of a central authority or an MSR commission, as proposed by Long (2012). Examples of best practices in this regard include the Solomon Islands' dedicated MSR legislation, the Cook Islands' MSR policy, and the Bahamas' step-by-step online resource enumerating the requirements for obtaining research clearance under the LOSC, as well as other instruments such as the CBD and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

5.2.3. The Exercise of Jurisdiction over MSR

The subsequent practice of SIDS regarding exercising the rights and obligations of the consent regime reveals a positive trend toward facilitating MSR activities, despite the need for improved MSR legislation. Papers II and III report high approval rates for consent request (96.7 percent and 95 percent, respectively) and timely responses from SIDS authorities (see Coelho, 2024, p 17; Coelho, forthcoming, p. 20). However, some delays occur due to limited institutional capacity for processing requests. Collaboration often takes precedence over restriction, even in situations where consent denial might be justified, such as in applications outside the six-month time line (see Coelho, forthcoming, p.20). When consent was denied (reported by 30 percent of QA respondents), national legislation usually allows for appeals or resubmissions after addressing deficiencies. Nevertheless, some respondents to QB reported instances where consent was denied based on factors outside Part XIII of the LOSC, including recognition of contested territories, COVID-19 concerns, and, occasionally, without justification (Coelho, forthcoming, 22). Notably, the only instance where opposition to the consent requirements put forth by SIDS was reported in QB pertained to the acknowledgment of sovereignty over a disputed territory. The use of the right to request the suspension and cessation of MSR projects by SIDS has been uncommon, with most incidents resolved through communication between the respective States (see Coelho, 2024, p 25; Coelho, forthcoming, p. 31).

From statements of QB respondents, researching States also demonstrate a cooperative and respectful relationship with SIDS in support of promoting research. Another evidence reinforcing this argument is the limited use of the prerogative to undertake MSR under the guise of implied consent (see Coelho, 2024, p 17; Coelho, forthcoming, 23). The limited instances where implied consent has been invoked concerned research conducted by regional organizations or mutually agreed arrangements among countries, such as appears to be the case with respect to EU member States (Long, 2012) and to member States of SPC (Coelho, forthcoming, 23).

An intriguing development in the practices of SIDS involves the introduction of new requirements in the information necessary to support clearance requests and the obligations to be observed during and after research cruises (see Coelho, 2024, Table 3, p. 18; Coelho, forthcoming, Table 5, pp. 25–30). Influenced by developments in other areas of international law, many SIDS now request information related to potential harm to the marine environment resulting from research activities and require the submission of Environmental Impact Assessments (EIAs) or risk assessments. Similarly, SIDS have increasingly requested the application of the precautionary approach and the utilization of the best available scientific information. Another addition pertains to information about

whether the research will involve collecting samples from areas subject to special management arrangements or protected species, where there has been acceptance that specific requirements may be imposed (DOALOS, 2010). Furthermore, in response to awareness regarding the significance of traditional and Indigenous knowledge, SIDS have been seeking information about the use and potential consequences of MSR activities on such knowledge. Less frequent, requirements encompass commitments to technology transfer, obtaining work permits, and notifying the national coast guard about the initiation and completion of research activities. Respondents to QB stated that additional information requested encompasses evidence of sharing reports from previous research projects within a specific EEZ and disclosing information about new technologies employed and personnel on board, including the submission of photographs.

Although not mandated by Article 249, the findings demonstrate that SIDS have consistently sought prior commitments to participate in research endeavors as a condition for granting consent (see Coelho, 2024, Table 3, p. 18; Coelho, forthcoming, Table 5, pp. 25–30). This practice may potentially reinforce the argument that such an obligation has crystallized into customary international law (Gorina-Ysern, 2003, pp. 334–335). Moreover, specific SIDS impose requirements for ensuring data, information, and sample sharing, alongside collaborative assessment, as prerequisites for granting consent. Interestingly, even if one were to contend that these requirements may not have reached the status of CIL, they have encountered minimal opposition from researching States. These States have reported that the creation of MSR projects and promoting the participation of local scientists, sometimes facilitated through memoranda of understanding, are widespread practices. Intriguingly, certain SIDS have even sought collaboration from research institutes during the cruise phase to monitor and report on suspicious vessels observed in the vicinity (Coelho, forthcoming, p. 35).

While SIDS' practice has not provided substantive clarification on interpreting "direct significance" and "normal circumstances," it offers compelling evidence on the introduction of new grounds for denying consent. These include the absence of participation opportunities for SIDS and potential adverse impacts on existing management and conservation measures (Coelho, forthcoming, p. 22). The general acceptance of additional consent denial requirements specific to certain islands (e.g., contravening national law or international commitments) remains inconclusive. Interestingly, in line with Gorina-Ysern's proposal of a general negotiation obligation under Article 250 (2006, p. 244), SIDS increasingly incorporate expansive clauses authorizing the consent evaluating body to impose additional conditions on any MSR project, not just those of direct economic significance.

Paper IV bolsters this discussion by identifying instances where States, including SIDS, have exhibited flexibility in adapting the consent regime requirements to

accommodate the specific operational aspects of emerging MSR technologies and activities of unresolved classification. It analyzes two concrete cases: the agreement negotiated for deploying Argo profiling floats in the high seas and the Project Containerised Autonomous Marine Environmental Laboratory (CAMEL) implemented under the Commonwealth Marine Economies Programme (CMEP) to aid Commonwealth SIDS in capacity-building and technology development (see Coelho & Rogers, 2023, pp. 10–11). Paper IV concludes that the State practice has been deferential to the LOSC framework governing MSR in AWNJ, even when it may need to be reinterpreted to incorporate the operational aspects of new technologies or circumstances involving certain activities.

In an effort to streamline the consent procedure while enhancing opportunities for capacity-building for SIDS, Papers II, III, and IV offer a set of recommendations. These proposals include enhancements to domestic regulatory frameworks governing MSR, measures to foster trust and mutual benefits among the involved States, and the exploration of assistance opportunities from regional organizations, as outlined in Article 247.

In sum, SIDS and researching States have been acquiescent with the framework governing the consent regime for MSR. SIDS have implemented their jurisdiction over MSR in an extensive way, encompassing a wide range of activities. However, among the specific activities researched, only ocean observation is generally considered subject to the consent requirement. Both the SIDS and researching States have largely cooperated through the consent regime to advance MSR. Interestingly, SIDS have interpreted the precruise and postconsent lists as nonexhaustive, incorporating new requirements stemming from developments in environmental, biodiversity, and climate regimes, as well as adjustments related to emerging technologies. Notably, these legal innovations and expansive interpretations of MSR appear to have faced minimal opposition from researching States. Given these findings, it is pertinent to explore the tools and techniques employed to lawfully evolve the consent regime for MSR over time.

5.3. What Were the Tools and Techniques Used by SIDS to Adapt the Consent Regime for MSR under the LOSC to Changing Circumstances between 2005 and 2020?

Building upon the findings related to the consent regime's objective, purpose, and SIDS' practices, this section examines the mechanisms utilized to enhance the flexibility of the consent regime for MSR in adapting to changing circumstances. This theme was explored in all five papers at the core of this dissertation. It is

important to acknowledge that this inquiry did not intend to explore exhaustively all potential mechanisms for evolving the LOSC. The analysis was limited to the use of generic terms, conduciveness, regionalism, informal law-making processes, regime interaction, and ocean science diplomacy. Furthermore, the study assumes an exploratory approach, meaning that an adaptation or modification to a provision may draw upon multiple tools and techniques.

Scientific and technological advancements have served as significant catalysts prompting the convening of UNCLOS III, with negotiators recognizing their potential impact on the delicate balance achieved within the Convention (Esmeir, 2017; Nandam & Dalaker, 2020; Scheiber, 2013). Recently, a growing body of scholarly work examines whether the LOSC remains effective in regulating the contemporary MSR projects proposing internal and external mechanisms to address potential gaps (Bork et al., 2008; Hofmann & Proelss, 2015; Klein et al., 2020; Veal et al., 2019). However, these discussions have not yet delved into the compatibility between the consent regime and emerging technologies, nor have they addressed the distributional dimension inherent in this. In this sense, considering that the production and access to scientific knowledge and technology have been central aspects of colonization and present-day inequalities (Adas, 1997; Barry, 2013; Endres, 2009), evaluating the adequacy of the consent regime in regulating the deployment and retrieval of new technologies also allows for an examination of whether SIDS have benefited from the use of such technologies.

The connections between MSR and the protection and preservation of the marine environment are evident in the negotiation history, the text of the Convention, and existing scholarship (Hubert, 2011, 2018; Tanaka, 2005). However, the extent and manner in which Part XIII has responded to contemporary developments in other areas of international law through State practice remains underexplored. On the one hand, MSR activities form the basis for producing EIA and designing management measures. Scientific data also play a fundamental role in the ecosystem approach, the prevention principle, and the precautionary approach (Tanaka, 2005). Furthermore, developments in environmental, biodiversity, and climate frameworks have been accompanied by a growing awareness of the need to preserve traditional and Indigenous knowledge and address inequalities. On the other hand, there is an increasingly acknowledged potential for adverse environmental impacts resulting from MSR (Hubert, 2011, 2018). Therefore, examining the changes introduced by the practice of SIDS was followed by identifying the mechanisms used to promote the evolution of the consent regime for foreign-MSR.

5.3.1. The Use of Generic Terms and Resort to General International Law

Tools enabling the framework's adjustment to the passage of time encompass the use of general terms open for evolutionary interpretation, as well as concepts and obligations referring to the balance of rights. As noted by Yu (2022a, pp. 37–39), the generic nature of the term “MSR” allows it to encompass activities that did not exist during UNCLOS III or have changed scope with the introduction of innovative technologies (Chircop, 2007). In this sense, SIDS's expansive interpretation of MSR discussed in Papers I, II and III find support in the generic nature of the term (see Coelho, 2022, pp. 15–16; Coelho, 2024, p. 13; Coelho, forthcoming, pp. 17–18). Also, this consideration enabled the use of Part XIII as a reference for regulating other activities such as Argo Profiling Floats, as explored in Paper IV (see Coelho & Rogers, 2023, p. 10). Another example of open terms that allow one to accommodate to changing circumstances includes expressions like “normal circumstances” and “direct significance,” although the subsequent practice of SIDS did not prove relevant to elucidate novel interpretations of these terms.

Gorina-Ysern makes two noteworthy contributions regarding the evolution of the MSR consent regime based on its envisioned balance. First, she argues that the obligation to engage the coastal State in the research project has achieved customary international law status (Gorina-Ysern, 2003). Second, she proposes that a combined interpretation of Articles 246 (5) and 249 (2) reveals a general obligation to negotiate consent in cases of research with direct economic significance (Gorina-Ysern, 2006). The information on subsequent state practice of SIDS reported in Papers II and III demonstrates that promoting the participation of local scientists in MSR activities constitutes a legal requirement enshrined in many SIDS' domestic legislation. These papers further reveal instances where facilitating SIDS scientist participation demonstrably aided in obtaining consent, suggesting the emergence of a generally accepted obligation binding researching States (see Coelho, 2024, p. 22; Coelho, forthcoming, p. 20). This finding lends support to the notion that such an obligation has indeed attained customary status. Furthermore, the evidence also reveals instances of negotiation between researching states and SIDS concerning the requirements under Articles 248 and 249, extending beyond situations where the research has direct economic significance. These negotiations have resulted in either increased flexibility (e.g., accepting consent requests outside the six-month legal time frame) or the inclusion of ad hoc requirements (e.g., negotiating property rights implications through bilateral agreements or including cooperation to monitor and report suspicious vessel activity in adjacent waters).

The new obligations introduced by SIDS regarding the protection and preservation of the marine environment within the precruise and postconsent obligations find support in a confluence of legal sources (for a list of the new requirements, see

Coelho, 2024, Table 3, p. 18; Coelho, forthcoming, Table 5, pp. 25–30). These include an interpretation of Article 240 (d) of the LOSC, relevant international jurisprudence,¹⁵ and legal scholarship (Hubert, 2011). An alternative perspective on these additions, given the absence of substantial opposition from researching States, is that this subsequent State practice signifies an agreement between the parties regarding the treaty's interpretation, in accordance with Article 31 (3)(b), VCLT. Or else, it could be considered a supplementary mean of interpretation as per Article 32 of the VCLT. In either case, the state practice of SIDS has broadened the scope of these obligations, shifting the interpretation of the lists under Articles 248 and 249 from being exhaustive to indicative.

5.3.2. Conduciveness and Regionalism

Conduciveness and regionalism offer alternative modalities for adapting the provisions of Part XIII beyond the “more law approach” (R. McLaughlin, 2020). Conduciveness refers to the adaptability of the LOSC through “contextualization, interpretation and implementation” at the domestic level (R. McLaughlin, 2020). In this sense, the analyses in Papers II and III revealed that concerns about impacts of MSR to the marine environment and equitable distribution of scientific capabilities were not only integrated in the legal framework through interpretation or establishment of agreements, they have been incorporated into the domestic laws of SIDS through the implementation of additional requirements (for a list of the new requirements, see Coelho, 2024, Table 3, p. 18; Coelho, forthcoming, Table 5, pp. 25–30). These include the application of the precautionary approach, the use of the best scientific information, and the conduct of EIA (e.g., Cook Islands, Jamaica, Kiribati, Mauritius, Tonga, Tuvalu, and Vanuatu). Such laws also demand an assessment of the impact of MSR projects on traditional and Indigenous knowledge, which are integral aspects of SIDS' cultural and societal context (e.g., Bahamas, Kiribati, St. Lucia, Timor-Leste, Tuvalu). Additionally, several laws require commitment to include local scientists, to share data, information, samples and transfer technology, to receive economic benefits in case of commercial applications from the research (e.g., Bahamas, Barbados, Belize, Cabo Verde, Cook Islands, Cuba, Dominican Republic, Guyana, Jamaica, Kiribati, Mauritius, Micronesia, Nauru, PNG, Samoa, Seychelles, Solomon Islands, St. Kitts and Nevis, Tonga, Tuvalu, Vanuatu).

¹⁵ For instance: *Gabcíkovo–Nagymaros Project Case* [Hungary v. Slovakia] 1997 ICJ Rep. 68, *Pulp Mills on the River Uruguay Case* [Argentina v. Uruguay] 2006 ICJ Rep. 156; 2007 ICJ Rep. 113, *Certain Activities carried out by Nicaragua in the Border Area* [Costa Rica v. Nicaragua] 2013 ICJ Rep. 490, and *Responsibilities and obligations of States with respect to activities in the Area*, Advisory Opinion, February 1, 2011, ITLOS Reports 2011, p. 10.

The concept of regionalism within the law of the sea encompasses two primary dimensions: geographically defined marine environments and institutionalized regional arrangements involving projects or mandates on MSR (Betsill, 2007; Giannopoulos, 2021). The first perspective emphasizes coordination among states bordering semi-closed seas, such as the Caribbean Sea, as mandated by Article 123 of the LOSC. This obligation compels such states to coordinate scientific research policies and undertake joint research programs. The second perspective focuses on the agency of regional and subregional organizations to catalyze policy and legal developments, promote knowledge exchange and concerned action. In this aspect, Paper I develops a chronology of SIDS participation in international ocean governance forums and negotiations, highlighting the significance of their actions through regional arrangements (Coelho, 2022, pp. 10–13). Paper II investigates the role of regionalism in the Caribbean, where organizations like the Organisation of Eastern Caribbean States (OECS) play a crucial role in developing policy and legal frameworks for MSR, facilitating knowledge exchange (see Coelho, 2024, p. 15). Paper III expands this analysis by exploring the role of regional organizations in the Pacific (Pacific Community [SPC], Pacific Regional Environment Programme [SPREP] and Pacific Islands Forum Secretariat [PIF]) and across regions (e.g., UNEP Regional Seas and the Alliance of Small Island Developing States [AOSIS]) in standardizing laws, and research efforts (Coelho, forthcoming, pp. 15–16). Finally, Paper IV discusses the CAMEL project, developed under the Commonwealth Secretariat's Blue Charter for a group of SIDS, which promotes training, capacity-building, and technology development regarding MAS (Coelho & Rogers, 2023, pp. 10–11). Consequently, drawing inspiration from the proposals set forth by Long (2012) for the European Union and Oral (2014) for the Black and Mediterranean Seas, it is suggested that there is a compelling case for regional organizations to assume more prominent roles in these regions regarding the evolution of the consent regime for MSR. Recommendations for consideration by regional organizations include:

The establishment of harmonized guidance and practices, serving as clearinghouse mechanisms that connect experts seeking opportunities on research vessels with available positions, and providing infrastructure for the storage and sharing of information and data related to non-resource-related MSR. Additionally, these organizations could consider enhancing governance for MSR on a regional basis, which may include the development of a unified consent application process for research projects covering regional seas or expanding the scope for conducting MSR through implied consent (Coelho, forthcoming, p. 35).

5.3.3. Informal Law-Making Processes

There is an increasing interest in understanding the influence of informal law-making processes in the development of international law (Klein, 2022). Regarding the consent regime for MSR, international organizations, such as IOC-UNESCO and DOALOS, alongside research societies and research vessel operators have played a significant role in the evolution of the consent regime to accommodate changing circumstances (Hubert, 2018; Kojima, 2022).

The DOALOS Guide on the implementation of Part XIII and XIV is a relevant example of informal law-making concerning the consent regime. As discussed in Paper II, the only existing guidance on the meaning of “normal circumstance” and “direct significance for the exploration and exploitation of natural resources” come from this guide (see Coelho, 2024, p. 15). As discussed in Paper IV, the guide

underscores the significance of direct communication between scientists from participating countries and advocates for meaningful involvement of the coastal State as mechanisms to expedite the consent process, foster a climate of trust and collaboration, and address potential legal gaps. Moreover, the guide reinforces the value of risk assessments and EIAs (Coelho & Rogers, 2023, p. 9). Furthermore, the guide offers a template form for requesting consent, which incorporates inquiries on new technologies.

Paper IV discusses additional instances of informal law-making processes. One noteworthy example concerns the IOC Guideline governing the deployment of profiling floats in the high seas that could potentially drift into waters under coastal State jurisdiction. This Guideline, inspired by the MSR consent regime, establishes two key stipulations: the potentially affected coastal State must be notified, and the coastal State has the right to retain release of data with economic significance if collected within its EEZ (Coelho & Rogers, 2023, p. 10). Guidelines by international organizations have a degree of relevance and influence due to their acceptance by a group of States members of a particular organization.

The paper further explores innovations for the protection of the marine environment introduced through codes of conduct by private and scientific associations, including the InterRidge code for responsible research at deep-sea hydrothermal vents (2006) and the International Ship Operators Meeting's code for MSR vessels (Breslin et al., 2007). Here, at a first glimpse, the influence of such instruments is circumscribed to a cluster of individuals or a sector. Nonetheless, the relevance of such documents expands if one considers the influence of deep-sea scientists and research vessel operators on national policies on MSR. Finally, Paper IV examines internal guidelines developed by researching States (e.g., NOC, 2019; SUT, 2009; UNLOS, 2021) that educate scientific institutions about the consent regime (Coelho & Rogers, 2023, p. 10). Similarly, these documents do not hold legal authority and

would only be applicable at the domestic level, but they are significant in creating good common ethical standards between scientific institutions.

5.3.4. Regime Interaction

The concept of regime interaction offers a valuable lens for analyzing the evolution of LOSC in light of changing circumstances (Coelho, 2016; Trevisanut et al., 2020). Drawing inspiration from Young (2011, p. 19), regimes are a “set of laws, processes and institutions that have evolved by addressing a particular problem or function.” Hence, regimes are considered to be interacting when the laws, processes, and institutions of one regime influence or are influenced by another. For the purposes of this discussion, which focuses on identifying potential tools for legitimizing the modifications to the MSR consent regime observed in SIDS' subsequent practice, a deeper exploration of the theoretical framework of regime interaction falls outside the present scope.¹⁶

Without exploring in detail this framework, it is important to highlight that international lawyers have explored regime interaction from various perspectives. A long-standing and prominent avenue for exploration has been in international litigation (Dunoff, 2012, p. 141). Particularly relevant to this research are studies examining the interplay between binding and nonbinding, as well as “hard” and “soft” law instruments, across regimes (Trevisanut et al., 2020). Also pertinent, scholars have turned their attention to the role of international organizations, the Conferences of the Parties to an agreement, and treaties’ secretariats in fostering interaction between regimes (Young, 2011; Trevisanut et al., 2020). This research further follows the insights offered by Dunoff (2012, pp. 158–166) regarding the interaction that occurs through rule and standard creation by administrative bodies interpreting international agreements, as well as by public officials charged with implementing international instruments in regional and domestic settings.

The reduced opposition from researching States concerning the incorporation of principles and considerations of international biodiversity and environmental law—including the precautionary principle, EIA, and traditional knowledge considerations—into the MSR consent regime presents a compelling case study for analyzing regime interaction. One potential avenue for analysis focuses on the influence of norms and principles from the law of the sea and other areas of international law. In this context, the requirement for researching States to submit a risk assessment or EIA during the precruise phase of the consent process appears less influenced by the obligation upon coastal States under Article 206 of the LOSC

¹⁶ For a theoretical foundation in regime interaction in international law and its in-depth analysis of cases, see Young, 2011; Young, 2012; Trevisanut et al., 2020.

and more by informal law-making processes, such as the InterRidge code of conduct or academic publications like Hubert (2011) (see Coelho & Rogers, 2023, p. 10). Similarly, even before ITLOS affirmed the trend of the precautionary approach toward customary international law, SIDS and researching States seem to have been agreeing that MSR in AWNJ should be guided by prudence and caution. Further supporting this point, Tables 3 and 5 of Papers II and III, respectively, demonstrate that the implementing legislation of many SIDS requires researching States to specify "other benefits" from the research that will accrue to the coastal state. This requirement directly reflects the influence of biodiversity law on the consent regime for MSR.

A second angle of regime interaction is through formal and informal institutional arrangements that create rules and standards. In this perspective, Papers II and IV explore how the ABE-LOS and the DOALOS Guide for the implementation of Part XIII and XIV contribute to this process (see Coelho, 2024, pp. 15–17; Coelho & Rogers, 2023, pp. 9–10). These entities systematize state practice, recommend best practices and interpretations, and develop standards for these parts of the LOSC. Significantly, from a regime interaction perspective, the 2010 DOALOS Guide incorporates the precautionary approach, the obligation to submit EIAs, and considerations of traditional knowledge, and highlights the relevance of promoting coastal State participation. The Guide also offers a consent request form template that anticipates the use of new technologies in MSR activities. Similarly, ABE-LOS developed a guide for implementing Article 247, facilitating interaction between the law of the sea regime and institutions from other regimes involved in research, such as FAO, which also play a role by facilitating discussions on the regulation of emerging technologies, like Argo floats.

This lens also allows us to observe the influence of informal arrangements and regional organizations on the evolution of the MSR consent regime and its interaction with other legal frameworks. Responses of QB used in Paper III were facilitated by informal groups representing researching States, such as the International Research Ship Operators (IRSO) and the Pink Flamingo Society. Discussions within these groups led to streamlined interpretations, procedures, and ultimately triggered the development of guides and standardized consent templates by scientific institutions, which consider principles of environmental law and data management (e.g., NOAA, NOC, GEOMAR, and IFREMER) (see Coelho, forthcoming, p. 19). Papers II and III further delve into the role of regional organizations, particularly in the Caribbean and Pacific regions, in developing standardized practices and rules relevant to the MSR consent regime. These regional efforts integrate developments in other areas of international law, fostering an evolution of the legal framework for MSR activities in light of changing circumstances (see Coelho, 2024, p. 15; Coelho, forthcoming, pp. 15–16).

The evidence from this research suggests a third avenue for analyzing regime interaction: the implementation of international law by government officials and institutions from SIDS. This finding is particularly relevant for SIDS, where limited human resources often compel officials to work across multiple legal regimes. Papers II and III analyze and discuss responses to QAs and QBs that reveal instances where officials from SIDS and researching states negotiated capacity-building and supportive measures beyond those explicitly enshrined in Article 249 of the LOSC (see Coelho, forthcoming, p. 20). This practice highlights the potential for SIDS officials to leverage international law principles from various regimes to secure additional benefits for their countries.

5.3.5. Ocean Science Diplomacy

Ocean science diplomacy is the last tool explored in this research through which the consent regime for MSR has been evolving in light of changing circumstances. According to Paper V, science diplomacy is “a practice by which international relations support and are supported by scientific research, evidencing sometimes conflicting national, regional, and global interests.” Hence, ocean science diplomacy refers to the interplay between marine sciences and practices of international relations.

Paper V explored the potential of ocean science diplomacy, a nonlegal tool, to address barriers faced by Latin American and Caribbean countries in promoting MSR projects and accessing marine technology. Through two compelling case studies, the paper explores how ocean science diplomacy can potentially enhance the benefits derived from the MSR consent regime beyond the measures explicitly mandated by Article 249 and Part XIV. This approach can help developing countries, including Caribbean SIDS, overcome day-to-day challenges in developing autonomous scientific research and infrastructure, such as limited ship time and the volatility of exchange rates (Polejack & Coelho, 2021, p. 3).

The first case study examines direct cooperation between researchers from Germany and Cape Verde, which culminated in a bilateral agreement on ocean research. This agreement facilitated MSR consent for the German scientists and paved the way for the establishment of the Ocean Science Center Mindelo in Cabo Verde (Polejack & Coelho, 2021, p. 8). The second case study investigates the informal partnership between scientists from NOAA, the University of São Paulo, and the private sector in Brazil, which led to the in-house development of a more cost-effective Atlas-B buoy technology (Polejack & Coelho, 2021, p. 8).

All-in-all, SIDS have utilized various tools and techniques to adapt the provisions governing the consent regime for MSR to changing circumstances; each met with differing levels of acceptance within the legal tradition. At one end of the spectrum,

changes grounded in the evolutionary interpretation of terms, conduciveness, or regionalism generally receive widespread support. On the opposite end, modifications introduced through informal law-making processes, including those produced by private entities and policy initiatives within the realm of ocean science diplomacy are likely to be regarded cautiously. Irrespective of the employment of these techniques, the persisting limitations on the participation of SIDS in MSR activities and their scientific and technological capacities emphasize the imperative of considering more general principles to maintain the compromise originally sought with the consent regime for MSR.

5.4. What Principles and Concepts Can Maintain the Balance Sought in the Consent Regime for MSR under the LOSC in Light of Changing Circumstances?

Papers I through V assert that fostering opportunities for capacity-building and technology transfer is within the original and contemporary intentions of SIDS with the consent regime for MSR under the LOSC. Based on that, Papers II through V provide recommendations to promote mutual benefits for coastal and researching States while streamlining the consent regime procedure. However, the effectiveness of these recommendations may be constrained in time and scope without a fundamental shift in the perspective on the consent regime. In this sense, a nuanced analysis regarding the common tenets within the subsequent practice of SIDS on the consent regime supports proposing that “cooperation” and “reasonableness” are fundamental ideas with the potential to promote balance envisioned within the MSR consent regime under the LOSC in light of the passage of time.¹⁷

A general duty to cooperate for the preservation of peace, justice, and progress for all peoples permeates the logic of the Convention, as articulated in its preamble. Cooperation is a pervasive theme interwoven throughout the instrument, manifesting distinctively in each of its constituent parts. Explicit reference to cooperation in MSR is discernible in Section 2 of Part XIII (Articles 242–244), although a positive obligation to cooperate is discernible within the entirety of the regime governing MSR (Yankov, 1983), including the consent regime, and provisions outside of Part XIII like Articles 123, 143, 197, 200–203, Part XIV, and

¹⁷ It is beyond the scope of this dissertation to determine whether reasonableness has crystallized as a principle under public international law; hence, it is referred to as a “concept” or “notion” (see Ryngaert, 2008) (see PCA Case N° 2014-07. In the Matter of the Duzgit Integrity Arbitration, *Malta vs. São Tomé*, para. 209; Arctic Sunrise Arbitration [*Netherlands v. Russia*], Award on the Merits of August 14, 2015, PCA, para. 222).

Annex VI of the Final Act of UNCLOS III. However, the content of such an obligation requires specification, and it is usually difficult to prove noncompliance (Tanaka, 2005).

An initial observation of the duty to cooperate in MSR reveals that it involves observance of the principles of sovereignty and jurisdiction; the mutual benefit of the States and International Organizations involved; and a commitment to peaceful purposes, as expounded in Section 2 of Part XIII. A detailed analysis indicates that such a duty entails the implementation of a series of actions across three dimensions, including (i) participation in research projects aimed at promoting training and capacity-building; (ii) exchange of data, information, and knowledge; and (iii) a distributive perspective aimed at mutual benefit for the participating States, with the special aim of strengthening the autonomous MSR capabilities of developing States (Tanaka, 2005).

The three dimensions mentioned are evident in Section 2 of Part XIII, requiring States to collaborate globally, regionally, and bilaterally to promote MSR projects and integrate the efforts of scientists; disseminate information produced in MSR projects crucial for preventing and controlling damage to health, safety, and the marine environment (Papanicolopulu, 2017); and strengthen the autonomous research capabilities of developing States (Article 244 [2]). On a similar note, the duty to cooperate for States bordering enclosed or semi-closed seas mandates the exchange of scientific information and necessitates joint research endeavors (Article 123) (see Oral, 2014). In the Area, the duty to cooperate in MSR encompasses fostering participation in the execution of research and sharing the outcomes and analyses of research projects, underscored by an overarching commitment to peaceful purposes and to benefiting humankind. In addition, States parties bear an obligation to cooperate to ensure that programs devised by the Authority and other international organizations enhance the research capabilities of developing States (Article 143) (Tanaka, 2005). The duty to cooperate to prevent, reduce, and control pollution in the marine environment involves providing opportunities for participation in MSR; exchanging information and data acquired; and establishing joint scientific criteria, standards, and recommended practices. It also includes providing capacity-building opportunities, equipment, and facilities to developing States and granting them preferential access to funds, technical assistance, and specialized services from international organizations on topics related to the prevention, reduction, control, and mitigation of marine pollution (Articles 200–203). Arising from the language employed in Part XIV of the Convention, the duty to cooperate serves as the principal legal mechanism, not only to facilitate the transfer of marine technology and provide access to international funding for developing States but also to promote the development of MSR (Articles 266, 270, 272, 273, and 278). Furthermore, considering that technology transfer encompasses training, capacity-building, and the sharing of data, information, knowledge, and

research infrastructure (Harden-Davies & Snelgrove, 2020; also see the definition of "marine technology" adopted in the BBNJ agreement), the obligation to cooperate in MSR is intricately intertwined with the implementation of Part XIV.

Another significant aspect of the duty to cooperate in MSR is its nonconfinement to the zonal approach, being applicable alongside the consent regime in AWNJ and calling for more thoughtful compliance. The coastal State's consent for foreign MSR, viewed through this prism, serves not only to attest to the bona fides of the MSR activity but also to establish trust between the involved States, fostering cooperation (Wegelein, 2005, p. 358). The three dimensions of collaboration in MSR can be observed in Articles 248 and 249, which outline obligations aimed at promoting capacity-building and the exchange of data, information, and knowledge, ultimately benefiting the participating States while respecting the principles of sovereignty, jurisdiction, and the peaceful purpose of the activity. From a perspective of cooperation, the participation of coastal States must be meaningful, when possible, involving the engagement of local scientists and institutions in research planning from the early stages and considering the priority needs and specific circumstances of SIDS (Harden-Davies & Snelgrove, 2020). Additionally, it has been suggested that the data, information, and knowledge exchanged must be reliable (Tanaka, 2005) and useful for coastal States, utilizing the "FAIR" principles for data governance—findable, accessible, interoperable, reusable (Harden-Davies & Snelgrove, 2020). Significantly, this suggestion aligns with a comment made by a stakeholder from SIDS during an informal conversation, highlighting the existence of several boxes stored in the office containing scientific data, shared in the context of past foreign MSR initiatives, which remain unused due to a lack of infrastructure and personnel for processing (see Coelho, forthcoming, pp. 23–24).

Recognizing that the duty to cooperate underlies the consent regime supports the perspective that the lists in Articles 248 and 249 are not exhaustive, allowing for flexibility in line with the development of international law, research, and the specific circumstances of the States involved. The integration of new requirements in the consent procedure to promote the conservation and sustainable use of the marine environment and biodiversity—like the submission of an EIA, not allowing research in certain places or periods, and information regarding the use of and impact in traditional knowledge—has gained endorsement from scholars, international organizations, and State practice, including of SIDS as discussed in Paper II and III (DOALOS, 2010; Tanaka, 2005; Verlaan, 2007; Wegelein, 2005). Moreover, the 2010 DOALOS Guide for the implementation of Part XIII has also incorporated additional information for the precruise phase, considering technical aspects of new technologies used in MSR not covered by Article 248 (see Coelho & Rogers, 2023; DOALOS, 2010).

Conversely, legal scholarship has dedicated less attention to the prospect of introducing novel measures during the preconsent and postconsent phases aimed at enhancing the mutual benefit of States, especially the research capability of developing States and SIDS. An analysis of State practices reveals instances where cooperation between SIDS and researching States has occurred through the consent regime, even introducing measures beyond those explicitly enumerated in Article 249 to promote training and capacity-building. For example, the implementing legislation and guidelines for the consent regime in several SIDS now require the researching State to specify the benefits such research will bring to the coastal State (see Coelho, 2024, Table 3, p. 18; Coelho, forthcoming, Table 5, pp. 25–30). Additionally, a response from QB reported a situation where the coastal State sought assistance from the researching State to inspect a suspicious vessel in its waters (see Coelho, forthcoming, p. 35). Other innovative practices, such as requests for reasonable fees and information regarding the benefits of the MSR project for the coastal State, have encountered no apparent opposition from researching States, thus expanding upon the measures envisioned under Article 249 (see Coelho, 2024, Table 3, p. 18; Coelho, forthcoming, Table 5, pp. 25–30). While these examples are limited by the number of states analyzed and do not represent widespread practice even among SIDS, they suggest that the lists in Articles 248 and 249 serve as a baseline for the information and measures required to demonstrate the bona fide nature of the research activity and the mutual benefits for the states involved. Consequently, these lists should not be interpreted as exhaustive.

Interpreting the framework governing the consent regime through the lens of cooperation supports the notion that special arrangements for foreign MSR consent can be negotiated, streamlining the procedure to obtain consent and concurrently agreeing on measures to enhance the research capabilities of SIDS. Such tailored arrangements can hold particular significance for SIDS that face constraints in processing requests in a timely manner, monitoring compliance, and exercising the right to conduct MSR (IOC-UNESCO, 2020; IOC-UNESCO et al., 2017). In this sense, Article 255, mandating coastal States to endeavor to adopt rules and procedure facilitating MSR, provides a legal basis for establishing simplified consent procedures bilaterally, regionally, or through competent international organizations (Huh & Nishimoto, 2017c). Article 247 establishes a special procedure for authorization in the case of MSR conducted under the auspices of international organizations, where the coastal State cooperates through membership or bilateral agreements. Examining the practices of SIDS from this perspective, Gorina-Ysern (2003, pp. 40–41) revealed a special arrangement between the US and Caribbean SIDS, where pending consent for research from one State did not impede a research cruise involving multiple jurisdictions from taking place; however, the findings of this dissertation suggest that such a collaborative approach may no longer be in effect (see Coelho, 2024). Conversely, the findings provide examples

in which SIDS granted requests for foreign MSR submitted outside the six months prior rule, attesting to a cooperative instance (Coelho, forthcoming). The research results also suggest that regional and subregional organizations have been streamlining MSR frameworks within SIDS. For instance, they indicated OECS efforts to establish a common MSR policy among its Member States (see Coelho, 2024). In the context of Pacific SIDS, Gorina-Ysern (2003, p. 604) and Wegelein (2005, p. 359) mentioned the work of the South Pacific Applied Geosciences Commission (SOPAC) in standardizing the consent procedure within the region. After SOPAC became part of the SPC, the latter assumed such a mandate, obtaining approval from Member States to conduct MSR under implied consent, as reported by a respondent to QA (Coelho, forthcoming).

Besides a level of cooperation, the State practice of SIDS also reveals that a level of reasonableness has implicitly guided the implementation of the consent regime for MSR, in particular in the EEZ and continental shelf. This suggests that a more deliberate consideration of reasonableness has the potential to promote the balance envisioned by States in the past and in contemporary times. Reasonableness is a nonlegal concept that has been used in international law as a constraint to arbitrariness in the exercise of coastal State jurisdiction (Goodman, 2021, p. 345), a method for interest-balancing (Ryngaert, 2008) (Monte Confurco [*Seychelles v. France*], Prompt Release, Judgment, ITLOS Reports 2000, p. 86, para. 71 and 72), and a nonlegal resort to introduce flexibility in legal texts, accommodating changing circumstances (Corten, 1999).

The notion of “reasonable” is expressed in several provisions of the Convention, typically in reference to the principle of proportionality and moral concepts with legal significance such as equity and good faith (Article 300), establishing the threshold for subjective assessment about the lawfulness of a State’s action in a particular case. For instance, under Articles 73 (2) and 292 (1), the payment of a “reasonable bond” is the criterion to assess whether a detained vessel should be promptly released. The right to visit a foreign vessel in the high seas hinges on the existence of “reasonable ground” (Article 110), which also serves as the standard for the coastal State’s duty to conduct EIA for planned activities in AWNJ (Article 206). In Part XIII, reasonableness determines whether a State has fulfilled its obligation to provide information to prevent and control damage to the health and safety of individuals and the marine environment (Article 242). Also, the threshold to identify whether a coastal State may exercise the right to withhold consent for MSR of economic significance in the extended continental shelf is based on a reasonableness test (246 [6]). Similarly, the right to request the cessation of a suspended MSR activity follows an examination of the quantity of time considered reasonable to rectify the activity (Article 253 [3]). Furthermore, reasonableness qualifies whether the rules, regulations, and procedures adopted by a coastal State are fit for the obligation to promote and facilitate MSR (Article 255).

In addition to explicit references, the notion of reasonableness is implicitly considered in provisions reconciling the interests of States. In this sense, it is inherent to obligations of “due regard” (Goodman, 2021, p. 348) and not “unjustifiable interference,” guiding the exercise of sovereign rights, jurisdiction, and freedoms in the EEZ and on the continental shelf (Articles 56 [2], 58 [3], and 78 [2]) (see The Duzgit Integrity Arbitration [*Malta v. São Tomé and Príncipe*] 2016, Partial Award, PCA Case No. 2014-07, ICGJ 510; Arctic Sunrise Arbitration [*Netherlands v. Russia*] 2015, Award on the Merits PCA Case No. 2014-02, ICGJ 511, para. 222). Consequently, in the exercise of jurisdiction over MSR in AWNJ, coastal States must be guided by the concept of reasonableness, including when interpreting the terms “normal circumstances” and “direct significance for exploration and exploitation” of resources, designing rules and procedures to ensure that consent is not unreasonably delayed or denied, and identifying the requirements to be complied with before and after consent is granted. Conversely, researching States must also be guided by the reasonable concept, including when sharing information with the coastal State about the activity, assessing the potential economic significance of the research, and providing opportunities for the coastal State's participation in the research project.

In the absence of a legal method for applying the notion of reasonableness, it has been suggested that the interpretation of legal provisions or frameworks should be guided by their object and purpose (Volga [*Russian Federation v. Australia*], Prompt Release, Judgment, ITLOS Reports 2002, p. 10, para. 77). Building upon the response to the first research question, the provisions of the consent regime for MSR should be interpreted to ensure coastal States of the *bona fides* of the research; facilitate MSR; protect and preserve the marine environment; and support the scientific capability of coastal States, particularly developing States. In view of that, the coastal State's right to introduce new measures within the list under Articles 248 and 249 is not absolute but should be guided by the notion of reasonableness, therefore not making impractical the conduct of research.¹⁸ Similarly, guided by the idea of reasonableness, it would be unreasonable for researching States to preclude opportunities for coastal State engagement in the research activity where participation in the research platform is impracticable.

The State practice of SIDS demonstrates instances in which their legislative and administrative actions in implementing the consent regime for MSR seem to be guided by the concept of reasonableness, as evidenced by the lack of opposition from researching States. Examples include the novel requirements regarding the

¹⁸ For instance, see the discussion in Paper II about the requirements for researching States imposed by the Bahamas under the new Biological Resources and Traditional Knowledge Act, which have been accused by the external and internal scientific community to have rendered it impractical to conduct collaborative MSR with foreign institutes therein.

submission of an EIA and risk assessment, information about the research's use of and implications for traditional and Indigenous knowledge, and details about new technologies employed (see Coelho, forthcoming, pp. 15–30). Similarly, respondents to QB attested to an increased collaborative and participatory approach when planning and undertaking MSR in SIDS waters, and no clear opposition was found against elaborating on the "benefits" of the MSR project to the coastal States. The example of requesting the researching State to monitor a suspicious vessel in vicinity waters exemplifies cases in which tailored measures can be agreed upon between coastal and researching States when deemed reasonable. Conversely, there were also examples of unreasonable requirements imposed by SIDS. For instance, despite the general acceptance by researching States to pay a fee to undertake research within SIDS' jurisdiction, the amount charged by the new law regulating the MSR permit in the Bahamas was considered contrary to the promotion of MSR, facing internal and external opposition (see Coelho, 2024, p. 16). Additionally, a respondent to QB in Paper III mentioned a case where granting MSR consent was conditioned on the recognition of sovereignty over a disputed territory, which was found to be a disproportional impediment to the conduct of MSR.

Supported by the concepts of cooperation and reasonableness, Papers II and III provide recommendations for both SIDS and researching States, aiming to facilitate the obtainment of consent while concurrently enhancing opportunities for autonomous scientific capability of SIDS (see Tables 9 and 10 above). Recommendations proposed for SIDS involve domestic legal reforms and the advancement of MSR governance. This entails standardizing procedures for granting consent, establishing designated points of contact to mitigate fragmentation, and identifying and sharing priority needs. Researching States are advised to consider the priority needs of SIDS in the research project; enhance meaningful engagement of scientists and representatives from these countries; and share detailed and accurate information to build trust and substantiate consent applications, maintain lists of delinquent vessels, and enhance their duty to cooperate.

The significance of regional and subregional organizations in supporting legal and policy development among Member States, promoting regional MSR projects, and addressing common challenges has been underscored throughout the papers and preceding sections. Notably, the OECS has played a substantial role in offering legal and policy support to its Member States (see Coelho, 2024). The UNEP Regional Seas Programs and SPC have contributed to training and capacity development for MSR (see Coelho & Tavonvunchai, 2022). Furthermore, the SPC has been granted authorization to undertake MSR based on implied consent in the Pacific. In light of these considerations, guided by the notions of cooperation and reasonableness, these organizations might consider bolstering efforts to offer legal and policy support concerning the consent regime, adopting regional guidelines on MSR consent,

establishing regional hubs for scientific data exchange, and forming a cadre of experts for collaborative MSR projects.

Recognizing that cooperation and reasonableness should form the foundation for interpreting the consent regime for MSR to uphold the envisioned balance in changing circumstances, the upcoming section provides some final remarks.

6. Concluding Remarks

As we navigate the complexities of contemporary society, it becomes increasingly evident that oversights and failures to realize the potential of the LOSC in the past have sown the seeds of the problems in the present. Forty years after the adoption of the LOSC, the Commission of Small Island States on Climate Change and International Law came before the International Tribunal for the Law of the Sea, arguing the following:

Although research into the precise modalities and effects of climate change on Small Island States remains limited due to lack of funding, the data that is available confirms they are facing existential threats. Sea-level rise and flooding damage communities, infrastructure, and scarce freshwater resources, and threaten to submerge low-lying islands such as Tuvalu, which has an average elevation of 2 meters. Tropical cyclones and other extreme weather events—such as Hurricane Irma on Antigua and Barbuda in 2017 or Severe Tropical Cyclone Ian on Tonga in 2014—can have similar effects, leading to water and food insecurity, as well as a decline in health outcomes. Small Island States often take years to recover from flooding by extreme weather events due in part to the high cost of debt financing for such projects.

Furthermore, ocean warming, stratification, and acidification destroy marine biodiversity and abundance around islands that depend on the sea for their lives and livelihoods; for example, over 70 percent of Niuean households eat fish caught in local waters every day. Ocean warming is bleaching Palau’s coral reefs, destroying those fragile ecosystems. Together, these effects also threaten natural and cultural heritage in and around Small Island States, including dozens of UNESCO World Heritage Sites and traditions of vulnerable populations.

(ITLOS, Request for an Advisory Opinion submitted by the Commission of Small Island States on Climate Change and International Law [Request for Advisory Opinion submitted to the Tribunal], Written Statement of the Commission of Small Island States on Climate Change and International Law, para 123–124).

While the triple planetary crisis is anticipated to affect the entire world, SIDS could have been more effectively equipped to confront the existential threats delineated before the Tribunal had the aspirations of developing autonomous MSR capabilities, as emphasized in Koh’s pronouncement cited in the introduction, been realized. Attentive to the transformative role of international law and the fitness for purpose of the Convention, this article-based thesis examined the State practice of SIDS on

the consent regime for MSR. It investigated the core elements of the balance envisioned within the consent regime for MSR under the LOSC; identified trends, best practices, and challenges emerging from the State practice of SIDS on the consent regime; examined the tools used by SIDS to future-proof the consent regime; and explored interpretative concepts that can achieve the balance envisioned by States with the consent regime of MSR in light of changing circumstances.

This study leverages TWAIL scholarship's approach of reinterpreting events through historical analysis, giving voice to subaltern groups. By unpacking the rationale behind the MSR consent regime negotiations during UNCLOS I and UNCLOS III, the research offers two key contributions for contemporary law of the sea scholars and practitioners. First, it highlights a key distinction between the consent regime under the 1982 LOSC and the 1958 Geneva Convention on the Continental Shelf. Unlike the latter, the consent regime under the LOSC explicitly aims to enhance developing States' autonomous scientific and technological capabilities through capacity-building and marine technology transfer. This objective aligns with the historical context of the second wave of decolonization, where discussions about a just and equitable world order in harmony with the right to self-determination, the NIEO, the declaration of permanent sovereignty over natural resources, and the principle of the common heritage of humankind permeated the international agenda. Second, the study posits that the MSR consent regime, reinterpreted through this historical lens, can function as an initial form of benefit-sharing mechanism alongside Part XI of UNCLOS. This reframing compels a stronger emphasis on compliance with pre- and post-consent obligations, even considering the seemingly voluntary language employed. This invigorates existing propositions that the right to participate in research projects is already a well-established principle in customary international law (Gorina-Ysern, 2003, pp. 334–335). By reframing this legal foundation, the study strengthens arguments for ensuring meaningful participation by SIDS in MSR activities.

This study further explores the role of SIDS in the development of the law of the sea. Information on the practice of SIDS regarding the consent regime for MSR and the experiences of researching States in SIDS waters were sourced from legal and policy instruments, along with questionnaires. Gathering information through questionnaires facilitated a nuanced understanding beyond what could be gleaned solely through legislative analysis. It enabled the assessment of unwritten legal procedures in place and clarified the interpretation of specific aspects of the consent regime, such as observer participation onboard research vessels. This approach yielded a rich and unique dataset that revealed discernible trends, best practices, treaty modifications, and challenges associated with interpreting and implementing the legal framework. Notably, this contribution significantly expands upon the

existing—yet outdated—database of State practice in Part XIII, which previously encompassed a limited number of SIDS.

The findings reveal that SIDS have embraced an expansive interpretation of the MSR definition, usually using the terms “research,” “scientific research,” and “MSR” equivalently and, at times, including activities of disputed classification, such as ocean observation, bathymetric surveys, and research collecting MGRs. While nearly all analyzed SIDS claim jurisdiction over MSR, the language in domestic laws does not consistently align with the Convention. Compliance with the obligation to establish rules, guidelines, and templates for promoting MSR varies among SIDS. The PSIDS and Indian Ocean SIDS exhibit a trend of reviewing laws and procedures, with many of the best practices observed in these regions. In contrast, Caribbean SIDS often regulate the consent regime within fisheries laws, though some establish templates for consent requests. Despite the promising trend observed, the governance of MSR within SIDS remains fragmented, often sectoral, with multiple bodies overseeing consent.

With respect to the obligations outlined in Articles 248 and 249, SIDS have exhibited a general propensity to grant consent for foreign MSR projects, even in the absence of established domestic procedures governing such consent. This inclination is often coupled with a desire to participate in foreign MSR activities. However, concerns have been raised regarding noncompliance with postconsent obligations. Additionally, there have been documented instances where MSR projects, conducted either under the guise of legitimate research or without requisite consent, have been found to be exploitative in nature. Researching States, for their part, emphasize the collaborative nature of their relationships with SIDS in obtaining MSR consent, even when precruise documents are submitted outside of the legally mandated six-month time frame. Nevertheless, delays attributed to limitations in human capacity within SIDS and instances of unreasonable demands imposed by SIDS have also been reported.

An examination of subsequent state practice by SIDS regarding the MSR consent regime reveals instances where these countries have arguably extended beyond interpretation, potentially modifying the Convention itself, particularly with respect to preconsent and postconsent obligations. Notably, the new requirements introduced in Articles 248 and 249 have, in many cases, been accepted by scholars and researching States. One such exception involved a SIDS conditioning MSR consent upon the recognition of a neighboring island's self-determination. Guided by the principle of cooperation, SIDS and researching States appear to have converged on the reasonableness of submitting, during the precruise phase, risk assessment or EIA, information on the implications of the research for traditional knowledge, and information on opportunities for meaningful participation by the coastal State, exceeding the minimum requirements outlined in Article 249.

Additionally, they appear to concur on the importance of applying the precautionary approach and best environmental practices during research development. Finally, upon completion of the in situ research phase, a shared understanding seems to exist regarding sharing data, samples, and research results within a three-month time frame following research conclusion. These findings highlight the agency of SIDS in reframing the MSR consent regime in response to the use of new technologies and developments in other areas of international law, ultimately aiming to maintain the balance envisioned by the consent regime.

The limits of the LOSC to adequately regulate novel activities in the ocean space and the capacity of States to modify the Convention on reasonable grounds have been contentious issues among international lawyers. For instance, prior to the recent advisory opinion by ITLOS, uncertainty existed regarding whether greenhouse gas emissions into the atmosphere constituted pollution of the marine environment under the LOSC. The BBNJ Agreement, however, addresses potential regulatory gaps within the LOSC concerning bioprospecting activities in ABNJ. Against this backdrop, this research investigated the legal and nonlegal tools employed by international lawyers to introduce flexibility into legal instruments. The aim was to determine whether the interpretations and modifications implemented by SIDS in the MSR consent regime utilized any of these tools. Papers I, II, III, IV, and V each explored different instruments utilized by SIDS to adapt Part XIII in light of changing circumstances. This toolkit encompasses evolutionary interpretation, conduciveness, regionalism, informal law-making processes, soft law instruments, regime interaction, and ocean science diplomacy. Finally, the study suggests that the flexibility of the consent regime is ultimately confined by the principle of reasonableness, which must be interpreted in light of the objective and purpose of the MSR consent regime itself.

The discussion in this kappa and within the papers on SIDS's governance on the consent regime for MSR identified insightful examples that can inspire other States to strengthen their regulatory frameworks. The following best practices identified in the research offer a roadmap for effective MSR governance in AWNJ:

- (i) Enact dedicated MSR legislation: Mauritius and the Solomon Islands established dedicated legal frameworks for MSR activities, promoting transparency and predictability, and avoiding a fragmented governance for MSR.
- (ii) Develop MSR principles: Cook Islands, Papua New Guinea, and the Solomon Islands adopted principles to ensure responsible research practices and safeguard the local marine environment, potentially enhancing trust and cooperation among States.
- (iii) Streamline consent applications: the Bahamas implemented an online consent application system, consolidating the legal requirements under several frameworks,

able to simplify the process for researching States and reduce administrative burdens for consent authorities.

(iv) Establish dedicated MSR processing bodies: Barbados, Cook Islands, and Papua New Guinea appointed dedicated entities to serve as focal points for receiving applications, liaising with relevant internal entities, and communicating with researching States, streamlining the consent procedure and facilitating the compilation of relevant information about the consent regime.

Drawing upon insights from the literature, best practices, and original data analysis, Papers II, III, and IV propose a series of actionable recommendations for both SIDS and researching States to strengthen the governance of the MSR consent regime under the LOSC, maintaining the balance envisioned. For SIDS, these recommendations prioritize domestic legal reforms and streamlined procedures to enhance their capacity to manage MSR consent requests. For researching States, the recommendations emphasize transparency, responsible research practices and capacity-building opportunities.

In more detail, SIDS are invited to: (i) ensure domestic laws fully align with the jurisdictional powers established in the LOSC; (ii) develop dedicated laws, guidelines, and procedures to implement the MSR consent regime in accordance with the LOSC; (iii) give due publicity to these instruments through official channels; (iv) establish dedicated national points of contact to handle consent requests; (v) create databases or information repositories that house relevant details about the consent regime; (vi) develop and share information about national priority research needs in marine sciences; and (vii) leverage existing regional and cross-regional mechanisms as platforms to share best practices, enhance cooperation, and exchange knowledge about the MSR consent regime.

In more detail, researching States are invited to: (i) proactively seek information from the SIDS regarding consent requirement when the classification of a planned at-sea research activity is uncertain, when possible, negotiate the terms of consent for specific activities; (ii) provide precruise information to SIDS authorities as early as possible, ideally at least six months in advance, including a detailed report about the research's potential implications for traditional knowledge and the marine environment; (iii) consider incorporating the SIDS' identified priority research needs into the research proposal; (iv) encourage meaningful participation of local scientists from the SIDS, if possible in all stages of the research project; (v) share data, information, and reports in a user-friendly format that is accessible and usable to SIDS; (vi) address potential implications to property rights arising from samples and data sharing through bilateral arrangements; (vii) consider additional forms of enhancing SIDS participation beyond those under the LOSC, including training related to MAS and transfer of technology; and (viii) develop mechanisms to

monitor compliance with postcruise obligations outlined in the consent agreement and consider adopting clear measures to deter future noncompliance.

In addition to the actionable specific recommendations for SIDS and researching States, this dissertation contributes to the law of the sea and TWAIL scholarships and enhances the literature on using empirical research in international law. Despite the existential threats faced by SIDS, heavily influenced by a colonial legacy, there is a notable scarcity of TWAIL-focused literature on SIDS. Furthermore, there was a research gap in exploring how prevailing interpretations of the legal framework contribute to perpetuating asymmetries in scientific research capabilities between States. In terms of methodology, this dissertation followed a rigorous step-by-step process involving stakeholder engagement, questionnaire development, internal and external reviews, and piloting with participants. Guided by ethical considerations, extensive efforts were made to engage with stakeholders, explain the research, raise awareness of the consent regime, capture the perspectives of SIDS representatives, and commit to sharing research results. This process aims to set a standard, serving as an example to avoid colonial and unethical practices.

Despite the thorough process of collecting and analyzing legal documents, survey responses, and insights from informal discussions with stakeholders, it is important to acknowledge the absence of responses from representatives of the Dominican Republic, Grenada, Marshall Islands, St. Lucia, Timor-Leste, and Tuvalu as a shortcoming. Additionally, the study may not have accessed all existing laws and regulations on the topics. The scope of the study also resulted in limitations, since it ended by excluding the practice of American, British, Dutch, and French overseas territories considered SIDS and the practices of competent international organizations and other stakeholders conducting MSR. Given these limitations, future inquiries could explore the practices of the omitted SIDS, overseas territories, and the application of the consent regime to non-State actors, such as philanthropic research vessels and NGOs. Another potential avenue of inquiry is the intersection between intellectual property rights and MSR, with a particular focus on the relevance of Article 241. Furthermore, despite this dissertation having addressed connections between Part XIII and the BBNJ Agreement, additional assessment is needed to fully explore their interplay.

This study lays the foundation for examining the implementation of the consent regime for MSR under the LOSC, with the overarching aim of promoting MSR while ensuring equitable benefit-sharing among States. Overall, it seeks to inspire legal scholars to explore aspects of Part XIII vis-à-vis new legal developments, employ empirical methodologies, and engage with the perspectives of SIDS and TWAIL.

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Appendix 1: Glossary of Definitions

For the purpose of this research, please consider the following definitions:

a) Marine Scientific Research

No agreed definition was reached during UNCLOS III due to difficulties in establishing a precise distinction between pure and applied research. Moreover, developing States identified the inexistence of a clear-cut definition as an opportunity to exercise more control over activities undertaken in the waters under their jurisdiction. Nonetheless, it was agreed that MSR differs from prospection, exploration, military survey, the collection of marine meteorological data, and activities directed at archaeological and historical objects found at sea. There is no agreement on the classification of hydrographic surveys and operational oceanography (Bateman, 2005; Gragl, 2014). Likewise, the line dividing the scientific stage of activities collecting marine genetic resources of prospection has been disputed (Proelss, 2017).

Generally, the activity can be broadly defined as “any study or related experimental work designed to increase [hu]man’s knowledge of the marine environment” (Soons, 1982, p. 6). This definition includes both pure and applied MSR (Yu, 2019).

b) Research Vessels

The research follows the LOSC use of the words “vessel” and “ship” interchangeably. In the absence of a clear-cut definition for vessel, it will be considered as “any self-propelled device capable of being used for maritime navigation and as a means of transportation on water of goods, people, or both” (Hofmann & Proelss, 2015, p. 176).

The ship’s nationality follows the flag it carries and each State shall establish the conditions for registering a vessel (Art. 91, LOSC). In this sense, when referring to foreign-flagged vessels, this study is relating to ships carrying flags of States other than the coastal State.

In the absence of a legal definition, “The vessel’s function and use as a research platform” is what identifies a research vessel (Wegelein, 2005, p. 126).

c) Platforms

Platforms are the larger devices to conduct research, other than vessels, deployed to stay in the marine environment for an extended period and for multiple purposes (Hofmann & Proelss, 2015).

d) Equipment

Refers to smaller instruments related to scientific projects, displayed for a short period and determined purposes (Hofmann & Proelss, 2015).

e) Prospection, Exploration, and Exploitation

The LOSC falls short of defining these three terms. The ISA has understood each of the activities as follows:

“Prospecting” means the search for deposits of polymetallic sulphides in the Area, including estimation of the composition, size and distribution of deposits of polymetallic sulphides and their economic values, without any exclusive rights;

“Exploration” means searching for deposits of polymetallic sulphides in the Area with exclusive rights, the analysis of such deposits, the use and testing of recovery systems and equipment, processing facilities and transportation systems, and the carrying out of studies of the environmental, technical, economic, commercial and other appropriate factors that must be taken into account in exploitation;

“Exploitation” means the recovery for commercial purposes of polymetallic sulphides in the Area and the extraction of minerals therefrom, including the construction and operation of mining, processing and transportation systems, for the production and marketing of metals”

(UN docs. ISBA/16/A/12/Rev.1).

These definitions are relevant as it has already been agreed that principles deriving from them can have a broader scope (A/59/62).

f) Military Survey

It refers to a range of different activities of data collection that have military aims. They are usually considered confidential (Roach, 2021). Military surveys will not be under the scope of this research.

g) Hydrographic Survey

It was originally understood that “the measurement of the bathymetry of the ocean and the study of waves, currents and tidal phenomena, surveying of underwater rocks, shoals and other hidden dangers for the purpose of the preparation of nautical publications such as sailing directions, tide tables, current charts and light lists” (Soons, 1982, p. 7). Nonetheless, recently, the IHO has updated the definition as follows:

That branch of applied sciences which deals with the measurement and description of the features of the seas and coastal areas for the primary purpose of navigation and all other marine purposes and activities, including – inter alia – offshore activities, research, protection of the environment, and prediction services.

(IHO Pub. S-32, International Hydrographic Organization, Manual on Hydrography, 1st ed. (Monaco, 2005), Publication C-13, www.iho.int/iho_pubs/CB/C-13/english/C-13_Chapter_1_and_contents.pdf).

Hence, it is harder to differentiate between MSR and hydrographic surveys.

h) Marine Environment

“Marine environment” includes the physical, chemical, geological, and biological components, conditions, and factors that interact and determine the productivity, state, condition, and quality of the marine ecosystem, the waters of the seas and oceans, and the airspace above those waters, as well as the seabed and ocean floor and subsoil thereof (UN docs. ISBA/16/A/12/Rev.1).

i) Subsequent Practice (State practice)

Includes official acts at the international and internal levels that serve to apply the treaty and official statements regarding its interpretation, official communications to which the treaty gives rise, the enactment of domestic legislation, the conclusion of international agreements for the purpose of implementing the treaty (adapted from ILC, Draft conclusions on subsequent agreements and subsequent practice in relation to the interpretation of treaties, with commentaries, 2018, A/73/10).

j) Maritime Autonomous Surface Ship

A term adopted by the IMO MSC for their scoping exercise, which means, for the purpose of this code, a surface ship that is capable of being operated without a human onboard in charge of that ship and for which the level of control may encompass any of those shown at Table 2.3 above [table of the Code of Practice](Maritime Autonomous Surface Ships UK Code of Practice [2018]).

l) Unmanned Maritime Vehicles (UMVs)

Are vehicles that are capable of controlled, self- propelled movement in water without any personnel onboard. Some of these vehicles traverse the water surface; these are unmanned surface vehicles (USVs). Others operate under the water surface, surfacing only on recovery and where necessary to transfer data and take instructions; these are unmanned underwater vehicles (UUVs) (Veal et al., 2019).

m) Marine Autonomous Systems

It is an umbrella term, not codified by law, generally accepted by practitioners to cover Marine Autonomous Surface Ships, Unmanned Underwater Vehicles, Remotely Operated Vehicle, Profiling Floats, Seabed Observatory, and Remotely Piloted Aircraft (Coelho & Rogers, forthcoming).

n) Ocean Observation

The evaluations of one or more elements of the physical environment in the ocean space (Technical Regulations WMO n. 49). It covers both sustained and experimental observations.

o) Sustained Observation

Measurements taken routinely that observing system programs have committed on an ongoing basis, generally for seven years or more. Such measurements serve primarily public good services or research in the public interest, but will usually support both (Cravatte et al., 2016, p. 4).

p) Experimental Observation

Measurements taken for a limited observing period, generally less than seven years, that observing system programs are committed to for research and development purposes. These measurements serve to advance knowledge, explore technical innovation, and/or lead to improvements in the effectiveness and efficiency of observing system programs (Cravatte et al., 2016).

Appendix 2: Questionnaire A with the Consent Form and Invitation to Participate

Questionnaire on State Practice of Small Island Developing States in the field of Marine Scientific Research in support of a PhD research

Dear Participant,

I am writing to invite you to kindly participate in a survey, reflecting on your country's practice, to support my PhD research entitled "An analysis of the State Practice of Small Island Developing States on the Consent Regimes for Marine Scientific Research (MSR) under the United Nations Convention on the Law of the Sea" (Articles 245-255c, LOSC). By identifying best practices and specific challenges faced by Small Island Developing States (SIDS) in the implementation of these provisions, the research examines options to strengthen the legal framework for MSR.

My doctoral studies are conducted at WMU-Sasakawa Global Ocean Institute, World Maritime University under the supervision of Professor Ronan Long and Dr. Zhen Sun. This survey is being conducted in line with the WMU Research Ethics Committee Protocol standard protection of data security and privacy. It was approved by the decision WMU # REC-21-22(P). Your personal data will not be publicized. Additional information regarding the data security can be found on the 'Consent form' on the link below.

Given your knowledge and extensive experience with marine scientific research, I would be grateful if you could assist me in my PhD research. Moreover, should you grant the courtesy of an interview, I would be happy to investigate further some practices of your country and provide details on my project by means of a video call or by email (w1903592@wmu.se).

To participate, please click on the link below.

Yours sincerely,

Luciana Fernandes Coelho
Malmö, 2021

Consent Form

Dear Respondent,

Thank you for agreeing to participate in this survey carried out in connection with my Doctoral Thesis at the World Maritime University.

This is an online survey that shall be fully answered on this website, which follows the highest data security and privacy standards. The replies will be directly received by the researcher, who will be the sole recipient of the data, and archived on a secure virtual drive linked to a World Maritime University email address, a copy will be store in an external drive. Besides, the information provided will be used only for research purposes. The results will form part of my Doctoral thesis, which will be made available to the public through academic publications.

The responses are provided on behalf of your country, your personal data (e.g. identity and contact details) will not be published nor disclosed to a third party. Furthermore, according to the WMU Research Ethics Committee standards, all the data will be deleted 10 years after the completion of the studies.

Your voluntary participation in this survey is highly appreciated. YOU MAY, however, WITHDRAW FROM RESPONDING AT ANY TIME, AND YOUR PERSONAL DATA AND RESPONSES WILL BE IMMEDIATELY DELETED. Additionally, you will be provided options to inform whether any of the questions contains sensitive information.

Supervisors' names: Professor Ronan Long and Dr. Zhen Sun

Student's name: Luciana Fernandes Coelho

Specialization: PhD in Maritime Affairs

Email address: w1903592@wmu.se

* * *

I consent to my personal data, as outlined above, which will be used for this study only. I understand that all personal data relating to participants and information is held and processed in the strictest confidence, and will be deleted at the end of the researcher's enrolment.

Name:

Signature:

Date:

Instructions

The survey contains **36 questions** and will require **approximately 30 minutes to complete**. If needed, you have the option of **pause and resume responding it** by clicking the invitation link again. The survey is in three parts.

The first part aims to **examine the scientific and technological capacity** of your country.

The second part of the questionnaire, investigates the implementation of **coastal States' rights and obligations to grant consent** for marine scientific research (MSR) projects undertaken by foreign flagged research vessels in the maritime spaces under the sovereignty or jurisdiction of your country, i.e. territorial sea, exclusive economic zone, continental shelf, and extended continental shelf.

The third part seeks to assess the **duty of researching entities to comply with certain conditions during the scientific project**, i.e. share of data and samples. There is a blank space at the end of each question in which you can detail or explain the answer if needed.

Finally, there is an open box for general comments, which provides an opportunity for you to indicate whether you would like any of the answers to be considered confidential.

Some questions are based on Section One of the IOC-UNESCO Questionnaire n.º 3 "The Practice of States in the fields of Marine Scientific Research (MSR) and Transfer of Marine Technology", adopted by the IOC Executive Council Resolution EC-XXXV.7, and by the United Nations General Assembly Resolution A/RES/56/12 (thereinafter, Questionnaire n.º 3). These are identified by a footnote indicating which question of the IOC-Questionnaire is referenced. Supplementary topics of inquiry are added to address emerging subjects. The survey does not cover rights and obligations related to the transfer of marine technology.

The survey uses the following acronyms:

Continental Shelf (CS)

Exclusive Economic Zone (EEZ)

International Organization (IO)

Marine Genetic Resources (MGR)

Marine Scientific Research (MSR)

Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (Nagoya Protocol)

Small Island Developing States (SIDS)

Third United Nations Conference on the Law of the Sea (UNCLOS III)

United Nations Convention on the Law of the Sea (LOSC)

United Nations Division for Ocean Affairs and the Law of the Sea (UNDOALOS)

Identification:¹

1) Name of the State:

2) Name of the contact person/organisation responsible for filling this form and the respective role in the MSR approval process:

3) Contact details of the person/organisation (address, e-mail address, telephone number, fax number):

Part I: Introduction

This Part aims to collect information on your country's capacities to conduct MSR

4) How would you describe the capacity of your country to conduct marine scientific research?

5) Indicate if your country has (or has access to) any of the below. Where possible, please specify the focus area of the research.

(i) Oceanographic Research Vessel

(ii) Deep Oceanographic Research Vessel (i.e. Global Class RV)

(iii) Seabed Observatories

(iii) Human Occupied Vehicle (HOV) (e.g. WHOI Alvin)

(iv) Unmanned Aerial System (UAS) (e.g. drones)

(v) Unmanned Underwater Vehicles (UUV):

Autonomous Underwater Vehicle (AUV) (e.g. submersibles, gliders)

Remotely Operated Vehicle (ROV)

Floats

(vi) Moorings

(vii) Research Facilities (e.g. National Research Centers on Marine Science, University, Oceanographic Data Center, etc.)

(vii) Permanent Funding Mechanisms

(viii) Other, please specify

6) Does your country have a national ocean policy in place?

No Yes

¹ Questions 1-3 are consolidated from questions 1-7 of the Questionnaire n.º 3.

In Progress

Do not know

If yes, please indicate the link or the reference to it, if possible.

7) Does your country have a national needs assessment in marine science, technology and ocean services?

No Yes

If yes, please indicate the link or the reference to it, if possible.

If not, please provide information on your country's capacity needs in marine science, technology and ocean services, if possible.

8) Has your country designated areas on the extended continental shelf, beyond 200 nautical miles from the baselines, in which exploitation or exploration activities might take place (article 246(6), LOSC)?

No Yes

Do not know

If yes, please indicate the link or the reference to it, if possible.

Part II: Consent Regime

This Part aims to collect data on the State's practice in authorizing MSR projects in waters under national jurisdiction

9) What does your country consider as Marine Scientific Research?

10) Does your country classify ocean observation (e.g. atmospheric, echo sounder, oceanic, and biogeochemical observations) as marine scientific research?

No Yes

Do not know

11) Does your country have legislation in force to implement the LOSC provisions related to MSR, as well as other international instruments relevant to MSR?²

No Yes

If yes, please provide a copy of your existing national legislation or administrative procedure [or a link to the website where it can be retrieved].

12) Has your country enacted legislation, rules, regulations and procedures to ensure that consent requested by foreign scientists will not be delayed or denied unreasonably (article 246(3), LOSC)?

No Yes

If yes, please indicate the link or the reference to it, if possible.

13) Has your country enacted internal laws or guidelines facilitating the access to its ports and promoting assistance to research vessels (article 255, LOSC)?

No Yes

If yes, please indicate the link or the reference to it, if possible.

14) What regulatory provisions, such as customs or tax requirements, apply to foreign research vessels while in your ports?³

15) Are there official channels established to handle requests for consent to MSR projects in waters under your country's sovereignty or jurisdiction, in accordance with Article 250, LOSC?⁴

No Yes

If yes, please provide names, address and contact information.

16) Taking into account Article 255, LOSC, has your country created an application form for requesting consent?⁵

No Yes

If yes, does your country use a specific model for application form(s) like those prepared by international organisations, e.g. model of International Council for the Exploration of Sea, model of the UNDOALOS, [model provided by the researching organization], etc.?

No Yes

² Modified from question I-A of the Questionnaire n.º 3.

³ Question IV-H of the Questionnaire n.º 3.

⁴ Question II-A of the Questionnaire n.º 3.

⁵ Modified from questions II-D of the Questionnaire n.º 3.

If yes, which model is used?

17) Taking into account Article 255, LOSC, has your country created any other specialized application form(s) for requesting consent?⁶

No Yes

If yes, please provide a copy of this/these specific form(s)?

18) Does your country have specific requirements to grant consent for research on marine genetic resources for non-commercial use (article 8 (a), Nagoya Protocol)?

No Yes

If yes, please indicate the link or the reference to the national legislation establishing the procedures to request consent, if possible.

19) Does your country have specific requirements to grant consent for bathymetric surveys? If yes, please specify the requirements.

No Yes

If yes, please indicate the link or the reference to the national legislation establishing the procedures to request consent, if possible.

20) Does your country receive requests for MSR approval coming directly from NGOs, foundations, private research, etc. (other than applications on behalf of states or under the auspices of IOs)?

No Yes

If yes, please indicate the link or the reference to the national legislation establishing the procedures to request consent, if possible.

21) Please summarise the procedures in your country when a request of consent for MSR has been received. When possible, identify what other departments are involved in issuing consent.

22) What is the average time taken by your country for responding to a request of consent for MSR?

Less than 4 months

Between 4 and 6 months

⁶ Question II-E of the Questionnaire n.º 3.

More than 6 months

Not sure

23) Have you utilised implied consent to allow research to be conducted in waters under your jurisdiction by another country (article 252, LOSC)?⁷

No Yes

If yes, why?

If no, why not?

24) What is the approximate number of requests for authorization your country has received annually, over the last eleven years (2009-2020)?⁸

25) Approximately how many of these requests were approved?⁹
[Please, provide a percentage if you do not have an exact number]

26) Approximately how many MSR requests submitted under the auspices of an IO have been approved in the past eleven years? (2009-2020) (article 247, LOSC)?

27) During the last eleven years (2009-2020), how often did your country require supplementary information or clarification relevant for the assessment of the nature and objectives of the MSR project (articles 246(5)(d), 248, and 252(c), LOSC)?

Less than 20% of the requests

Between 20% and 50% of the requests

Between 50% and 80% of the requests

More than 80% of the requests

Not sure

28) What was the supplementary information or clarification requested about? Check all that apply.

⁷ Question III-B of the Questionnaire n.º 3.

⁸ Modified from question II-B of the Questionnaire n.º 3.

⁹ Question II-C of the Questionnaire n.º 3.

- The nature and object of the project
- The methods, means, and description of the scientific equipment
- The precise geographical scope of the project
- The date of first appearance and final departure of the research vessels
- The name of the sponsor institution and the person in charge of the process
- The extent to which the coastal State can participate in the project
- Other, please provide details

29) If the consent was withheld in any of the requests, which was the legal ground for the decision (art. 246 (5), LOSC)? Check all that apply:

- Is of direct significance for the exploration or exploitation of natural resources
- Involves drilling, the use of explosives or the introduction of harmful substances
- Involves the construction, operation or use of artificial islands, installations or structures
- Do not provide clear and sufficient information
- The requesting entity has pending obligations regarding a previous project
- The extent to which the coastal State can participate in the project
- Other, please specify

30) What constitutes the expected starting date of the MSR project in your country (article 248, *caput*, LOSC)?¹⁰

- The specified starting date of the research plan?
- The date the research plan is approved?
- The date the research vessel departs?
- The date the actual research operation begins in waters under your national jurisdiction?
- Other, please specify

31) Has your country already sent scientists as observers on-board foreign research vessels in the framework of a MSR project conducted in the waters under your national jurisdiction (articles 248(f) and 249(a), LOSC)?¹¹

No Yes

32) Do the observer(s) represent your government on board foreign research vessel?¹²

No Yes

¹⁰ Question IV-A of the Questionnaire n.º 3.

¹¹ Question IV-B(i) of the Questionnaire n.º 3.

¹² Question IV-B(iii) of the Questionnaire n.º 3.

33) What are the functions/assignments of the observers on board (articles 248(f) and 249(a), LOSC)?¹³ Check all that apply.

To report on research activities carried out?

To ensure that the type of research undertaken and the area where the research is conducted conforms to the official notification document?

To act as an official channel for possible communications between the vessel and your government?

To take the opportunity to be trained in the field of work defined in the MSR project?

Others? Please specify.

Part III: Post-cruise rights and obligations

This Part seeks to clarify information related to the rights and duties while performing MSR activities

34) Does your country require that researchers provide the relevant authorities with copies of data and samples (Article 249 (1(c)), LOSC)?¹⁴

No Yes

35) Does your country require that researchers provide and or assist the relevant authorities with an assessment of [data, samples, and] research results (Article 249 (1(d)), LOSC)?¹⁵

No Yes

36) Has your country ever required suspension/cessation of MSR projects conducted in waters under your national jurisdiction for non-compliance with Article 248 and 249, LOSC?¹⁶

No Yes

Comments:

Thank you!

¹³ Question IV-B(iv) of the Questionnaire n.º 3.

¹⁴ Question IV-C of the Questionnaire n.º 3.

¹⁵ Question IV-D of the Questionnaire n.º 3.

¹⁶ Question IV-G of the Questionnaire n.º 3.

Annex I
United Nations Convention on the Law of the Sea¹⁷

SECTION 3. CONDUCT AND PROMOTION OF MARINE SCIENTIFIC RESEARCH

Article 245 Marine scientific research in the territorial sea Coastal States, in the exercise of their sovereignty, have the exclusive right to regulate, authorize and conduct marine scientific research in their territorial sea. Marine scientific research therein shall be conducted only with the express consent of and under the conditions set forth by the coastal State.

Article 246 Marine scientific research in the exclusive economic zone and on the continental shelf

1. Coastal States, in the exercise of their jurisdiction, have the right to regulate, authorize and conduct marine scientific research in their exclusive economic zone and on their continental shelf in accordance with the relevant provisions of this Convention.

2. Marine scientific research in the exclusive economic zone and on the continental shelf shall be conducted with the consent of the coastal State.

3. Coastal States shall, in normal circumstances, grant their consent for marine scientific research projects by other States or competent international organizations in their exclusive economic zone or on their continental shelf to be carried out in accordance with this Convention exclusively for peaceful purposes and in order to increase scientific knowledge of the marine environment for the benefit of all mankind. To this end, coastal States shall establish rules and procedures ensuring that such consent will not be delayed or denied unreasonably.

4. For the purposes of applying paragraph 3, normal circumstances may exist in spite of the absence of diplomatic relations between the coastal State and the researching State.

5. Coastal States may however in their discretion withhold their consent to the conduct of a marine scientific research project of another State or competent international organization in the exclusive economic zone or on the continental shelf of the coastal State if that project:

(a) is of direct significance for the exploration and exploitation of natural resources, whether living or non-living;

(b) involves drilling into the continental shelf, the use of explosives or the introduction of harmful substances into the marine environment;

(c) involves the construction, operation or use of artificial islands, installations and structures referred to in articles 60 and 80;

¹⁷ United Nations Convention on the Law of the Sea, Montego Bay, Adopted on 10 December 1982, In force on 16 November 1994, 1833 UNTS 396. Available at:
<https://www.un.org/Depts/los/convention_agreements/texts/unclos/unclos_e.pdf>.

(d) contains information communicated pursuant to article 248 regarding the nature and objectives of the project which is inaccurate or if the researching State or competent international organization has outstanding obligations to the coastal State from a prior research project.

6. Notwithstanding the provisions of paragraph 5, coastal States may not exercise their discretion to withhold consent under subparagraph (a) of that paragraph in respect of marine scientific research projects to be undertaken in accordance with the provisions of this Part on the continental shelf, beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured, outside those specific areas which coastal States may at any time publicly designate as areas in which exploitation or detailed exploratory operations focused on those areas are occurring or will occur within a reasonable period of time. Coastal States shall give reasonable notice of the designation of such areas, as well as any modifications thereto, but shall not be obliged to give details of the operations therein.

7. The provisions of paragraph 6 are without prejudice to the rights of coastal States over the continental shelf as established in article 77.

8. Marine scientific research activities referred to in this article shall not unjustifiably interfere with activities undertaken by coastal States in the exercise of their sovereign rights and jurisdiction provided for in this Convention.

Article 247 Marine scientific research projects undertaken by or under the auspices of international organizations

A coastal State which is a member of or has a bilateral agreement with an international organization, and in whose exclusive economic zone or on whose continental shelf that organization wants to carry out a marine scientific research project, directly or under its auspices, shall be deemed to have authorized the project to be carried out in conformity with the agreed specifications if that State approved the detailed project when the decision was made by the organization for the undertaking of the project, or is willing to participate in it, and has not expressed any objection within four months of notification of the project by the organization to the coastal State.

Article 248 Duty to provide information to the coastal State States and competent international organizations which intend to undertake marine scientific research in the exclusive economic zone or on the continental shelf of a coastal State shall, not less than six months in advance of the expected starting date of the marine scientific research project, provide that State with a full description of:

(a) the nature and objectives of the project;

(b) the method and means to be used, including name, tonnage, type and class of vessels and a description of scientific equipment;

- (c) the precise geographical areas in which the project is to be conducted;
- (d) the expected date of first appearance and final departure of the research vessels, or deployment of the equipment and its removal, as appropriate;
- (e) the name of the sponsoring institution, its director, and the person in charge of the project; and
- (f) the extent to which it is considered that the coastal State should be able to participate or to be represented in the project.

Article 249 Duty to comply with certain conditions

1. States and competent international organizations when undertaking marine scientific research in the exclusive economic zone or on the continental shelf of a coastal State shall comply with the following conditions:

- (a) ensure the right of the coastal State, if it so desires, to participate or be represented in the marine scientific research project, especially on board research vessels and other craft or scientific research installations, when practicable, without payment of any remuneration to the scientists of the coastal State and without obligation to contribute towards the costs of the project;
- (b) provide the coastal State, at its request, with preliminary reports, as soon as practicable, and with the final results and conclusions after the completion of the research;
- (c) undertake to provide access for the coastal State, at its request, to all data and samples derived from the marine scientific research project and likewise to furnish it with data which may be copied and samples which may be divided without detriment to their scientific value;
- (d) if requested, provide the coastal State with an assessment of such data, samples and research results or provide assistance in their assessment or interpretation;
- (e) ensure, subject to paragraph 2, that the research results are made internationally available through appropriate national or international channels, as soon as practicable;
- (f) inform the coastal State immediately of any major change in the research programme;
- (g) unless otherwise agreed, remove the scientific research installations or equipment once the research is completed.

2. This article is without prejudice to the conditions established by the laws and regulations of the coastal State for the exercise of its discretion to grant or withhold consent pursuant to article 246, paragraph 5, including requiring prior agreement for making internationally available the

research results of a project of direct significance for the exploration and exploitation of natural resources.

Article 250 Communications concerning marine scientific research projects Communications concerning the marine scientific research projects shall be made through appropriate official channels, unless otherwise agreed.

Article 251 General criteria and guidelines States shall seek to promote through competent international organizations the establishment of general criteria and guidelines to assist States in ascertaining the nature and implications of marine scientific research.

Article 252 Implied consent States or competent international organizations may proceed with a marine scientific research project six months after the date upon which the information required pursuant to article 248 was provided to the coastal State unless within four months of the receipt of the communication containing such information the coastal State has informed the State or organization conducting the research that:

(a) it has withheld its consent under the provisions of article 246; or

(b) the information given by that State or competent international organization regarding the nature or objectives of the project does not conform to the manifestly evident facts; or

(c) it requires supplementary information relevant to conditions and the information provided for under articles 248 and 249; or

(d) outstanding obligations exist with respect to a previous marine scientific research project carried out by that State or organization, with regard to conditions established in article 249.

Article 253 Suspension or cessation of marine scientific research activities

1. A coastal State shall have the right to require the suspension of any marine scientific research activities in progress within its exclusive economic zone or on its continental shelf if:

(a) the research activities are not being conducted in accordance with the information communicated as provided under article 248 upon which the consent of the coastal State was based; or

(b) the State or competent international organization conducting the research activities fails to comply with the provisions of article 249 concerning the rights of the coastal State with respect to the marine scientific research project.

2. A coastal State shall have the right to require the cessation of any marine scientific research activities in case of any non-compliance with the provisions of article 248 which amounts to a major change in the research project or the research activities.

3. A coastal State may also require cessation of marine scientific research activities if any of the situations contemplated in paragraph 1 are not rectified within a reasonable period of time.

4. Following notification by the coastal State of its decision to order suspension or cessation, States or competent international organizations authorized to conduct marine scientific research activities shall terminate the research activities that are the subject of such a notification.

5. An order of suspension under paragraph 1 shall be lifted by the coastal State and the marine scientific research activities allowed to continue once the researching State or competent international organization has complied with the conditions required under articles 248 and 249.

Article 254 Rights of neighbouring land-locked and geographically disadvantaged States

1. States and competent international organizations which have submitted to a coastal State a project to undertake marine scientific research referred to in article 246, paragraph 3, shall give notice to the neighbouring land-locked and geographically disadvantaged States of the proposed research project, and shall notify the coastal State thereof.

2. After the consent has been given for the proposed marine scientific research project by the coastal State concerned, in accordance with article 246 and other relevant provisions of this Convention, States and competent international organizations undertaking such a project shall provide to the neighbouring land-locked and geographically disadvantaged States, at their request and when appropriate, relevant information as specified in article 248 and article 249, paragraph 1(f).

3. The neighbouring land-locked and geographically disadvantaged States referred to above shall, at their request, be given the opportunity to participate, whenever feasible, in the proposed marine scientific research project through qualified experts appointed by them and not objected to by the coastal State, in accordance with the conditions agreed for the project, in conformity with the provisions of this Convention, between the coastal State concerned and the State or competent international organizations conducting the marine scientific research.

4. States and competent international organizations referred to in paragraph 1 shall provide to the above-mentioned land-locked and geographically disadvantaged States, at their request, the information and assistance specified in article 249, paragraph 1(d), subject to the provisions of article 249, paragraph 2.

Article 255 Measures to facilitate marine scientific research and assist research vessels States shall endeavour to adopt reasonable rules, regulations and procedures to promote and facilitate marine scientific research conducted in accordance with this Convention beyond their territorial sea and, as appropriate, to facilitate, subject to the provisions of their laws and regulations, access to their harbours and promote assistance for marine scientific research vessels which comply with the relevant provisions of this Part.

Annex II

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

Article 8 Special Considerations

In the development and implementation of its access and benefit-sharing legislation or regulatory requirements, each Party shall:

- (a) Create conditions to promote and encourage research which contributes to the conservation and sustainable use of biological diversity, particularly in developing countries, including through simplified measures on access for non-commercial research purposes, taking into account the need to address a change of intent for such research;
- (b) Pay due regard to cases of present or imminent emergencies that threaten or damage human, animal or plant health, as determined nationally or internationally. Parties may take into consideration the need for expeditious access to genetic resources and expeditious fair and equitable sharing of benefits arising out of the use of such genetic resources, including access to affordable treatments by those in need, especially in developing countries;
- (c) Consider the importance of genetic resources for food and agriculture and their special role for food security.

Appendix 3: Questionnaire B with the Consent Form

Questionnaire on State Practice of Small Island Developing States in the field of Marine Scientific Research in support of a PhD research

Dear Participant,

I am writing to invite you to kindly participate in a survey to support my PhD research entitled “An analysis of the State Practice of Small Island Developing States on the Consent Regimes for Marine Scientific Research (MSR) under the United Nations Convention on the Law of the Sea” (Articles 245-255, LOSC). By identifying best practices and specific challenges faced by Small Island Developing States (SIDS) in the implementation of these provisions, the research examines options to strengthen the legal framework for MSR.

My doctoral studies are conducted at WMU-Sasakawa Global Ocean Institute, World Maritime University under the supervision of Professor Ronan Long and Dr. Zhen Sun. This survey is being conducted in line with the WMU Research Ethics Committee Protocol and high standard protection of data security and privacy. It was approved under the decision #REC-21-70(P). Your personal data will not be publicized. Additional information regarding the data security can be found on the 'Consent form' on the link below.

Given your knowledge and extensive experience with the clearance process for marine scientific research, I would be grateful if you could assist me in my PhD research. Moreover, should you grant the courtesy of an interview, I would be happy to investigate further your comments and provide details on my project by means of a video call or by email (w1903592@wmu.se).

To participate, please click on the link below.

Yours sincerely,

Luciana Fernandes Coelho
Malmö, 2021

Consent Form

Dear Respondent,

Thank you for agreeing to participate in this survey carried out in connection with my Doctoral Thesis at the World Maritime University.

This is an online survey that shall be fully answered on this website, which follows the highest data security and privacy standards. The replies will be directly received by the researcher, who will be the sole recipient of the data, and archived on a secure virtual drive linked to a World Maritime University email address, a copy will be stored in an external drive. Besides, the information provided will be used only for research purposes. The results will form part of my Doctoral thesis, which will be made available to the public through academic publications.

The responses are provided based on your experience facilitating clearance approvals for marine scientific research projects, your personal data (e.g. identity and contact details) will not be publicized nor disclosed to a third party. Furthermore, all data will be deleted when the degree is awarded.

Your voluntary participation in this survey is highly appreciated. YOU MAY, however, WITHDRAW FROM RESPONDING AT ANY TIME, AND YOUR PERSONAL DATA AND RESPONSES WILL BE IMMEDIATELY DELETED. Additionally, you will be provided options to inform whether any of the questions contains sensitive information.

Supervisors' names: Professor Ronan Long and Dr. Zhen Sun

Student's name: Luciana Fernandes Coelho

Specialization: PhD in Maritime Affairs

Email address: w1903592@wmu.se

* * *

I consent to my personal data, as outlined above, which will be used for this study only. I understand that all personal data relating to participants and information is held and processed in the strictest confidence, and will be deleted at the end of the researcher's enrollment.

Name:

Signature:

Date:

Instructions

The survey seeks to collect information on challenges and best practices faced before and after requesting clearance to conduct marine scientific research in maritime spaces under the jurisdiction of SIDS in accordance with articles 245-255 of the United Nations Convention on the Law of the Sea.

For the purpose of this survey, the countries considered as SIDS are the ones classified at the United Nations, which are: 1) Antigua and Barbuda, 2) Bahamas, 3) Bahrain, 4) Barbados, 5) Belize, 6) Cabo Verde, 7) Comoros, 8) Cuba, 9) Dominica, 10) Dominican Republic, 11) Federated States of Micronesia, 12) Fiji, 13) Grenada, 14) Guinea-Bissau, 15) Guyana, 16) Haiti, 17) Jamaica, 18) Kiribati, 19) Maldives, 20) Marshall Islands, 21) Mauritius, 22) Nauru, 23) Palau, 24) Papua New Guinea, 25) Samoa, 26) Singapore, 27) São Tomé and Príncipe, 28) St. Kitts and Nevis, 29) St. Lucia, 30) St. Vincent and the Grenadines, 31) Seychelles, 32) Solomon Islands, 33) Suriname, 34) Timor-Leste, 35) Tonga, 36) Trinidad and Tobago, 37) Tuvalu, 38) Vanuatu.

It contains **14 questions** and will require **approximately 30 minutes to complete**. If needed, you have the option of **pause and resume responding** by clicking the invitation link again.

The survey is in three parts. The first aims to collect **identification information** of the vessel(s) operated by your institute. Please, be aware that none of this data will be disclosed.

The second part of the questionnaire, investigates the implementation of **coastal States' rights and obligations to grant consent** for marine scientific research (MSR) projects undertaken by foreign flagged research vessels in the maritime spaces under the sovereignty or jurisdiction of SIDS, i.e. territorial sea, exclusive economic zone, continental shelf, and extended continental shelf.

The third part seeks to assess the **duty of researching entities to comply with certain conditions during the scientific project**, i.e. share of data and samples. There is a blank space at the end of each question in which you can detail or explain the answer if needed.

Finally, there is an open box for general comments, which provides an opportunity for you to indicate whether you would like any of the answers to be considered confidential.

The survey uses the following acronyms:

Continental Shelf (CS)
Exclusive Economic Zone (EEZ)
Marine Scientific Research (MSR)
Small Island Developing States (SIDS)
United Nations Convention on the Law of the Sea (LOSC)

Part I: Identification

1) Name of the Institution and vessel operated:

2) Name of the contact person/organisation responsible for filling this form and the respective role in the MSR approval process:

3) Contact details of the person/organisation (address, e-mail address, telephone number, fax number):

4) Is the vessel operated publicly or privately funded?

Public
Private

5) Please, describe the process to request the assistance of your vessel?

6) What type of research can be operationalized by the vessel? What type of equipment does it provide?

Part II: Pre-cruise obligations

7) Could you explain the process followed by your institution to get clearance approval?

8) For your institution standards, what criteria determines which country should submit the clearance request?

i) Flag State of the research vessel

- ii) Nationality of the chief scientists/principal investigator
- iii) Nationality of the institution sponsoring the MSR project
- iv) Other, please specify

9) Have you ever faced challenges to get approval for marine scientific research projects conducted in the maritime spaces under the jurisdiction of SIDS?

Yes
No

If yes, please provide the most common challenges faced and/or any particular situation that you deem abnormal and/or that requires caution from the international scientific community.

How did you overcome the challenge?

10) If you ever have direct contact with the department/authority at SIDS in charge of issuing licenses for foreign flagged research vessels, could you please provide the direction/contact?

Part III: Post-cruise obligations

11) Have you ever faced challenges to accomplish the post-cruise obligations (e.g. share of data, samples and report) when operating a research vessel in maritime spaces under the jurisdiction of SIDS?

Yes
No

If yes, please provide the most common challenges faced and/or any particular situation that you deem abnormal and/or that requires caution from the international scientific community.

How did you overcome the challenge?

12) Have you ever faced the situation of a marine scientific research project under your operation in the waters under the jurisdiction of SIDS being requested to be suspended or cancelled?

Yes

No

If yes, how often does this happen?

If yes, could you list the name of the coastal States?

13) In your perspective, are SIDS benefiting from MSR projects undertaken by foreign flagged research vessels in the maritime spaces under their jurisdiction?

14) Could you list any relevant situation of marine scientific research collaboration with SIDS that might have speed-up the clearance approval?

Appendix 4: Questionnaire 3, IOC-UNESCO

IOC QUESTIONNAIRE N°3

THE PRACTICES OF STATES IN THE FIELD OF MARINE SCIENTIFIC RESEARCH (MSR) AND TRANSFER OF MARINE TECHNOLOGY (TMT)

- **Questionnaire n°3 – Section One** : Conduct of marine scientific research in waters under sovereignty or jurisdiction of a coastal State.
- **Questionnaire n°3 – Section Two** : Transfer of Marine Technology and related Capacity Building

This questionnaire responds to IOC Resolution EC-XXXV.7 adopted by the 35th session of the IOC Executive Council (Paris, 4-14 June 2002) and of Resolution A/RES/56/12 of the UN General Assembly.

The purpose of the survey and compilation is (i) to assess the problems encountered in the implementation of the marine scientific research (MSR) regime as established by Part XIII of UNCLOS (Section One), (ii) to assist States in establishing generally accepted guidelines, criteria and standards for the transfer of marine technology (TMT) in accordance with Article 271 of UNCLOS (Section Two) and to inform the international community as to the status of MSR and TMT and practical issues raised in their implementation.

Both Sections One and Two of the questionnaire are attached below. It would be most helpful if the entire questionnaire could be returned, completed, to Mrs Aurora MATEOS (a.mateos@unesco.org), at your earliest convenience. Thank you in advance for your co-operation.

GENERAL	
1. Name of State	
2. Name of contact person responsible for completing this form	
3. Organization	
4. Address	
5. Telephone number	
6. Fax number	
7. E-mail address	

QUESTIONNAIRE N°3 – SECTION ONE

CONDUCT OF MARINE SCIENTIFIC RESEARCH (MSR) IN WATERS UNDER SOVEREIGNTY OR JURISDICTION OF A COASTAL STATE

I NATIONAL LEGISLATION ON MARINE SCIENTIFIC RESEARCH

A. Does your country have legislation in force to implement the UNCLOS provisions related to MSR, as well as other international instruments relevant to MSR?

YES

NO

- If yes, please provide the IOC Secretariat with a copy of your existing national legislation or administrative procedure.
- If no, would your country be interested in requesting technical assistance to draft/update/revise its specific national legislation on MSR?"

II. CONSENT

A. Are there official channels established to handle requests for MSR projects in waters under your country's sovereignty or jurisdiction, in accordance with Article 250 of UNCLOS?

YES

NO

If yes, please provide names, address and contact information.

B. What is the approximate number of requests for authorisation your country has received annually, over the last five years (1998-2002)?

C. Approximately how many of these requests were approved?

D.. Taking into account Article 255 of UNCLOS, has your country created an application form for requesting consent?

YES

NO

If yes, does your country use a *specific* model for application form(s) like those prepared by international organisations, e.g. model of the International Council for the Exploration of Sea, model of the UN/OLA/DOALOS standard, etc.?

YES

NO

If yes, which model did you or are you use/using?

E. Taking into account Article 255 of UNCLOS, has your country created any other specialised application form(s) for requesting consent?

YES NO

If yes, please provide a copy of this/these specific form(s) to the IOC Secretariat.

III. APPLICATION REQUIREMENTS FOR FOREIGN COUNTRIES INTENDING TO CONDUCT MSR PROJECTS IN THE WATERS UNDER SOVEREIGNTY OR JURISDICTION OF YOUR COUNTRY

A. Does your country conduct MSR in areas that are not under your sovereignty or jurisdiction?

If yes, as a researching State, has your country benefited from the procedure of implied consent as stated in Article 252 of UNCLOS to conduct research in the waters of another coastal State?

YES NO

B. Is your country a coastal State?

If so, do you or have you utilised implied consent to allow research to be conducted in waters under your jurisdiction by another country?

YES NO

If yes, why?

If no, why not?

IV. PROCEDURES AFTER CONSENT FOR MSR PROJECT IS GRANTED BY THE COASTAL STATE

A. What constitutes the expected starting date of the MSR project in your country?

(i) The specified starting date of the research plan?

(ii) The date the research plan is approved?.....

(iii) The date the research vessel departs?.....

(iv) The date the actual research operation begins in waters under your national jurisdiction?

(v) Others If others, please specify.

B. Status of observers (Article 249 1a)

- (i) Has your country already sent scientists as observers on-board foreign research vessels in the framework of a MSR project conducted in the waters under your national jurisdiction?
- YES NO
- (ii) Has/have the research vessel(s) of your country hosted foreign observers?
- YES NO
- (iii) Do the observer(s) represent your government on board foreign research vessel?
- YES NO
- (iv) What are the functions/assignments of the observers on board:
- a) To report on research activities carried out?
- YES NO
- b) To ensure that the type of research undertaken and the area where the research is conducted conforms to the official notification document?
- YES NO
- c) To act as an official channel for possible communications between the vessel and your government?
- YES NO
- d) To take the opportunity to be trained in the field of work defined in the MSR project?
- YES NO
- e) Others? Please specify.
- (v) If your country decides to undertake a MSR project in waters under the national jurisdiction of another coastal State, do you generally plan to provide equipment (on-board the research vessel) for use by a potential observer(s) from that coastal State?
- YES NO

C. Does your country require that researchers provide the relevant authorities with copies of data and samples (Article 249 (1c)?

- YES NO

D. Does your country require that researchers provide and or assist the relevant authorities with an assessment of research results (Article 249 (1d)?

YES

NO

E. If your country performs research, does it publish and disseminate at the national, subregional/regional and international levels the research results and / or conclusions of the research project (Articles 249 (1e)?

YES

NO

F. During the last five years, how many foreign vessels have undertaken MSR in the waters under your national jurisdiction for the following types of research?

(i) Fishery

(ii) Pollution

(iii) Geology

(iv) Oceanography

(v) Hydrology

(vi) Other

Total

G. Has your country ever required suspension/cessation of MSR project conducted in waters under your national jurisdiction for non-compliance with Article 248 and 249 of UNCLOS?

YES

NO

H. What regulatory provisions, such as customs or tax requirements, apply to foreign research vessels while in your ports?

QUESTIONNAIRE N°3 – SECTION TWO

TRANSFER OF MARINE TECHNOLOGY AND RELATED CAPACITY BUILDING

I. TRANSFER OF MARINE TECHNOLOGY (TMT) AT THE NATIONAL/BILATERAL LEVEL (ARTICLE 275 OF UNCLOS)

A. Does your country have marine scientific and technological research centre(s)?

YES NO

If yes,

• Please list below your existing centre(s). (additional pages may be used if necessary)

• What are its/their functions? (additional pages may be used if necessary)

(i) At the national level?

(ii) At the subregional/regional level?

(iii) At the international level?

B. Is/are your national centre(s) a focal point or a designated official channel for communications concerning TMT projects?

YES NO

If not, what is the official channel?

C. Has your country participated in a TMT Project(s)?

YES NO

If yes, was your country the holder/supplier of technology or was it the recipient?

Holder/supplier of technology transfer recipient

D. As a holder/supplier of marine technology, at what level are TMT projects usually initiated?

Bilateral level Sub-regional

Regional level Global

E. As a holder/supplier of marine technology, what is the preferred form of technology transfer projects?

- Joint ventures?
- Partnership
- Other? Please specify.

F. As a recipient, what is the preferred level for development of TMT projects/requests?

- Bilateral level Sub-regional
- Regional level Global

G. As a recipient of marine technology, what is the preferred form of technology transfer projects?

- Joint ventures?
- Partnership
- Other? Please specify.

H. As a holder/supplier of technology transfer, in which aspects/areas of marine scientific and technological research did/does your country provide assistance?

- (i) Human resources
- (ii) Financial support
- (iii) Equipment.....
- (iv) Data and information management and related education
- (v) Observation technologies and related training
- (vi) Know-how
- (vii) Others
- (viii) None

I. As a holder/supplier of technology transfer, what was/were the difficulties met in implementing a TMT project?

J. As a recipient, in which aspects/areas of marine scientific and technological research does your country need assistance?

- (i) Human resources

- (ii) Financial support
- (iii) Equipment.....
- (iv) Data and information management and related education
- (v) Observation technologies and related training
- (vi) Know-how
- (vii) Others
- (viii) None

K. As a recipient, which aspects/areas of marine scientific and technological research assistance has been provided in during the last 10 years?

- (ix) Human resources
- (x) Financial support
- (xi) Equipment.....
- (xii) Data and information management and related education
- (xiii) Observation technologies and related training
- (xiv) Know-how
- (xv) Others
- (xvi) None

K. As the recipient of technology transfer, what was/were the difficulties encountered in implementing TMT projects?

II. TRANSFER OF MARINE TECHNOLOGY AT THE SUBREGIONAL/REGIONAL LEVEL

A. As a holder/supplier or recipient country, did/do you meet difficulties in promoting or applying a TMT project in your region/subregion?

- YES NO

If yes, what were/are these difficulties?

- (i) Lack of regional policy on marine science and technology development?..
- (ii) Lack of human resources development?

- (iii) Lack of infrastructure development?.....
 - (iv) Lack of financial resources?.....
 - (v) Others?
- B. Please, provide contact information for the subregional/regional TMT focal point(s), if any.
- C. Did your region use the IOC regional subsidiary bodies as a subregional/regional mechanism for TMT projects?

III. TRANSFER OF MARINE TECHNOLOGY AT THE INTERNATIONAL LEVEL

- A. Attached for your information and comments are the IOC draft criteria and guidelines for the transfer of marine technology, including the draft transfer of marine technology application (TMTA), which would be submitted for adoption to the 22nd session of the IOC Assembly in June 2003.
- B. Who are generally your partners in the TMT process at the international level?
- (i) Governments? Which ones? Which agencies within those governments are your main interlocutors?
 - (ii) Private sector? Which companies?
 - (iii) Funding agencies? Which ones?
 - (iv) NGOs? Which ones?
- C. In your country, is/are there national scientific and technological research centre(s) which is/are member(s) of international network(s) of MSR institutions?
- YES NO

If yes, please list this (these) network(s) of MSR institutions?

IV. CAPACITY BUILDING RELATED TO TRANSFER OF MARINE TECHNOLOGY

- A. What is/are your need(s) for TMT related capacity building at the national level?
- B. What is/are the need(s) for TMT related capacity building at the subregional/regional level?

C. Did/does your country take part in technical co-operation programme(s) for the effective transfer of marine technology?

YES

NO

If yes,

- Please list the programmes already implemented?

- Please list the current programmes?

D. Has your country ever participated in exchange programmes of marine scientists and technological? If yes, please, elaborate

Appendix 5: Letters of Endorsement

H.E. Dr. Walton Webson
Permanent Representative of Antigua & Barbuda to the United Nations
Alliance of Small Island States (AOSIS)
305 E 47th Street
6th Floor, New York.

Malmö, 19 October 2021

Dear Ambassador,

Letter of Support - Data Collection on Consent for Foreign Research Vessels

I am writing to you in my capacity as the Director of the WMU - Sasakawa Global Ocean Institute to introduce Ms. Luciana Fernandes Coelho, who is pursuing a Doctor of Philosophy (Ph.D.) in Maritime Affairs under my supervision.

Her doctoral research is supported by the Swedish Agency for Marine and Water Management and the German Ministry of Transport and Digital Infrastructure, under a programme that has a special focus on meeting the needs of Small Island Developing States (SIDS).

To this end, Ms. Coelho is reviewing the **Practice of Small Island Developing States on the Consent Regimes for Marine Scientific Research under the United Nations Convention on the Law of the Sea**. A central aspect of her work entails the completion of a survey questionnaire, which has already been circulated to some representatives of SIDS¹. We anticipate that this work will make a vital contribution to the Decade of Ocean Science, Sustainable Development Goals 14.A and C, as well as the implementation of a future BBNJ Agreement.

In view of its regional significance, we wish to request your assistance in sharing the questionnaire with AOSIS member States. The findings will be duly presented and discussed with relevant authorities in the participating member States, as well as with key stakeholders in regional and global bodies concerned with marine scientific research.

A word version of the questionnaire can be found attached to this e-mail and a link to the online version can be found here: <https://fs4.formsite.com/wmuregistry/MSRForHumankind/index.html>

Lastly, I hereby extend my sincere gratitude for your kind participation in this vital research project for the benefit of SIDS, as well as for the participating institutions, which we will acknowledge in all project outputs and publications. Should you require any further clarification regarding this matter, I can be reached at rl@wmu.se.

Yours Sincerely,



Professor Ronán Long

Director, WMU-Sasakawa Global Ocean Institute,
World Maritime University

¹ We acknowledge the valuable contribution of Antigua & Barbuda, Barbados, Belize, Saint Vincent and the Grenadines, Nauru and Seychelles, which have already provided answers to the survey.

Appendix 6: Core Papers Included in This Dissertation

- Paper I Coelho, L. F. (2022). Marine scientific research and Small Island Developing States in the twenty-first century: Appraising the United Nations Convention on the Law of the Sea, *The International Journal of Marine and Coastal Law*, 37(3), 493–528. doi: <https://doi.org/10.1163/15718085-bja10099>.
- Paper II Coelho, L. F. (2024). The practice of the Caribbean SIDS on the consent regime for marine scientific research under UNCLOS: Trends, gaps, and recommendations. *Ocean Development and International Law*, 1–29. <https://doi.org/10.1080/00908320.2024.2332304>.
*The open access has been a courtesy of the Ocean Development and International Law.
- Paper III Coelho, L. F. (forthcoming). Developing and reframing UNCLOS in changing circumstances: The practice of Small Island Developing States on the consent regime for marine scientific research [*revised, accepted with minor revisions*].
- Paper IV Coelho, L. F., and Rogers, R. (2023). The use of Marine Autonomous Systems in the delivery of Marine Scientific Research under UNCLOS: Resuming balance and sharing benefits. In T. Johansson, D. Dalaklis, J. E. Fernández, A. Pastra, & M. Lennan (Eds.), *Smart ports & robotic systems: Navigating the waves of techno-regulation & governance* (Vol. 2). Palgrave Macmillan. <https://doi.org/10.1007/978-3-031-2529696>.
The author of this thesis was involved in conceptualizing the main argument and structure, planning, and write-up.
*This chapter is not currently available for open access. The attached version is a preprint containing peer reviewer comments. Copyright remains with the author.

Paper V

Polejack, A., & Coelho, L. F. (2021). Ocean science diplomacy can be a game changer to promote the access to marine technology in Latin America and the Caribbean. *Frontiers in Research Metrics and Analytics*, 6(April), 34–36. <https://doi.org/10.3389/frma.2021.637127>.

The author of this thesis was involved in conceptualizing the main argument and structure, planning, and write-up.

Paper I



Marine Scientific Research and Small Island Developing States in the Twenty-First Century: Appraising the United Nations Convention on the Law of the Sea

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Abstract

Fitness for purpose of the 1982 United Nations Convention on the Law of the Sea (LOS) in the twenty-first century has been at the core of legal and political discussions. Such an inquiry is pertinent for small island developing States (SIDS), which have experienced first-hand the consequences of anthropogenic disturbances on the ocean. This study examines whether the provisions governing marine scientific research (MSR) in the LOS provide mechanisms to strengthen SIDS scientific and technological capacities. It is suggested that the framework governing MSR seeks to promote fair and equitable benefit sharing and has rules enabling the time element therein. Accordingly, the consent regimes for MSR, rules on international cooperation, and the framework for the transfer of marine technology could serve the end of enhancing SIDS capacities. This interpretation shifts the avenues of inquiry from a descriptive to an empirical perspective.

Keywords

marine scientific research – small island developing States (SIDS) – consent regimes – international cooperation – transfer of marine technology

Introduction¹

Jules Verne's book *Twenty Thousand Leagues under the Seas*, written at the end of the nineteenth century, portrays a fictional account of Captain Nemo's scientific journey on a submarine through the underwater world.² Captain Nemo and his crew are nationals of what are today widely described as developed States, exploring the waters of developing States.³ Likewise, in the real world, rarely is science independent of geopolitics and international strategic considerations, and the question arises as to who benefits from scientific discoveries.⁴

After Jules Verne's visionary account, most marine scientific research (MSR) continued to be undertaken by governments of developed States, perpetuating practices of colonial science.⁵ However, in recent times, United Nations documents and reports, such as the Second World Ocean Assessment, reinforced the need to strengthen national capacities in marine science and technology,

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- 1 The author would like to extend sincere gratitude for the valuable comments provided by the peer reviewer. Thanks are extended to Dr. Montserrat Gorina-Ysern, Dr. Rían Derrig, Ms. Genevieve Quirk, Dr. Harriet Harden-Davies, Ms. Luisa Hedler, Mr. Alex Oliveira, and Ms. Julia Weston for providing comments on an earlier version of this manuscript as well as to Professor Ronán Long and Dr. Zhen Sun for supervising the study. This article is part of a PhD research project under the Land-to-Ocean Leadership Programme, at the World Maritime University (WMTU)-Sasakawa Global Ocean Institute. The author would like to acknowledge the generous funding by The Nippon Foundation, as well as the financial support from the Swedish Agency for Marine and Water Management (SwAM) and the German Federal Ministry of Transport and Digital Infrastructure.
 - 2 J Verne, *Vingt mille lieues sous les mers* (J Hetzel, Paris, 1870).
 - 3 The classification 'developed and developing States' is used in this study due to its relevance both in UNCLOS III and in the context of the United Nations, for example in the Sustainable Development Goals. It follows the classification provided by the UN Statistic Division in which the group of developed states encompasses the United States, Canada, Japan, Israel, Australia, New Zealand and European States. N Dados and R Connell, 'The Global South' (2012) *Contexts* 11(1) 12–13. doi:10.1177/1536504212436479 available at <http://journals.sagepub.com/doi/10.1177/1536504212436479>; L Nielsen, 'Classifications of countries based on their level of development: How it is done and how it could be done' available at <https://unstats.un.org/unsd/methodology/m49/>. All websites accessed on 5 July 2022, unless otherwise mentioned.
 - 4 A Chircop, 'Advances in ocean knowledge and skill: Implications for the MSR regime' in M Nordquist *et al.* (eds), *Law, Science & Ocean Management* (Martinus Nijhoff Publishers, Leiden, 2007) 575–615, at p. 576; BDS Santos, *Epistemologies of the South: Justice against Epistemicide* (Taylor & Francis, New York, 2015) 193.
 - 5 Santos (n 4), at p. 199; K Isensee (ed), *Global Ocean Science Report 2020: Charting Capacity for Ocean Sustainability* (UNESCO Publishing, Paris, 2020).

especially in countries at the forefront of the climate crisis and sea level rise, such as the small island developing States (SIDS).⁶

Since the 1990s, SIDS have had a clear standing in international negotiations pertaining to the ocean.⁷ However, their positioning was different during the negotiations for the regulation on MSR under the 1982 United Nations Convention on the Law of the Sea (hereinafter LOSC or the Convention).⁸ Consequently, the 'constitution of the ocean' lacks special rules dedicated to SIDS.⁹ Against this background, this article inquires whether the framework governing MSR in the LOSC is fit for purpose to address the needs of SIDS in the twenty-first century.

Four assumptions are taken as a point of reference to answer this question. First, the temporal dimension of treaties must be taken into account in their interpretation and implementation.¹⁰ In this sense, the Convention is considered a living instrument with openings and tools to accommodate changing circumstances and needs.¹¹ Second, the LOSC's objective is to provide a global

6 This article utilises the terminology SIDS due to its usage by the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and the Small Island Developing States (UN-OHRLS). The limitations of such terminology are acknowledged, as well as the emergence of other classifications, such as 'large ocean States'. For more details, see A Hume *et al.*, 'Towards an ocean-based large ocean States country classification' (2021) 134 *Marine Policy* 104766; UN, *The Second World Ocean Assessment*, Volume 1 (United Nations, New York, 2021) available at <https://www.un.org/regularprocess/sites/www.un.org.regularprocess/files/2011859-e-woa-ii-vol-1.pdf>; E Popova *et al.*, 'Ecological connectivity between the areas beyond national jurisdiction and coastal waters: Safeguarding Interests of coastal communities in developing countries' (2019) 104 *Marine Policy* 90–102; MK Vierros and H Harden-Davies, 'Capacity building and technology transfer for improving governance of marine areas both beyond and within national jurisdiction' (2020) 122 *Marine Policy* 104158; R Davis and H Quentin, 'The law of the sea and ocean governance small island States and the LOS Convention 30 years on: Have the benefits been realized?' (2012) *Ocean Yearbook* 49–85.

7 ABM Vadrot, A Langlet and IT Wysocki, 'Who owns marine biodiversity? Contesting the world order through the "common heritage of humankind" principle' (2021) 31(2) *Environmental Politics* 226:250.

8 United Nations Convention on the Law of the Sea (Montego Bay, 10 December 1982, in force 16 November 1994) 1833 *UNTS* 31363 [LOSC].

9 TTB Koh, 'Negotiating a new world order for the sea' (1983) *Virginia Journal of International Law* 761–784.

10 Y Tanaka, 'Reflections on time elements in the international law of the environment' (2013) 73 *Harvard Journal of International Law* 139–175.

11 H Woker *et al.*, 'The law of the sea and current practices of marine scientific research in the Arctic' (2020) 115 *Marine Policy* 103850; I Buga, 'Between stability and change in the Law of the Sea Convention: Subsequent practice, treaty modification, and regime interaction' in D Rothwell *et al.* (eds), *The Oxford Handbook of the Law of the Sea* (3rd edn, Oxford University Press, Oxford, 2015); A Boyle, 'Further development of the Law of

order for the ocean, balancing the respective interests, rights, and obligations of coastal vis-à-vis other States, with the aim to facilitate, amongst others, the study, protection, and preservation of the marine environment.¹² Third, the history of international law is not linear and single; thereafter, any exercise of revisiting the past is an intervention in the present.¹³ Fourth, the consent regimes are at the core of the compromise reached in Part XIII of the LOSC, which are intertwined with the provisions regulating international cooperation, the protection of the marine environment (Part XII), and the transfer of marine technology (Part XIV).¹⁴ It is suggested that the framework's potential has been restrained by an interpretation that insufficiently considers obligations to promote the sharing of benefits within the provisions governing MSR and overlooks existing tools thereof able to adapt it to current needs.¹⁵

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- the Sea Convention: Mechanism for change' (2013) 54(3) *International and Comparative Law Quarterly* 563–584, at p. 563. T Heidar 'How does the law of the sea adapt to new knowledge and changing circumstances?' in T Heidar (ed), *New Knowledge and Changing Circumstances in the Law of the Sea* (Brill Nijhoff, Leiden, 2020) 1–12. See also, Separate Opinion of Judge Lucky, *Request for Advisory Opinion submitted by the Sub-Regional Fisheries Commission*, Advisory Opinion, 2 April 2015, *ITLOS Reports 2015*, p. 92.
- 12 LOSC (n 8), preamble; Boyle (n 11), at p. 566; C Salpin, 'The law of the sea: A before and an after Nagoya?' in E Morgan, M Buck and E. Tsioumani (eds), *The 2010 Nagoya Protocol on Access and Benefit-sharing in Perspective: Implications for International Law and Implementation Challenges* (Martinus Nijhoff Publishers, Leiden, 2013) 149–183, at p. 151.
- 13 GRB Galindo, 'Para que serve a história do direito internacional?' (2015) 2 *Revista de Direito Internacional* 338–359, at p. 359; C Storr, *International Status in the Shadow of Empire: Nauru and the Histories of International Law* (Cambridge University Press, Cambridge, 2020) 26.
- 14 See UN Doc A/CONF.62/L.18; E Jarmache, 'Sur quelques difficultes de la recherche scientifique marine' in *La mer et son droit* (Pedone, Paris, 2003) 303–314 at 305; M Nordquist et al. (eds), *United Nations Convention on the Law of the Sea 1982: A Commentary, vol. IV, Articles 192 to 278, Final Act, and Annex V* (Martinus Nijhoff Publishers, Dordrecht, 1985) 540; S Huh and K Nishimoto, 'Article 246' in A Proelss (ed), *United Nations Convention on the Law of the Sea: A Commentary* (Nomos Verlagsgesellschaft, Munich, 2017) 1662; R Long, 'Marine science capacity building and technology transfer: Rights and duties go hand in hand under the 1982 UNCLOS' in M Nordquist et al. (eds), *Law Science and Ocean Management*, (Martinus Nijhoff Publishers, Leiden, 2007).
- 15 The terms 'fair and equitable benefit sharing' and 'benefit sharing' are used interchangeably in the context of actions and programmes enabling the strengthening of marine science and technology capacities of SIDS, particularly in needed areas. This study acknowledges the absence of an international legal concept of fair and equitable benefit sharing. Equally, there are multiple legal connotations for this term, including a 'treaty objective, an international obligation, a right, a safeguard or a mechanism' (E Morgera, 'The need for an international legal concept of fair and equitable benefit sharing' (2016) 27 *European Journal of International Law* 353–383, at p. 355). In spite of the relevance in discussing the status of 'fair and equitable benefit sharing' in international law, that is, customary norm, a general principle of international law, and its links to the principle of equity, this article opts to not address this issue, since it deviates from the legal argument proposed. Also, only *in situ* access to resources is considered, despite the current

Most provisions regulating MSR in the LOSC are located in Part XIII, which sets general rules applicable to MSR activities across all marine zones and rules on international cooperation.¹⁶ Part XIII regulates the conduct and promotion of MSR in the territorial sea, exclusive economic zone (EEZ), and on the continental shelf and governs the deployment of scientific research installations and equipment in the marine environment. Furthermore, it outlines rules governing responsibility, liability, the settlement of disputes, and interim measures. In areas under national jurisdiction, coastal States shall provide prior authorisation before other States may initiate an MSR project. The rights and obligations entailed in permitting an MSR project form the ‘consent regimes’.

The SIDS needs considered are to strengthen national and regional capacities in marine science and technology. Science and technology capacities entail (i) training and capacity development; (ii) national and regional technological infrastructure, including equipment and platforms; (iii) access to data, information, and knowledge; and (iv) legal and policy frameworks enabling the fulfilment of international obligations and preventing colonial science.¹⁷

Colonial science refers to the practice of researchers from developed States undertaking MSR in areas under the jurisdiction of developing States without engaging with the local scientific community or investing in human capacity or infrastructure. Such a practice reproduces colonial relations of power imbalance, ignores local knowledge and maintains a dependency on external expertise.¹⁸

While seeking to avoid anachronism and generalisations, the acronym ‘SIDS’ is used when discussing periods predating the formal advent of this group in the 1990s to facilitate reference to the States later classified in the group. In this article, SIDS comprises the States listed in Table 1. The documents analysed focus on the statements by representatives of the Caribbean and Pacific SIDS (C&PSIDS), which are the islands and low-lying States listed in Table 2.

debate on the understanding of ‘access’, particularly in the context of genetic resources (see Salpin (n 12)).

16 Relevant rules on MSR can also be found in Articles 21, 40, 56, 143, 226, 270, 275, 276, 277, Annex VI, and Annex VIII. RP Anand, *Origin and Development of the Law of the Sea* (Martinus Nijhoff Publishers, The Hague, 1982) 209–211.

17 H Harden-Davies and P Snelgrove, ‘Science collaboration for capacity building: Advancing technology transfer through a treaty for biodiversity beyond national jurisdiction’ (2020) 7(40) *Frontiers in Marine Science* 1–14; C Salpin *et al.*, ‘Marine scientific research in Pacific small island developing States’ (2018) 95 *Marine Policy* 363–371; PV Stefanoudis *et al.*, ‘Turning the tide of parachute science’ (2021) 31(4) *Current Biology* R184–R185.

18 A de Vos, ‘The problem of “colonial science”’ (2020) *Scientific American* available at <https://www.scientificamerican.com/Article/the-problem-of-colonial-science/>; Stefanoudis *et al.* (n 17).

TABLE 1 List of SIDS considered for this study

Caribbean	Pacific	Atlantic, Indian Oceans, and South China Sea (AIS)	Non-UN Members/ Associate Members of the Regional Commissions and State of Affiliation
Antigua and Barbuda	Federal States of Micronesia	Bahrain	American Samoa/US
Bahamas	Fiji	Cabo Verde	Anguilla/UK
Barbados	Kiribati	Comoros	Aruba/NT
Belize	Marshall Islands	Guinea-Bissau	Bermuda/UK
Cuba	Nauru	Maldives	British Virgin Islands/UK
Dominica	Palau	Mauritius	Cayman Islands/UK
Dominican Republic	Papua New Guinea	São Tomé e Príncipe	Commonwealth of Northern Marianas/US
Grenada	Samoa	Seychelles	Cook Islands/NZ
Guyana	Solomon Islands	Singapore	Curaçao/NT
Haiti	Timor-Leste		French Polynesia/FR
Jamaica	Tonga		Guadeloupe/FR
St. Kitts and Nevis	Tuvalu		Guam/US
St. Lucia	Vanuatu		Martinique/FR
St. Vincent and the Grenadines			Montserrat/UK
Suriname			New Caledonia/FR
Trinidad and Tobago			Niue/NZ
			Puerto Rico/US
			Sint Maarten/NT
			Turks and Caicos Islands/UK
			US Virgin Islands/US

Legend: US – United States; UK – United Kingdom; NT – Netherlands; FR – France; NZ – New Zealand

SOURCE: OHRLLS, 'LIST OF SIDS' AVAILABLE AT [HTTPS://WWW.UN.ORG/OHRLS/CONTENT/LIST-SIDS](https://www.un.org/ohrls/content/list-sids)

TABLE 2 Independence timeline of the Caribbean and Pacific SIDS

Caribbean and Pacific SIDS	Year	Caribbean and Pacific SIDS	Year
Haiti	1804	Dominica	1978
Dominican Republic	1844	Solomon Islands	1978
Cuba	1902	Tuvalu	1978
Jamaica	1962	Kiribati	1979
Samoa	1962	St. Lucia	1979
Trinidad and Tobago	1962	St. Vincent and the Grenadines	1979
Barbados	1966	Vanuatu	1980
Guyana	1966	Antigua and Barbuda	1981
Nauru	1968	Belize	1981
Fiji	1970	St. Kitts and Nevis	1983
Tonga	1970	Marshall Islands	1986
Bahamas	1973	Federal States of Micronesia	1986
Grenada	1974	Palau	1994
Papua New Guinea	1975	Timor-Leste	1975* 2002
Suriname	1975		

* Self-declared in 1975 and restored in 2002

SOURCES: PREPARED BY THE AUTHOR BASED ON KNOWLEDGE WALK INSTITUTE, 'INDEPENDENCE IN THE CARIBBEAN' AVAILABLE AT [HTTP://WWW.CARIBBEANELECTIONS.COM/EDUCATION/INDEPENDENCE/DEFAULT.ASP](http://www.caribbeanelections.com/education/independence/default.asp); PD DECKKER, 'DECOLONISATION PROCESSES IN THE SOUTH PACIFIC ISLANDS: A COMPARATIVE ANALYSIS BETWEEN METROPOLITAN POWERS' (1996) *VICTORIA UNIVERSITY OF WELLINGTON LAW REVIEW* 355–371; PACIFIC ISLANDS LEGAL INFORMATION INSTITUTE, 'PACIFIC ISLANDS TREATY SERIES: COUNTRY INFORMATION' AVAILABLE AT [HTTP://WWW.PACLII.ORG/PITS/EN/COUNTRY_INFORMATION.SHTML](http://www.paclii.org/pits/en/country_information.shtml); FIRTH (N 21)

Materials and Methods

This study begins by contextualising the SIDS and what commonalities unite the group. This followed by a review of the literature on SIDS's emergence as an interest group in international negotiations on the ocean and how their needs have been at the forefront of the ocean governance agenda post-LOSC.

The assessment of the Convention's fitness for purpose follows a three-step approach. First, SIDS's participation in negotiating MSR at the First United Nations Conference on the Law of the Sea (UNCLOS I) is compared and contrasted with their influence when negotiating the consent regimes at the Third

United Nations Conference on the Law of the Sea (UNCLOS III).¹⁹ Second, three mechanisms in which developing countries at UNCLOS III requested a fair and equitable benefit sharing to enable SIDS scientific and technological capacities are analysed. Third, the study examines the existence of standards providing flexibility in the laws governing MSR.

The majority of SIDS are located in the Caribbean and Pacific regions. Such geographical proximity was relevant for groupings at UNCLOS I and UNCLOS III. It also enabled advancing regional cooperation mechanisms on the law of the sea and MSR in the past and present. Conversely, the geographical dispersion of the Atlantic, Indian Ocean and South China Sea (AIS) SIDS challenges regional coordination. For these reasons, this piece focuses on the statements from representatives of the C&PSIDS.

A total of 98 archival records, that is, *travaux préparatoires*, were reviewed to substantiate the first and second steps mentioned above. Using the research tool provided on the website of the United Nations Codification Division, statements of the Caribbean States independent at the time of the negotiation of the Geneva Convention on the Continental Shelf (CSC) at UNCLOS I were located and assessed, accounting for nine documents. The same online tool was used when assessing interventions in the Third Committee at UNCLOS III from the C&PSIDS requesting opportunities for fostering scientific and technological capacities. One round of data collection searched the name of each C&PSIDS participating in the Third Committee. The findings were classified into three topics: the definition of MSR, the consent regimes, and MSR in areas beyond national jurisdiction (ABNJ). Only the statements related to the consent regimes are discussed in this study. A second round searched for keywords (i.e., marine scientific research, scientific research, benefit, sharing, technology, transfer of technology). The results included discussions in the Third Committee, Plenary Meetings, and the Second Committee. References to economic or commercial benefits are outside the scope of this study and, therefore, were excluded.

After the two rounds of searching and applying the exclusion criteria, 89 documents were examined; however, not all are cited in this article. Secondary sources, such as reports and literature, also substantiated the analysis.

19 Convention on the Continental Shelf (Geneva, 29 April 1958, in force 10 June 1964) 499 *UNTS* 311.

Small Island Developing States: A Special Interest Group in the Post-LOSC Era

SIDS are geographically located in the Caribbean, Pacific, Atlantic, and Indian Oceans and in the South China Sea.²⁰ They share a social, cultural, and economic link to the marine environment and historical experiences of colonisation.²¹ In many of these islands, traditional knowledge underpins their perceptions of society, nature, and the world.²² In certain cases, the ocean is considered a sacred living entity and a part of their heritage.²³ The primary economic activities of many SIDS are directly connected to the oceans, for example, tourism, shipping, mining, and fishing.²⁴ Their limited landmass usually restricts resilience and increases dependence on imports, transportation, and energy.²⁵ Their colonial past allegedly is one of the reasons for their late participation in international negotiations (Table 2) and their present status as developing States²⁶ – including eight of them that are classified as least developed countries (LDCs).²⁷

There is considerable variation in the classification of SIDS. Distinctive lists have been adopted by the UN Department of Economic and Social Affairs, UN Conference on Trade and Development (UNCTAD), and the UN Office of the High Representative for the Least Developed Countries, Landlocked

20 OHRLLS, 'About Small Island Developing States' available at <https://www.un.org/ohrlls/content/about-small-island-developing-states>.

21 S Firth, 'Sovereignty and independence in the contemporary Pacific', (1989) 1 *The Contemporary Pacific* 75–96; T Frere, CY Mulalap and T Tanielu, 'Climate change and challenges to self-determination: Case studies from French Polynesia and the Republic of Kiribati', (2020) 129 *Yale Law Journal Forum* 648–673.

22 UN Doc A/CONF.62/L.6; CY Mulalap *et al.*, 'Traditional knowledge and the BBNJ instrument' (2020) *Marine Policy* 104103.

23 UN Doc A/CONF.62/L.6.

24 PG Patil *et al.*, *Toward a Blue Economy: A Promise for Sustainable Growth in the Caribbean* (World Bank, Washington, DC, 2016) available at <https://openknowledge.worldbank.org/handle/10986/25061>.

25 H Harden-Davies *et al.*, *Science in Small Island Developing States Capacity Challenges and Options Relating to Marine Genetic Resources of Areas Beyond National Jurisdiction, Report for the Alliance of Small Island States* (University of Wollongong, Australia, 2020) 34–39; Patil *et al.* (n 24).

26 Firth (n 21); Frere, Mulalap and Tanielu (n 21).

27 According to the UN, the classification of LDCs is based on per capita gross national income, the human assets index and the economic vulnerability index. In February 2022, the following SIDS are considered LDCs: Comoros, Guinea-Bissau, Haiti, Kiribati, São Tomé e Príncipe, Solomon Islands, Timor-Leste, and Tuvalu (OHRLLS, 'Profiles of LDCs' available at <https://www.un.org/ohrlls/content/profiles-ldcs>).

Developing Countries, and Small Island Developing States (UNOHRLLS).²⁸ Against this backdrop, this study follows the list of UNOHRLLS that comprises a group of 38 islands and low-lying States and 20 territories classified either as non-self-governing or non-members of the UN (Table 1).

SIDS influence on international law-making pertaining to the oceans can be examined in stages marked by (i) the numeric increase in independent SIDS participating in intergovernmental negotiations and (ii) the establishment of SIDS as a special interest group.

A Chronology of SIDS Participation in International Forums Pertaining to the Ocean

The increased participation of SIDS in negotiations was fundamental to insert their interests in the international law of the sea. Only Cuba, the Dominican Republic, and Haiti represented SIDS at UNCLOS I.²⁹ As a result, the outcome of the negotiations did not reflect their aspirations when compared with UNCLOS III.

With the benefit of hindsight, UNGA Resolution 1514(XV) of 1960,³⁰ which declared the granting of independence to countries and peoples, was a defining moment in the process of decolonisation and was followed by an increase in the number of independent SIDS.³¹ Of the 29 States members of the group of C&PSIDS, 18 were at the concluding meeting of UNCLOS III. Some territories, notably SIDS located in the Pacific, participated as UN Trust Territories, achieving a certain degree of representation.³² Such an increase in number likely assisted in asserting rights favouring their interests in the Convention.³³ However, SIDS' full participation at UNCLOS III was still likely compromised because many were not independent at that time or already were sovereign but lacked the expertise and human resources to engage in all topics discussed.

28 Davis and Quentin (n 6); Hume *et al.* (n 6).

29 United Nations Conference on the Law of the Sea, 'List of delegations' available at https://legal.un.org/diplomaticconferences/1958_LOS/docs/english/vol_2/delegations.pdf.

30 UN Doc A/RES/1514(XV).

31 *Legal Consequences of the Separation of the Chagos Archipelago from Mauritius in 1965*, Advisory Opinion, *ICJ Reports 2019*, p. 95, para 150 [Chagos Advisory Opinion]. The absence of many States from UNCLOS I and II was acknowledged by UNGA as one of the reasons for a reformed regime for the ocean in preambular paragraphs of Resolution 2750(XXV) (UN Doc A/RES/2750(XXV)).

32 This was the case for Western Samoa, Nauru, Papua New Guinea, Micronesia, Marshall Islands, Northern Mariana Islands and Palau (UN Doc A/CONF.62/119).

33 UN Doc A/CONF.62/119; Davis and Quentin (n 6).

Moreover, without a group to speak on their behalf, some of their claims fell within the agenda of overarching groups (e.g., G77).³⁴

Discussions on adopting a different treatment for developing island countries were inaugurated on the international stage during the 1960s and 1970s in the context of adopting a New International Economic Order (NIEO) championed by UNCTAD.³⁵ Between 1976 and 1982, following UNCTAD's work, UNGA adopted resolutions compelling developed countries and UN organisations to adopt rules and actions to improve developing island nations economies, transport systems, access to technology, and response to natural disasters. Nonetheless, these efforts lost momentum at UNCTAD between 1987 and 1992.³⁶ Consequently, the LOSC does not harbour special rules dedicated to SIDS.

On the environmental front, during the 1980s, the discovery that human activities can alter the climate system and increase sea level motivated the creation of a collective bloc in international negotiations to address the concerns of small islands.³⁷ Following the Small States Conference on Sea-Level Rise in 1989, at the Second World Climate Conference, the Alliance of Small

34 UN Doc A/CONF.62/WS/27. In the Chagos Advisory Opinion (n 31), the ICJ raised questions on a party's full capacity to consent when it is still under the authority of other States. The Primer Minister of the Cook Islands underlined a similar argument during the negotiations of UNCLOS III, stating that 'he was impressed by the consideration that the Conference was giving to the developing States, but he also felt some concern as to whether the circumstances of small island States such as his own were fully appreciated by those who had the influence and strength to decide the matters before the Conference.... He hoped that the Conference would pay special attention to small island States. In appealing for recognition of their position, he included his neighbours in the Pacific, some of which were not directly represented at the Conference. Those States, like his own, were dependent on the sea: it did not seem reasonable that they should also be deprived of the full benefits of an economic zone' (UN Doc A/CONF.62/SR.46). There were indeed topics where SIDS successfully protected their interests. For instance, since UNCLOS I, Indonesia and the Philippines have sought to advance the archipelagic State concept without success. At UNCLOS III, they were joined by newly independent SIDS aspirants for archipelagic status, that is, Fiji, Mauritius, Tonga, Papua New Guinea, and the Bahamas, and managed to develop a regime for archipelagos. Anand (n 16), at pp. 202, 213; SN Nandan and KE Dalaker, *Reflections on the Making of the Modern Law of the Sea* (Ridge Books, Singapore, 2021) 84–90.

35 The NIEO was a response to developing States' demands to replace the economic order of that time, which was predicated on the principles of liberalism and the free market, for a system that would ensure substantive and procedural equality. See J Grote, 'The Changing tides of small island States discourse: A historical overview of the appearance of small island States in the international arena' (2010) 43 *Law and Politics in Africa, Asia and Latin America* 164–191; Hume *et al.* (n 6).

36 Grote (n 35).

37 *Ibid.*

Island Developing States (AOSIS) was established.³⁸ It assembled the already existing Caribbean Community (CARICOM), Indian Ocean Commission, and Pacific Island Forum³⁹ and successfully advanced environmental principles in international law by demonstrating the common concerns of SIDS regarding climate change.⁴⁰

Another landmark was the 1992 United Nations Conference on Environment and Development (UNCED) at Rio de Janeiro. The legal and policy instruments adopted at UNCED acknowledged the strong connection of SIDS with the ocean and their vulnerability to changes therein.⁴¹ Since then, many international agreements relating to sustainable development have dedicated rules for SIDS, including stressing the need to build their human and technological capacities.⁴² However, most of these instruments are either political commitments or lack legal binding force.

Large Ocean States in the Forefront of Current Discussions on Ocean Governance

In recent times, SIDS have championed debates about equitable access to marine scientific knowledge and technology at different levels of the political and legal fronts. An example of this is the inclusion of the topic ‘capacity-building in science and technology for SIDS’ in the UNGA’s yearly resolutions on oceans and the law of the sea.⁴³ Equally relevant was their influence on adopting the stand-alone Sustainable Development Goal on the ocean and

38 PS Chasek, ‘Margins of power: Coalition building and coalition maintenance of the South Pacific Island States and the Alliance of Small Island States’ (2005) 14 *Review of European, Comparative & International Environmental Law* 125–137; Grote (n 35).

39 The Pacific Islands Forum (PIF) was established in 1971, and was previously called the South Pacific Forum. Currently, the Pacific Small Islands Developing States (PSIDS), which includes the members of the PIF except Australia and New Zealand, is the primary group representing the Pacific Islands at the United Nations. See F Manoa, ‘The new Pacific diplomacy at the United Nations: The rise of the PSIDS’ in G Fry and S Tarte (eds), *The New Pacific Diplomacy* (ANU Press, Australia, 2015) 89–91.

40 TN Slade, ‘The making of international law: The role of small island States’ (2003) 17 *Temple International and Comparative Law Journal* 531–543.

41 Davis and Quentin (n 6).

42 Slade (n 40). For instance, see UN Docs A/RES/66/288 and A/65/69, para 323. For the purpose of this article, capacity development is understood as ‘a perpetually evolving process’ in which ‘individuals, organizations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time’ (UN Doc A/65/69, para19). The terms capacity building and capacity development are used interchangeably in this article.

43 For instance, see UN Docs A/RES/74/19, A/RES/74/18, A/RES/73/124, A/RES/72/73.

climate, which prescribes targets directed to SIDS.⁴⁴ The recent emphasis on climate change and sea level rise in the work of the UNGA and the International Law Commission (ILC) was an additional consequence of SIDS' advocacy.⁴⁵

Furthermore, the groups representing SIDS – particularly AOSIS, CARICOM, and PSIDS – have been highly influential in the ongoing negotiations of an implementing agreement on biodiversity beyond national jurisdiction (BBNJ).⁴⁶ Amongst other topics, these groups have championed the importance of traditional knowledge and ecological connectivity in ABNJ; asked for a revision of the common heritage of humankind principle; advocated the implementation of the obligation in the LOSC to transfer technology and scientific knowledge; and sought fair and equitable mechanisms for sharing the benefits of marine genetic resources.⁴⁷

Notwithstanding the awareness raised by SIDS' advocacy, given the LOSC's role as the core legal instrument regulating activities at sea and the persistent asymmetries in the distribution of capacities in marine sciences, one might wonder whether the legal framework can respond to the needs of SIDS in the twenty-first century.⁴⁸

Is the Framework Governing MSR at the LOSC Fit for Purpose to Address the Needs of SIDS in the Twenty-First Century?

In the 40 years since UNCLOS III was concluded, it is impossible to determine how the Convention would look if SIDS had been a negotiating group in the 1950s and 1970s. Nevertheless, the preamble of LOSC stresses the aim to facilitate the study of the marine environment by all States. Likewise, it would be expected from an international treaty considered as the 'constitution of the ocean' that mechanisms to incorporate social changes over time would be included. The suitability of the laws regulating MSR to strengthen

44 Manoa (n 39), at p. 97; G Quirk and Q Hanich, 'Ocean diplomacy: The Pacific Island countries' campaign to the UN for an ocean Sustainable Development Goal' (2016) 1 *Asia-Pacific Journal of Ocean Law and Policy* 68–95.

45 For instance, see UN Docs A/75/70, A/64/350, A/74/10.

46 EM De Santo *et al.*, 'Stuck in the middle with you (and not much time left): The Third Intergovernmental Conference on Biodiversity beyond National Jurisdiction' (2020) 117 *Marine Policy* 103957; Vadrot, Langlet and Wysocki (n 7); UN Doc A/RES/72/249.

47 De Santo *et al.* (n 46); Vadrot, Langlet and Wysocki (n 7); Harden-Davies *et al.* (n 25); Popova *et al.* (n 6); A Rogers *et al.*, 'Marine genetic resources in areas beyond national jurisdiction: Promoting marine scientific research and enabling equitable benefit sharing' (2021) 8 *Frontiers in Marine Science*.

48 Isensee (n 5).

SIDS' scientific and technological needs begins by assessing their participation in negotiating the consent regimes for MSR at UNCLOS I and III.

SIDS Participation in Establishing the Consent Regimes for MSR

SIDS Participation in UNCLOS I

UNCLOS I was convened in 1958, and, at its conclusion, four conventions were adopted, including the CSC, the first to regulate MSR.⁴⁹ The disagreement at the core of the CSC negotiation was the expansion of coastal States' rights over the continental shelf. In addition, developing States requested the revision of the long-standing principle of the freedom of the seas, which, in light of technological developments, was said to benefit developed States mainly.⁵⁰

Eighty-six States participated in the negotiations, of which the representatives of the C&PSIDS were only Cuba, the Dominican Republic, and Haiti.⁵¹ They worked with other developing States, particularly in Latin America, on matters of common concern.⁵²

Article 5(1) of the CSC precludes any exploratory activity on the continental shelf by coastal States from unjustifiably interfering with 'fundamental oceanographic or other scientific research carried out with the intention of open publication' taking place on the high seas.⁵³

A proposal from Indonesia introduced the requirement of prior consent from coastal States for any research 'concerning the shelf and undertaken there' (Article 5(8), CSC).⁵⁴ With a French proposal, this prerequisite was balanced with the duty to 'normally' provide it when the project (i) is submitted by a 'qualified institution,' (ii) seeks 'purely [to conduct] research into the physical or biological characteristics of the continental shelf,' (iii) aims to have

49 The other treaties are: Convention on the Territorial Sea and the Contiguous Zone (Geneva, 29 April 1958, in force 10 September 1964) 516 *UNTS* 205; Convention on the High Seas (Geneva, April 1958, in force 30 September 1962) 450, *UNTS* 82; and Convention on Conservation of the Living Resources of the High Seas (Geneva, 29 April 1958, in force 20 March 1966) 559, *UNTS* 825. The Optional Protocol of Signature concerning the Compulsory Settlement of Disputes was also concluded in 1958 (Geneva, 29 April 1958, in force 30 September 1962, 169 *UNTS* 450).

50 Anand (n 16) at 209; FV Garcia-Amador, 'The Latin American contribution to the development of the law of the sea' (1974) 68(1) *American Journal of International Law* 33–50, at p. 44; VM Rangel, 'O novo direito do mar e a América Latina' (1979) 74 *Revista da Faculdade de Direito* 41–51; HT Franssen, 'Developing country views of sea law and marine scientific research' (1973) *Freedom of Oceanic Research* 137–178, at p. 139.

51 United Nations Conference on the Law of the Sea (n 29).

52 Garcia-Amador (n 50), at p. 42.

53 M Gorina-Ysern, *An International Regime for Marine Scientific Research* (Transnational Publishers, New York, 2003) 253.

54 UN Doc A/CONF.13/C.4/L.53.

its results published, and (iv) allows the coastal States' participation or representation in the research (Article 5(8), CSC).⁵⁵

SIDS and developing States' participation in negotiating the rules on MSR was minimal, and no particular statement stressing their perspective on MSR could be found. As a result, the regulation of MSR on the CSC is modest, privileges the freedom of the seas, employs ambiguous terminology, and does not elaborate on coastal States' rights to participate in research projects.⁵⁶ Over time, the increasing number of 'new' States and technological advances contributed to the legal framework's inability to keep pace with the conflicting interests.

SIDS Participation in UNCLOS III

Developing a comprehensive regulation for MSR was on the international agenda since the late 1960s because the Latin American States accused States conducting research in areas under their national jurisdiction of failing to satisfy the obligations to request consent, allow for coastal States' participation, and share samples and data from the research conducted.⁵⁷

The precise legal definition of MSR was problematic for all States. There was consensus that the activity should focus on the marine environment, which is different from 'scientific research,' 'research,' and meteorological data collection.⁵⁸ Parties also agreed that it should fall under a distinctive legal framework than the one applicable to prospecting, exploration, and exploitation.⁵⁹ Nonetheless, no definition for MSR was agreed upon. Consequently, the coastal States' right to provide prior consent for foreign research vessels became the mechanism to determine which activities were classified as such.⁶⁰

55 UN Doc A/CONF.13/C.4/L.56. In accordance with the understanding of the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO), this article uses the terms 'consent' and 'authorisation' as synonyms if not otherwise mentioned. See 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* (2nd ed., DOALOS, New York, 2010).

56 Franssen (n 50), at pp. 140–141.

57 Gorina-Ysern (n 53), at pp. 283, 287.

58 UN Doc A/CONF.62/C.3/SR.46; AHA Soons, *Marine Scientific Research and the Law of the Sea* (TMC Asser Instituut, The Hague, 1982) 125; FHT Wegelein, *Marine Scientific Research: The Operation Status of Research Vessels and Other Platforms in International Law* (Martinus Nijhoff Publishers, Leiden, 2005) 80.

59 Soons (n 58), at pp. 118–125.

60 Chircop (n 4); United Nations (n 55), at p. 29.

Designing the consent regimes in Part XIII of the LOSC demanded the most strenuous compromise from developed and developing States, and coastal and researching States. Initial discussions on Part XIII oscillated between sovereignty and freedom. Trinidad and Tobago proposed the breakthrough compromise consisting of attenuating degrees of control being attributed to the coastal State in each maritime zone.⁶¹ The delegations accepted this proposal, which is why it is accurate to refer to several consent regimes.⁶²

Consent for MSR in the Territorial Sea

In light of coastal State sovereignty, the limits to the freedom of research in the territorial sea were agreed upon from the outset. Article 245 of the LOSC is straightforward in requiring 'express consent' from coastal States for all MSR activities as an 'exclusive right'.⁶³ In complement, undertaking research when engaged in innocent passage, transit passage, and passage through archipelagic sea lanes is considered a breach of 'the peace, good order or security of the coastal State' (Articles 19(j), 40 and 54, LOSC). Similar rights were extended to archipelagic waters.

Consent for MSR in the Exclusive Economic Zone and on the Continental Shelf

Agreeing to the regulation of MSR in the EEZ and on the continental shelf was comparatively more laborious. The compromise established a complex framework of rights and obligations for coastal via-à-vis other States in which Articles 246, 248, and 249 of the LOSC are central.⁶⁴

The right of prior consent from coastal States was maintained in exchange for a reduction of the discretion to deny it under 'normal circumstances,' when the research is for peaceful purposes and aims to increase knowledge of the marine environment for the benefit of humankind (Article 246(3)).⁶⁵

Predicated on coastal States sovereign rights and jurisdiction, the discretion to withhold consent remained when the research (i) is of direct significance for the exploration and exploitation of natural resources; (ii) involves drilling into the continental shelf, the use of explosives, or the introduction of harmful substances in the marine environment; or (iii) comprises the construction of artificial islands, installations, and structures. Coastal States can also deny

61 UN Docs A/CONF.62/C.3/L.9 and A/CONF.62/C.3/SR.13.

62 Nordquist *et al.* 1985 (n 14), at pp. 507–518.

63 *Ibid.*, at p. 495.

64 UN Docs A/CONF.62/L.18 and A/56/58; S Huh and K Nishimoto, 'Article 249' in Proelss (ed) (n 14), at pp. 1680–1681; Jarmache (n 14), at pp. 306–307.

65 UN Doc A/CONF.62/C.3/SR.30.

consent when the project contains inaccurate information about the project's nature and objective and when the researching State has pending obligations from a previous project (Article 246(5)). The former provision was agreed upon to hold researching States accountable for the information provided and enforce its duties, particularly post-cruise obligations.⁶⁶

A restrictive form of consent was agreed upon on the extended continental shelf, where it can only be withheld in areas previously designated for 'exploitation or detailed exploratory operations' (Article 246(6)). Trinidad and Tobago, and other developing States, opposed this form of consent, advocating for the integrity of the continental shelf concept.⁶⁷ However, it ended up being accepted as part of the compromise.

Pre-cruise Obligations

When proposing research in the EEZ or on the continental shelf, researching States must provide coastal States with a description of the project no less than six months before its starting date (Article 248). This obligation allows for an assessment of the nature of the research and whether it is of 'direct significance for the exploration and exploitation of natural resources' (Article 246(5)(a)).⁶⁸

Upon receiving the information, coastal States must communicate a decision within four months, or else consent is implied. Developing States agreed with the list of information to be provided as a basis for the clearance. However, they opposed the adoption of implied consent, arguing that it would lead to a misuse of Part XIII and infringe upon their jurisdiction (Article 252). Additionally, they opined that implied consent would put a burden upon States missing human resources and capacity to clear the consent request on time.⁶⁹ However, once more, they had to accept it to reach a compromise.⁷⁰

Post-cruise Obligations

Developing countries were dissatisfied with the lack of compliance with the post-cruise obligations under the CSC. Hence, in exchange for easing restrictions on MSR in the EEZ and on the continental shelf, developing States focused on advancing the obligations for researching States to comply with during and after a MSR project.⁷¹

66 Huh and Nishimoto (n 14), at p. 1662.

67 UN Docs A/CONF.62/L.50 and A/CONF.62/C.3/SR.42.

68 Huh and Nishimoto (n 64), at p. 1677.

69 UN Docs A/CONF.62/SR.135 and A/CONF.62/C.3/SR.46.

70 UN Doc A/CONF.62/SR.135 and A/CONF.62/WP.10/Add.1.

71 UN Docs A/CONF.62/C.3/SR.9; A/CONF.62/SR.135; A/CONF.62/C.3/L.9; A/CONF.62/C.3/L.13*; CV Kries and G Winter, 'Harmonizing ABS conditions for research and

Springing from coastal States' sovereign rights over the new maritime zones, developing countries set forth ambitious demands, including access to scientific and technical capacities and property over samples, data, and specimens collected.⁷² The agreement ended up following the zonal approach with nuances. Coastal States can impose any conditions in exchange for consent in internal waters, the territorial sea, and archipelagic waters. In the EZZ and on the continental shelf, such discretion is limited to when clearance can be denied. In all other situations, researching States have to comply only with the obligations listed in Article 249 of the LOSC, which are obligations of conduct.

Already established in the CSC, coastal States' right to participate in research through observers remained (Article 249(1)(a)). Additionally, the research results shall be made available internationally. However, to accommodate developing States' concerns over data from resource-related research, in such cases, the publication of the research results can be restrained (Article 249(1)(e) and (2)).⁷³

Researching States have to provide coastal States with preliminary reports 'as soon as practicable,' 'undertake to provide' access to data and samples, and support the latter in the assessment of samples and data if requested (Article 249(1)(a)(b)(c)(d)).⁷⁴ In addition, to avoid significant disturbances to the marine environment, scientific equipment must be removed after the conclusion of the research, if not otherwise agreed (Article 249(1)(g)).

Researching States must inform coastal States of any significant change in the scientific activity; otherwise, the activity might be suspended (Article 249(1)(f)). Non-compliance with post-cruise obligations can justify withholding consent for future MSR projects (Article 246(5)(d)).⁷⁵

Suspension and Cessation of the MSR Project

Coastal States claimed the right to request the suspension and cessation of a MSR project as inherent to the jurisdictional rights over MSR, as established in Article 56(1)(b)(ii), and as a way to guarantee compliance with the pre- and post-cruise obligations.⁷⁶ Despite opposition from researching States, it was agreed that the suspension can be requested if the MSR project is conducted

development under UNCLOS and CBD/NP' in E Chege Kamau, G Winter and P-T Stoll (eds), *Research and Development on Genetic Resources: Public Domain Approaches in Implementing the Nagoya Protocol* (Routledge, London, 2015) 75–90.

72 UN Doc A/CONF.62/SR.135, A/CONF.62/C3/L.9, A/CONF.62/C.3/L.13*.

73 Nordquist et al. 1985 (n 14) at 537–63.

74 UN Doc A/CONF.62/C.3/SR.9.

75 Huh and Nishimoto (n 14) at 1663.

76 UN Doc A/CONF.62/C.3/SR.42.

in a way that differs from the documentation on which the consent was based and the researching State fails to comply with the post-cruise obligations (Article 253(1), LOSC).

The cessation of the MSR project may be requested if the researching State abstains from communicating major changes in the project or if it is unable to rectify the situation that justified the suspension within 'reasonable time' (Article 253(2) and (3)).

As members of the larger group of developing States, SIDS' participation was critical to creating in the 1982 LOSC a more sophisticated regime for coastal States' consent than the one in the 1958 CSC. Of relevance, Trinidad and Tobago's proposed consent regimes were fundamental to resolving this deadlock by harmonising the different interests at stake. It is further suggested that the purpose of the MSR framework was expanded to include the promoting fair and equitable benefit sharing.

Mechanisms in the LOSC to Strengthen the Scientific and Technological Capacity of SIDS

The concept of fair and equitable benefit sharing in international law was first developed under the umbrella of the NIEO, and subsequently incorporated in debates over sustainable development and ecosystem services.⁷⁷ The most notable expression of benefit sharing in the LOSC is the common heritage of humankind (CHH) and regulation thereof in Part XI.⁷⁸

Less noticed, the request for the CHH also carried the claim to 'a natural right to free access to technology'⁷⁹ in the Area, and some States advocated that the findings of international MSR projects should belong to all

77 The Universal Declaration of Human Rights could be considered the first international document to make reference to benefit sharing. It does so exactly in reference to everyone's right 'to share in scientific advancement and its benefits' (Universal Declaration of Human Rights, Geneva, adopted 10 December 1948, UNGA Res 217 A(III), Article 27). Nonetheless, its declaratory nature raises questions on its normative content. See Morgera (n 15).

78 Morgera (n 15); K Mickelson, 'Common heritage of mankind as a limit to exploitation of the global commons' (2019) 30 *European Journal of International Law* 635–663; A Jaeckel, 'Benefitting from the common heritage of humankind: From expectation to reality' (2020) 35 *International Journal of Marine and Coastal Law* (IJMCL) 660–681; A Jaeckel, JA Ardron and KM Gjerde, 'Sharing benefits of the common heritage of mankind: Is the deep seabed mining regime ready?' (2016) 70 *Marine Policy* 198–204.

79 D Yarn, 'The transfer of technology and UNCLOS' (1984) *Georgia Journal of International and Comparative Law* 121–153.

humankind.⁸⁰ Likewise, it has been overlooked that Ambassador Arvid Pardo's statement also prompted discussions about the right to access marine technology, scientific knowledge, and data in other maritime zones as springboards to the right to development.⁸¹

Although there are inconsistencies related to the concept of fair and equitable benefit sharing (see footnote 15), the production and use of knowledge are accepted as triggers to international benefit-sharing obligations in the context of the human right to science.⁸² Therefore, the need to share benefits from MSR projects was not only prompted by Ambassador Arvid Pardo, it is inherently linked to a human right, even if Part XIII does not make a direct reference to it.

Legal instruments rarely provide an exhaustive list of benefits, but some examples can be identified. The International Treaty on Plant Genetic Resources for Food and Agriculture mentions the exchange of information, access to and the transfer of marine technology, capacity building, and the sharing of monetary and other benefits of commercialisation.⁸³ The World Health Organization Pandemic Influenza Preparedness Framework focuses on allocating vaccines, antivirals and diagnostic materials, pandemic surveillance and risk assessment, sharing information, capacity building, and the transfer of technology and know-how as modalities of benefits to be shared.⁸⁴ The Convention on Biological Diversity expressly refers to promoting access to marine genetic resources, the transfer of technology and access to funding as benefits.⁸⁵ Annex 1 to the Nagoya Protocol cites monetary and non-monetary benefits, including sharing research and development results, cooperation in scientific research, training and capacity building, admittance to databases,

80 UN Doc A/CONF.62/C.3/SR.9. Indeed, the LOSC (n 8) connects the purpose of MSR in the Area to benefit all humankind (Article 143(1)).

81 UN Doc A/CONF.62/C.3/SR.8.

82 E Morgera, 'Fair and equitable benefit-sharing: History, normative content and status in international law' (22 June 2017) available at <https://doi.org/10.2139/ssrn.2956927>; E Morgera, 'Fair and equitable benefit-sharing at the cross-roads of the human right to science and international biodiversity law' (2015) 4 *Laws* 803–831.

83 International Treaty on Plant Genetic Resources for Food and Agriculture (Rome, 3 November 2001) 2400 *UNTS* 303.

84 World Health Organization (WHO), *Pandemic Influenza Preparedness Framework for the Sharing of Influenza Viruses and Access to Vaccines and Other Benefits* (WHO Doc WHA64.5, 24 May 2011).

85 Convention on Biological Diversity (CBD) (Rio de Janeiro, 5 June 1992, in force 29 December 1993) 1760 *UNTS* 79.

TABLE 3 Modalities of benefits to strengthen scientific and technological capacities of SIDS considered for this study



		LOSC Article
Training and Capacity Building 	Consent regimes	
	Participate or be represented on board of vessels, craft, or installations	249(1)(a)
	Receive support to assess and interpret data, samples, and information	249(1)(d)
International cooperation		
	Training and capacity development	244(2)
	Create favourable conditions for MSR and integrate the efforts of scientists	243
	Strengthen the MSR capabilities of developing States	244(2)
	Promote studies and programmes on scientific research about marine pollution	200
	Promote programmes of scientific, educational, technical and other assistance to developing States for the protection and preservation of the marine environment, preparation of environmental assessment, and prevent pollution	202(a)(c)
	Training and education of nationals of developing States	268(d)
	Promote the exchange of scientists and experts	269(c)
Access to Data, Samples, Information and Knowledge 	Consent regimes	
	Access data, samples, information, and knowledge	249(1)(b)(c)
	International cooperation	
	Promote the flow of data and information, including preventing and controlling damage to the health and safety of persons and the marine environment	242(2)

TABLE 3 Modalities of benefits to strengthen scientific and technological capacities (*cont.*)



		LOSC Article
	Disseminate on proposed major programmes and their objectives	244(1)
	Encourage the exchange of data and information on marine pollution	200
	Facilitate the acquisition, evaluation and dissemination of marine technological knowledge, information and data	268(a)
Enable Research Infrastructure	International cooperation	
	Supply developing States with equipment, facilities and capacity to manufacture thereof to protect and preserve the marine environment and minimise the effects of major incidents	202(a)(b)
	Preferential treatment for developing States in the allocation of funds and technical assistance for the prevention, reduction and control of pollution	203(a)
	Preferential treatment for developing States to utilise the specialised services of international organisations	203(b)
	Development of marine technology and technological infrastructure	268(b)(c)
	Establishment of and strengthening of national marine scientific and technological research centres	275
	Establishment of regional marine scientific and technological research centres	276
Establish Legal and Policy Framework	Consent regimes	
	Establishment of general criteria and guidelines to assist in ascertaining the nature and implications of MSR	251

TABLE 3 Modalities of benefits to strengthen scientific and technological capacities (*cont.*)

	LOSC Article
International cooperation	
Elaborating agreements to create favourable conditions for MSR projects	243
Establish rules, standards, procedures and recommended practices for the prevention, reduction and control of pollution of the marine environment	201
Conclude contracts and agreements under equitable and reasonable conditions for the acquisition of marine technology	269(b)
Establish guidelines, criteria and standards for the transfer of marine technology	271

SOURCE: PREPARED BY THE AUTHOR

transfer of knowledge, information and technology, and legal and policy support.⁸⁶

Springing from the examples above, all the needs of SIDS in the twenty-first century guiding this study – namely, training and capacity development, technological infrastructure, access to data, information, and knowledge, and assistance to develop legal and policy frameworks – are accepted modalities of benefits (Table 3). An attentive reading of the LOSC reveals that those benefits are found within the rules on the consent regimes for MSR, international cooperation on MSR, and obligations to transfer marine technology. This section focuses on examining whether and how the consent regimes provide opportunities to share the benefits from MSR activities, briefly commenting on how measures to strengthen science and technology capacities are manifested in the other mechanisms.

86 Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (Nagoya, 29 October 2010, in force 12 October 2014), CBD Decision X/1 (2010), Annex I.

Consent Regimes for MSR in the 1958 CSC and the 1982 LOSC

Turning first to the 1958 CSC, the proposal of a prior consent introduced by Indonesia in Article 5(8) aimed at satisfying the coastal State with the bona fides of a proposed MSR project.⁸⁷ Hence, the parties intended to preserve the freedom of scientific research while providing coastal States with safeguards to protect national security and rights over resources.

Scholars agree that participation should occur at every stage of an MSR project, including during the preparatory work and when accessing raw data for the analytical phase. Nevertheless, slim consideration has been paid to the purpose of this participation or to the legal consequences of breaching such obligation.⁸⁸

From the records consulted, no debates on the conditions permitting the withholding of consent were found. This absence can be explained because these conditions were inspired by resolutions of the International Science Council (ICSU), which acknowledged the scientific community's awareness of the security and resource interests involved in coastal States' rights over the continental shelf.⁸⁹

A survey of municipal laws and State practices related to the 1958 CSC confirmed that coastal States' consent served to assess the project's scientific nature and its repercussions for exploiting resources and national security.⁹⁰ However, States were also using the consent process to increase knowledge about the continental shelf and to pursue capacity building.⁹¹

Judicial interpretations of the consent's purpose and the discretion to withhold it are limited by the nonexistence of a procedure for dispute settlement in the CSC. The *Aegean Sea Continental Shelf* case had in its background the distinction between MSR and exploration and the obligation to request prior consent.⁹² Nonetheless, the International Court of Justice found no jurisdiction to adjudicate this case.⁹³ Therefore, based on the *travaux préparatoires* and subsequent practice, coastal State consent served the sole purpose of attesting that no exploratory or military aims were in the background of a proposed scientific research project.

Turning to the 1982 LOSC, it was the outcome of comprehensive negotiations in which developing countries pursued a more equitable international order

87 UN Doc A/CONF.13/C.4/L.53.

88 Gorina-Ysern (n 53), at p. 271; Soons (n 58), at p. 75.

89 Gorina-Ysern (n 53), at p. 234.

90 *Ibid.*, at p. 274.

91 Soons (n 58), at p. 75.

92 *Aegean Sea Continental Shelf (Greece v. Turkey)*, Judgment, *ICJ Reports* 1978, p. 3.

93 *Ibid.*

alongside related projects such as the NIEO. Following Trinidad and Tobago's proposal, a plethora of consent regimes were established, differing according to each maritime zone under the coastal State's jurisdiction. Developing States made numerous attempts to connect the obligation to grant consent for MSR to the sovereign rights to conserve and manage natural resources and the rights to access scientific knowledge and research infrastructure. By doing so, it is suggested that the purpose of the consent regimes was expanded compared to what was agreed upon in the 1958 CSC to include the sharing of benefits.

Looking back at the historical records, developing States went beyond concerns over security and resource-related activities, requesting researching States to consider national scientific and technology needs when proposing MSR projects in maritime areas under their jurisdiction.⁹⁴ For instance, on one occasion, the representative of Cuba stressed that

in the case of the developing countries, in particular, that right [of access to the data obtained through scientific research] would have no substance unless it was accompanied by regulations governing the transfer of technology, the training of specialists and scientists from those countries, and the development of research facilities to analyse and utilize such data in the national interest.⁹⁵

On another occasion, the representative of Nigeria proposed that 'the coastal State whose territory was involved could participate in the research and share in the benefits of the data obtained therefrom'.⁹⁶

Developed States took into account such requests and, to an extent, accepted them. For instance, when describing matters of consideration, the Canadian delegation explained that

within areas under their jurisdiction, however, the developing States wanted to have some voice in setting the priorities for such research and to participate not only in the execution of scientific ventures by outside agencies but also in the planning and follow-up of those ventures to obtain training for their technical and scientific personnel and strengthen their research capabilities.⁹⁷

⁹⁴ UN Docs A/CONF.62/C.3/SR.9, A/CONF.62/C.3/SR.30, and A/CONF.62/C.3/SR.8.

⁹⁵ UN Doc A/CONF.62/C.3/SR.9; see also UN Docs A/CONF.62/C.3/SR.41, A/CONF.62/C.3/SR.42.

⁹⁶ UN Docs A/CONF.62/SR.135, A/CONF.62/C.3/SR.9.

⁹⁷ UN Doc A/CONF.62/C.3/SR.9.

However, developed States avoided using technology transfer and scientific benefits as a bargain in exchange for MSR approval.⁹⁸

The request to accommodate the sharing of benefits within the purpose of the consent regimes – and Part XIII – can also be inferred from the resolution on development of national marine science, technology and ocean service infrastructures approved in Annex VI. The resolution affirms the LOSC's purpose to provide the same weight to promoting the equitable and efficient utilisation of marine resources and the study, protection, and preservation of the marine environment. It also stresses that developing States need to share in marine science and technology achievements.⁹⁹

Although limited and quite outdated, information on the practice of States reveals a common understanding that post-cruise obligations entail capacity building and other opportunities.¹⁰⁰ Moreover, certain coastal States have conditioned the clearance on assurances of participation, data information exchange, and/or protection of the marine environment.¹⁰¹

Judicial interpretations on the purpose of the consent regimes and related obligations are constrained by Article 297(2), which authorises the coastal State to opt out of the compulsory dispute resolution mechanism controversies related to the coastal State's right to withhold consent and to request the suspension of a MSR project.¹⁰²

98 UN Doc A/CONF.62/C.3/SR.8.

99 UN Doc A/CONF.62/120.

100 Affirmations on State practice rely on different sources. First, from 2002 to 2008, the Advisory Body of Experts on the Law of the Sea (ABE-LOS) of the IOC UNESCO collected data on the State practice of its members in implementing Part XIII and provided recommendations on how to improve it (EJ Tirpak, 'Practices of States in the Fields of Marine Scientific Research and Transfer of Marine Technology: An Update of the 2005 Analysis of Member State Responses to Questionnaire No. 3', Doc IOC/ABE-LOS VIII/8 (2009) available at <https://unesdoc.unesco.org/ark:/48223/pf0000218773> United Nations (n 55)). This initiative was discontinued in 2011. Second, the compilation of State practice made by Gorina-Ysern (n 53) over fourteen years assessed, in particular, the recordings of the State Department of the United States. Third, Roach compiled challenges faced in enforcing Part XIII through the perspective of the United States (J Ashley Roach, *Excessive Maritime Claims* (4th edn, Brill Nijhoff, Leiden, 2021) 510). The last source comes from a report commissioned by AOSIS, published in 2020, about the capacity and challenges faced by Member States in accessing and managing marine genetic resources in ABNJ (Harden-Davies *et al.* (n 25)).

101 United Nations (n 55), at p. 31; Tirpak (n 100); Gorina-Ysern (n 53), at p. 334; Huh and Nishimoto (n 64), at p. 1681.

102 M Gorina-Ysern, 'Marine scientific research: Overview of major issues, programmes and their objectives' in HD Smith, JLS de Vivero and TS Agardy (eds), *Routledge Handbook of Ocean Resources and Management* (Routledge, London, 2015) 127–142. Conversely, scholars argue that Article 297(2) does not exclude all options of legal appreciation of the consent

Some scholars concur that post-cruise obligations can be considered benefits in the sense of those set forth by the Nagoya Protocol.¹⁰³ However, international law scholarship lacks a detailed assessment demonstrating it.

Modalities of Benefits to Strengthen Scientific and Technological Capacities of SIDS Related to the Consent Regimes

The expansion of the consent regimes' purpose to include measures to strengthen developing countries' scientific and technological capacities was followed by the addition of new post-cruise obligations. Therefore, when using its sovereign rights over natural resources to grant consent in areas under national jurisdiction, coastal States prompt the right to benefit from the MSR project.

In internal waters, the territorial sea, and archipelagic waters, the coastal State enjoys full discretion to set conditions to enhance science and technology capacities, including monetary benefits (Article 245) such as access fees.¹⁰⁴ In the EEZ and on the continental shelf, such discretion is limited to when coastal States can withhold consent, including in the case of resource-related research (Articles 246(5(a)) and 249(2)).¹⁰⁵ Generally, the conditions must be previously determined in municipal laws and regulations (Article 249(2)).

Article 249 enumerates obligations that researching States have to comply with during and after a cruise. Predicated on the similarity between the benefits listed in Article 249 and those in other legal instruments and on the debates during UNCLOS III, it is fair to conclude that the consent regime's purposes expanded its scope from only surveillance to include enhancing the marine science and technology capacities of developing States.

The enforcement of almost all the post-cruise obligations is conditioned to 'when practicable', 'as soon as practicable,' and when requested by the coastal State. Conversely, the obligation to inform coastal States of any significant change in the scientific activity is the only obligation with direct applicability and can justify the suspension or cessation of the MSR project.¹⁰⁶

regimes. For instance, the duty to provide consent under 'normal circumstances' and to establish rules and procedures ensuring the authorization will not be delayed or denied unreasonably would still be under the binding dispute settlement mechanism. This interpretation would not favour States with reduced human resources to process the consent request rapidly and without legal capacity to establish detailed rules on the matter. See Roach (n 102), at p. 519.

103 Salpin (n 12); Kries *et al.* (n 71).

104 Salpin (n 12).

105 *Ibid.*; Huh and Nishimoto (n 64), at p. 1689.

106 Nordquist *et al.* 1985 (n 14), at p. 551; Gorina-Ysern (n 53), at p. 339.

The existing State practice demonstrates that coastal States, including SIDS, rely on the capacity-building opportunities and scientific data enabled by foreign scientists. Access to data, samples, and results has been pointed out as a relevant mechanism of non-monetary benefits.¹⁰⁷ However, it has been reported that local needs are rarely considered in the planning. Additionally, the enjoyment of benefits has been impinged by a lack of human or technical resources, an inability to understand the language in which the information is provided, and/or property rights implications.¹⁰⁸ It has also been reported that researching States have occasionally failed to comply with post-cruise obligations, particularly with sharing final reports.¹⁰⁹ Such a situation could trigger the use of Article 246(5)(d), denying permission for future MSR applications.

International Cooperation in MSR

Promoting international scientific cooperation was the backbone of the MSR regime from the outset, mainly due to the high costs of performing science at sea.¹¹⁰ Such a framework cross-cuts all maritime spaces and potentially facilitates procedures of granting consent and fulfilling pre-and post-cruise obligations.

The historical records attest that enabling the scientific and technological capabilities of developing States, including transferring technology and sharing data, was within the scope of section two of Part XIII.¹¹¹ In effect, the language of benefit sharing emerges from the general obligation of States and international organisations to encourage collaboration ‘on the basis of mutual benefit’ (Article 242(1)).

The promotion of international cooperation entails (i) *with regards to the planning and operational stages*, the creation of favourable conditions for undertaking research and building the autonomous science and technology capacities of developing States (Articles 143 (3)(a)(b), 243, 244(2)) and (ii) *with regards to the assessment and integration of information*, the exchange of data, information, and knowledge, including the necessity to prevent and control

107 United Nations (n 55), at pp. 30–31; Tirpak (n 100).

108 United Nations, *ibid.*, at p. 35; Tirpak, *ibid.*

109 UN Doc A/56/121; Gorina-Ysern (n 53), at p. 178.

110 Y Tanaka, *A Dual Approach to Ocean Governance: The Cases of Zonal and Integrated Management in International Law of the Sea* (Routledge, London, 2016) 346; I Papanicolopulu, ‘Article 242’, in Proelss (ed) (n 14), at p. 1632; EJ Hind *et al.*, ‘Fostering effective international collaboration for marine science in small Island States’ (2015) 2(86) *Frontiers in Marine Science* 1–7; Vierros and Harden-Davies (n 6); B Maas *et al.*, ‘Women and Global South strikingly underrepresented among top-publishing ecologists’ (2021) 14(4) *Conservation Letters* e12797.

111 UN Docs A/CONF.62/C.3/SR.8, A/CONF.62/C.3/SR.9.

damage to the health and safety of persons and the marine environment, particularly for developing States (Articles 143(3)(c), 242(2), 244).¹¹² It is worth noting the similarity of these benefits to those listed in other legal instruments dealing with benefit sharing.

Outside of Part XIII, scientific cooperation and knowledge exchange are significant elements in protecting the marine environment, considering the transboundary effects of pollution of the marine environment (Articles 197, 200, 201, 202, 205). Additionally, most of the provisions to develop and transfer marine technology in the LOSC are rooted in international scientific cooperation (e.g., Articles 266, 269, 270, 271, 272, 273, 275, 276, 278).¹¹³

International organisations have a primary mandate to promote cooperation. At the global level, most of the efforts made by the UN to develop SIDS's science and technology capacities are prompted through cooperation.¹¹⁴ Many efforts have been made to implement capacity-building programmes and to share data and knowledge related to MSR, including legal and policy aspects. Some examples include the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC UNESCO), the Division for Ocean Affairs and the Law of the Sea, the International Maritime Organization, the World Maritime University, the International Seabed Authority (ISA or the Authority), the Food and Agriculture Organization of the United Nations, the United Nations Environment Programme, and the World Meteorological Organization (WMO).¹¹⁵ Of particular relevance, IOC UNESCO has the mandate to follow the implementation of Parts XIII and XIV and to establish criteria and guidelines connected with such topics (Article 251).¹¹⁶

At subregional and regional levels, AOSIS, CARICOM, the Indian Ocean Commission, PSIDS, the Organization of Eastern Caribbean States, regional fisheries bodies, Regional Seas Programmes, and the Commonwealth Secretariat have championed partnerships to develop science and technology capacities.¹¹⁷

112 Harden-Davies and Snelgrove (n 17); Papanicolopulu (n 110), at pp. 1634–1635; United Nations (n 55), at p. 27.

113 Harden-Davies and Snelgrove, *ibid.*

114 For instance, see UN Docs A/65/69, A/RES/70/235*, A/RES/69/15, A/74/350, A/75/340.

115 UN Doc A/65/69; United Nations (n 55); Gorina-Ysern (n 53), at pp. 551–558; Gorina-Ysern (n 102).

116 For instance, UN Doc IOC/INF-1222.

117 Gorina-Ysern (n 53), at pp. 537–558; R Billé *et al.*, 'Regional oceans governance: Making regional seas programmes, regional fishery bodies and large marine ecosystem mechanisms work better together' in PALD Nunes, LE Svensson, and A Markandya (eds), *Handbook on the Economics and Management of Sustainable Oceans* (Edward Elgar Publishing, Cheltenham, 2017) 493–518; J Rochette and R Billé, 'Bridging the gap between

Funding has been enabled by the World Bank, Global Environment Facility, regional development banks, and the ISA Endowment Fund. The work of non-governmental organisations on these matters has also been acknowledged.¹¹⁸

The Ocean Science Center Mindelo in Cape Verde resulted from a successful case of international cooperation between States.¹¹⁹ Another example is the implementation strategy offered in the Belem Statement.¹²⁰

However, despite international cooperation being a relevant mechanism in promoting the sharing of benefits from MSR projects, recent studies demonstrate that developing States' participation in scientific collaboration is unsatisfactory.¹²¹ Therefore, similar to the conclusion concerning consent regimes, implementation of the laws governing international cooperation is inadequate.

Beyond Part XIII, a last mechanism in the LOSC able to enable scientific and technological capacities of SIDS is the framework governing the transfer of marine technology.¹²²

Transfer of Marine Technology

The LOSC enshrined two sets of rules regarding the transfer of marine technology. The first is within Part XI, setting mandatory obligations on the Authority and State Parties to facilitate marine technology transfer to the Enterprise and developing States in the Area (Article 144, LOSC; Article 5, Annex III).¹²³ The second is in Part XIV, where States, competent international organisations, and the Authority are subject to precatory obligations to foster the transfer of

legal and institutional developments within regional seas frameworks' (2013) 28(3) *IJMC* 433–463; N Oral, 'Forty years of the UNEP Regional Seas Programme: From past to future' in R Raufyse (ed), *Research Handbook on International Marine Environmental Law* (Edward Elgar Publishing, Cheltenham, 2015) 339–362.

118 UN Doc A/65/69.

119 A Polejack and LF Coelho, 'Ocean science diplomacy can be a game changer to promote the access to marine technology in Latin America and the Caribbean' (2021) 6 *Frontiers in Research Metrics and Analytics* 1–11.

120 Rogers *et al.* (n 47); A Polejack, S Gruber and MS Wisz, 'Atlantic ocean science diplomacy in action: The Pole-to-Pole All Atlantic Ocean Research Alliance' (2021) 8 *Humanities and Social Sciences Communications* 1–11.

121 P Tolochko and ABM Vadrot, 'The usual suspects? Distribution of collaboration capital in marine biodiversity research' (2021) 124 *Marine Policy*; Hind *et al.* (n 10).

122 M Pavliha and NM Gutiérrez, 'Marine Scientific Research and the 1982 United Nations Convention on the Law of the Sea' (2010) 16 *Ocean and Coastal Law Journal* 115–133; Long (n 14).

123 According to Article 170(1) of the LOSC (n 8), the Enterprise 'shall be the organ of the Authority which shall carry out activities in the Area directly, pursuant to Article 152, paragraph 2(a), as well as the transporting, processing and marketing of minerals recovered from the Area'.

technology and scientific knowledge and develop regional and local scientific infrastructure and human capacity.¹²⁴

Following uncertainty over the worldwide acceptance of the LOSC, the 1994 Agreement changed the regime governing the seabed set up in 1982, favouring developed States' interests.¹²⁵ The new compromise agreement replaced the mandatory duty in Part XI to transfer technology to developing States or the Enterprise with the due regard obligation of cooperation to that end.¹²⁶

Promoting a fair and equitable share of benefits is also visible in the language used in Part XIV. For instance, the transfer of marine science and technology must be promoted on 'fair and reasonable terms and conditions' (Article 266(1)), 'for the benefit of all parties concerned on an equitable basis' (Article 266(3)), and in 'equitable and reasonable conditions' (Article 269(b)).¹²⁷

The connection between Part XIII and Part XIV, initiated at the negotiations of UNCLOS III, is noticeable when comparing the two and assessing the consequences of implementing each.¹²⁸ For instance, inasmuch as obligations under Part XIV aim to foster marine scientific capacities and infrastructure and facilitate MSR (e.g., Articles 266, 270, 275, 276), the enforcement of these rules would be beneficial to fulfilling obligations under Part XIII.¹²⁹

Despite international efforts, the implementation gap of Part XIV is noticeable.¹³⁰ Equally to what has been pointed out regarding Part XIII, existing State practice reveals that limited human and financial resources, reduced sustained funding, property rights implications, and reports of MSR projects using language non-accessible to coastal States have been deterrents.¹³¹

The BBNJ negotiations can address some of these issues, as capacity building and technology transfer are part of the agenda. Albeit uncertainties over its outcome, it is hoped that the new agreement will influence the implementation of Parts XIII and XIV.

124 Yarn (n 81); Pavliha and NM Gutiérrez (n 122).

125 Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982, (New York, 28 July 1994, in force 28 July 1996) 1836 *UNTS* 3; GRB Galindo, "Quem Diz Humanidade, Pretende Enganar?": Internacionalistas e Os Usos Da Noção de Patrimônio Comum da Humanidade Aplicada aos Fundos Marinhos (1967–1994)' (PhD Thesis, University of Brasília, 2006) 339.

126 Jaeckel (n 80).

127 Salpin (n 12).

128 UN Doc A/CONF.62/C.3/SR.8.

129 Harden-Davies and Snelgrove (n 17); Long (n 14).

130 Harden-Davies and Snelgrove, *ibid.*; Salpin (n 12); Long, *ibid.*

131 United Nations (n 55) 35; Tirkpak (n 100).

Intertemporal Aspects of the Framework Governing MSR

The passage of time is a significant aspect when appraising the adequacy of the LOSC to the present.¹³² The doctrine of intertemporal law requires the interpreter to balance a static and a dynamic element in interpreting treaties.¹³³ Whereas the former provides legal stability, the latter, in the case of the LOSC, assures the progressive achievement of the Convention's objective and purpose.

The LOSC is a product of the 1970s and 1980s; nevertheless, it has been considered a 'living instrument,' able to keep pace with new scientific knowledge and technological advances.¹³⁴ For instance, there is broad acknowledgement of the changes performed by the 1994 and 1995 implementing agreements and the potential implications of the agreement coming out of the BBNJ negotiations.¹³⁵ Additional forms of adaptation can result from the rules of reference to public international law, evolutionary treaty interpretation and subsequent practice.¹³⁶ In this regard, the last step to determine whether the LOSC is fit for purpose to address SIDS necessities in the twenty-first century is to assess whether the laws governing MSR have mechanisms to incorporate the time element within the legal obligations.

An examination of the literature and State practice reveals that Articles 239, 243, 246(1), 246(3), 249(2), 250, and 255 are key to adjusting static legal standards to social, regional, scientific, and technological changes.¹³⁷ One set of such rules is related to the duty to cooperate to promote and facilitate the conduct of MSR projects by partnerships or communication through agreed or official channels. By using such rules, States are called on to adapt the terms of the Convention to the specificities of recent MSR projects. The other is connected to the coastal States' obligations to adopt rules, regulations, and procedures, facilitating access to ports and ensuring that consent will not be delayed or denied without justification. By using such norms, municipal laws can adjust

132 Tanaka (n 10).

133 *Ibid.*

134 Separate Opinion of Judge Lucky (n 11); Buga (n 11); Heidar (n 11); Rob McLaughlin, 'Reinforcing the Law of the Sea Convention of 1982 through clarification and implementation' (2020) 25 *Ocean and Coastal Law Journal* 130–163.

135 Boyle (n 11); Buga (n 11); Rogers *et al.* (n 47).

136 Buga (n 11); Tanaka (n 10); H Zhang, 'Redefining marine scientific research in UNCLOS: Could evolutionary interpretation play any role?' in K Zou and A Telesetsky (eds), *Marine Scientific Research, New Marine Technologies and the Law of the Sea* (Brill Nijhoff, Leiden, 2021).

137 Nordquist *et al.* 1985 (n 14), at pp. 477, 556.

TABLE 4 LOSC articles that facilitate incorporating the time element within Part XIII

<i>States' duty to cooperate and facilitate the conduct of MSRs</i>	<i>Coastal States' obligations to adopt rules, regulations, and procedures regulating MSR by foreign scientists</i>
239 Promote and facilitate the development and conduct of MSR	246(1) Right to regulate the conduct of MSR
243 Create favourable conditions for the conduct of MSR and integrate the efforts of scientists through bilateral or multilateral agreements	246(3) Obligation to establish rules and procedures ensuring that consent will not be delayed or denied unreasonably
250 Communication concerning MSR must be made through official channels if not otherwise agreed	249(2) Right to establish conditions in the exercise of its discretion to withhold consent
251 Competent international organisations must establish criteria and guidelines to determine the nature and implications of MSR	251 Competent international organisations must establish criteria and guidelines to determine the nature and implications of MSR
	255 Right to adopt rules, regulations and procedures to facilitate the access to harbours and promote assistance to MSR vessels

SOURCE: PREPARED BY THE AUTHOR

the terms of Part XIII to local and regional particularities. Table 4 lists articles of the LOSC that facilitate incorporating the passage of time within Part XIII.

Albeit limited, information on State practice demonstrates that early informal communication between scientists from coastal and researching States occurs to some extent and has been encouraged to overcome deadlocks when implementing the legal framework.¹³⁸ For instance, direct contacts could elucidate how to promote coastal States' participation in research using unmanned maritime autonomous systems (MAS) where on board involvement is not possible. It could also facilitate incorporating local needs in research projects, such as studies about the *Sargassum* in the Caribbean Sea. Likewise, States could identify whether previous research has collected similar samples and/or

¹³⁸ United Nations (n 55), at p. 44.

used methodology and refer the proposer to it, thus avoiding replication and stimulating effective usage of marine resources.¹³⁹

When exercising the right to regulate the conduct of MSR, coastal States can put forward detailed conditions for protecting the marine environment and share benefits insofar as these are not in contravention with the LOSC.¹⁴⁰ Indeed, a review of State practice shows national laws requiring the submission of risk or environmental impact assessments and imposing additional permits, fees, and strict rules for foreign scientists to access protected areas.¹⁴¹ In such cases, including other requirements in pre-cruise obligations, seem to follow the laws governing MSR and the evolution of international standards to protect the marine environment.

The regulations and guidelines developed by the IOC in 2007 and 2008 for the deployment of profiling floats in the Argo Program are a concrete example of tailoring the laws governing MSR to accommodate the element of time. Floats have the quality of drifting freely in the oceanscape, which makes it difficult to determine whether an incursion into waters under the jurisdiction of a State will take place.¹⁴² Therefore, States agreed on a multilateral basis that IOC and WMO would serve as clearinghouse mechanisms for notifying States concerned about the potential entrance of floats into their waters. IOC and WMO must also avoid the public release of data of direct significance for the exploration and exploitation of natural resources in areas under the jurisdiction of a State and consider how to maximise the number of States participating in a project.¹⁴³ Even though this example is not restricted to SIDS, it demonstrates that Part XIII has the scope to accommodate innovations in the performance of MSR, advances in the protection of the marine environment, and geographical needs in terms of knowledge and technology.

139 Rogers *et al.* (n 47).

140 Salpin (n 12); United Nations (n 55), at p. 31.

141 United Nations (n 55), at pp. 30–31.

142 Guidelines for the Implementation of Resolution XX-6 of the IOC Assembly Regarding the Deployment of Profiling Floats in the High Seas Within the Framework of the Argo Program, IOC Executive Council Res EC-XLI.4, Executive Council of the IOC-UNESCO, 41st sess. Agenda Item 4.2.2, UN Doc IOC/EC-XLI/3 Annex II (29 July 2008); H Harden-Davies, 'The regulation of marine scientific research: Addressing challenges, advancing knowledge' in R Warner and S Kaye (eds), *Routledge Handbook of Maritime Regulation and Enforcement* (Routledge, London, 2015).

143 Guidelines for the Implementation of IOC Resolution XX-6 (n 142).

Conclusion

The contemporary journeys that follow in the wake of Captain Nemo's fictitious expedition beneath the sea occur in a changing oceanscape in which environmental threats faced worldwide are more dramatic than in 1870 when Jules Verne wrote his futuristic novel. Realising the persistent unequal distribution of scientific and technological capacities, this study argues that Part XIII of LOSC has the potential to meet the needs of SIDS in the 21st century.

In the aftermath of the second wave of decolonisation, C&PSIDS participation at UNCLOS III, as part of the developing States' group, was fundamental to establishing a sophisticated framework in which the tension between coastal States' jurisdiction over maritime zones are potentially balanced with the freedom to undertake MSR. Beyond that, their participation was fundamental to expanding the purpose of the consent regimes for MSR to incorporate the fair and equitable sharing of benefits, particularly in Article 249. A similar ambition is found in the rules governing international cooperation and the transfer of marine technology. Furthermore, the framework governing MSR provides openings to accommodate new circumstances without compromising legal stability. Together, these three legal mechanisms combined with the rules to provide flexibility under Part XIII to open opportunities to enable SIDS' scientific and technological capacities.

It must be acknowledged, however, that the benefits have not been duly shared, and colonial science remains a frequent practice.¹⁴⁴ The level of human resources in marine science and infrastructure in SIDS are inadequate to face the environmental threats ahead of them,¹⁴⁵ the participation of developing States in MSR cooperative projects is still reduced,¹⁴⁶ and Part XIV suffers an implementation gap that can only be partially fulfilled in the BBNJ negotiations. Realising that fair and equitable benefit sharing is under the purpose of Part XIII shifts the question from a purely normative inquiry – the more legislation approach – to an empirical question on how such rules have been implemented, how to optimise the framework's implementation, and if the modalities of benefit sharing are sufficient to respond to the challenges faced by SIDS in the twenty-first century.

An interesting first step towards effectuating the benefit-sharing opportunities of Part XIII would be to collect SIDS' practices regarding consent regimes. Such an exercise could assist in understanding how SIDS have enjoyed the

¹⁴⁴ For instance, de Vos (n 18); Stefanoudis *et al.* (n 17).

¹⁴⁵ Isensee (n 5).

¹⁴⁶ Tolochko and Vadrot (n 121).

benefits under Part XIII, the nature of potential shortcomings faced, and demonstrate whether the best practices might constitute *de lege ferenda*. Another relevant follow-up investigation would be to collect the practice of States non-party to the LOSC on MSR to assess whether the scope of the consent regime in the 1958 CSC has changed or whether benefits have been shared based on customary law. These undertakings seem appropriate in the current moment since the UN Decade of Ocean Science for Sustainable Development and BBNJ negotiations create a good environment to promote MSR for all humankind.¹⁴⁷

¹⁴⁷ UN Doc A/RES/72/73.

Paper II





The Practice of the Caribbean SIDS on the Consent Regime for Marine Scientific Research Under UNCLOS: Trends, Gaps, and Recommendations

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ABSTRACT

This article examines the practice of the Caribbean Small Island Developing States (SIDS) regarding the consent regime for marine scientific research (MSR), identifying trends in the interpretation and application of international law, and implementation gaps. The state practice analyzed is derived from domestic laws, regulations, and policy instruments, and from responses to questionnaires by state officials responsible for interpreting and applying the MSR consent regime. It concludes that the framework is fit for purpose and that states share a common interest of furthering marine research, while proposing recommendations for future-proofing the consent regime and advancing the scientific and technological capacity of the Caribbean SIDS.

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SUSTAINABLE DEVELOPMENT GOALS

SDG 14: Life below water

Introduction

The enhancement of the scientific and technological capabilities of Small Island Developing States (SIDS) is fundamental to addressing vulnerabilities arising from their special circumstances.¹ This theme has gained prominence in recent policy and legal developments in ocean affairs, such as the 2030 Agenda for Sustainable Development, including Sustainable Development Goal (SDG) 14,² the United

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¹ The special circumstances of SIDS include “small populations and geographies, remoteness, and acute exposure to external shocks”: Alliance of Small Islands States (AOSIS), *Submission of Proposals Related to the Further Revised Draft Text of an Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction* (as reflected in A/CONF.232/2022/5), at: https://www.un.org/bbnj/sites/www.un.org/bbnj/files/bbnj_submissions_template_igc_5_article_5_aosis_0.docx (accessed 30 September 2023).

² UNGA Resolution A/RES/70/1, *Transforming Our World: The 2030 Agenda for Sustainable Development*, 21 October 2015, at: <https://www.refworld.org/docid/57b6e3e44.html> (accessed 30 September 2023).

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Nations Decade of Ocean Science for Sustainable Development (Ocean Decade),³ and the 2023 Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (BBNJ Agreement).⁴ Despite the absence of dedicated rules for SIDS within the United Nations Convention on the Law of the Sea (UNCLOS or Convention),⁵ it is suggested that their special circumstances were considered during the negotiation of the Convention, opening new avenues for exploration regarding its normative potential.⁶ In this context, this article contributes to the body of literature scrutinizing the fitness for purpose of UNCLOS in addressing contemporary concerns, by investigating the state practice of Caribbean SIDS concerning the consent regime for marine scientific research (MSR) under UNCLOS. The analysis highlights trends, good practices, and implementation gaps, and proposes recommendations.

Like other SIDS, the Caribbean islands and low-lying states share a strong socio-cultural and economic connection with the ocean.⁷ Engaging in and reaping the benefits of MSR and accessing marine technology are fundamental to effectively manage the Sargassum influx,⁸ manage marine waste,⁹ improve blue economic sectors,¹⁰ fulfill international obligations,¹¹ and ultimately, ensure the continued existence of the Caribbean SIDS.¹² Despite the considerable time that has elapsed since the adoption of the Convention, the involvement of these states in MSR projects continues to be

³ UNGA Resolution A/RES/72/73, *Oceans and the Law of the Sea*, 5 December 2017, at: <https://undocs.org/en/a/res/72/73> (accessed 11 March 2024).

⁴ Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction, adopted 19 June 2023, not yet in force, C.N.203.2023.TREATIES-XXI.10.

⁵ United Nations Convention on the Law of the Sea, adopted 10 December 1982, entered into force 16 November 1994, 1833 UNTS 397.

⁶ Luciana Fernandes Coelho, "Marine Scientific Research and Small Island Developing States in the Twenty-First Century: Appraising the United Nations Convention on the Law of the Sea" (2022) 37 *International Journal of Marine and Coastal Law* 493, 507–511.

⁷ David Read Barker, "Biodiversity Conservation in the Wider Caribbean Region" (2002) 11 *Review of European Community & International Environmental Law* 74, 75; CARSEA 2007, "Caribbean Sea Ecosystem Assessment (CARSEA): A Sub-Global Component of the Millennium Ecosystem Assessment (MA)" (2007) *Caribbean Marine Studies, Special Edition*; Winston Anderson, *The Law of the Sea in the Caribbean* (Brill Nijhoff, 2020), 53–57; Harriet Harden-Davies, Diva Amon, Tyler-Rae Chung et al., *Science and Knowledge to Support Small Island States Conserve and Sustainably Use Marine Biodiversity beyond National Jurisdiction* (University of Wollongong, 2022), 6–9, at: <https://www.aosis.org/wp-content/uploads/2022/06/SIDS-Marine-Science-Report-Full-Feb-2022.pdf> (accessed 30 November 2022).

⁸ Hazel A. Oxenford, Shelly-Ann Cox, Brigitta I. van Tussenbroek et al., "Challenges of Turning the Sargassum Crisis into Gold: Current Constraints and Implications for the Caribbean" (2021) 1 *Phycology* 27; Daniel Robledo, Erika Vázquez-Delfín, Yolanda Freile-Pelegrin et al., "Challenges and Opportunities in Relation to Sargassum Events Along the Caribbean Sea" (2021) 8 *Frontiers in Marine Science* 699664.

⁹ Kristal K. Ambrose, Carolyn Box, James Boxall et al., "Spatial Trends and Drivers of Marine Debris Accumulation on Shorelines in South Eleuthera, The Bahamas Using Citizen Science" (2019) 142 *Marine Pollution Bulletin* 145, 146; La Daana K. Kanhai, Hamish Asmath and Judith F. Gobin, "The Status of Marine Debris/Litter and Plastic Pollution in the Caribbean Large Marine Ecosystem (CLME): 1980–2020" (2022) 300 *Environmental Pollution* 118919, 3.

¹⁰ Pawan G. Patil, John Viridin, Sylvia Michele Diez et al., *Toward a Blue Economy: A Promise for Sustainable Growth in the Caribbean* (World Bank, 2016), 48 at: <https://openknowledge.worldbank.org/handle/10986/25061> (accessed 30 November 2022).

¹¹ Coelho, note 6, 497.

¹² Michelle Mycoo, Morgan Wairiu, Donovan Campbell et al., "Small Islands" in *Climate Change 2022: Impacts, Adaptation and Vulnerability*, Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge University Press, 2022), 2043, 2095–2096.

impeded by inadequate infrastructure, insufficient and inconsistent funding, and limited human resources.¹³

Often considered the “Constitution for the Oceans,” UNCLOS provides the framework governing activities in and uses of the ocean.¹⁴ Its preamble underscores the objective of promoting equitable and efficient utilization and conservation of marine resources, along with fostering MSR and protecting the marine environment. The Resolution on Development of National Marine Science, Technology and Ocean Service Infrastructures, appended to the Final Act of the Third United Nations Conference on the Law of the Sea, highlights that the MSR regime under UNCLOS not only fosters the conduct of MSR activities but also embodies an equity dimension, urging consideration of the special needs and interests of developing countries and the sharing of marine scientific and technological advancements to bridge the gap between developed and developing states.¹⁵

Part XIII of UNCLOS encompasses the majority of provisions governing MSR, comprising 27 articles across six sections. Through a number of negotiated compromises, Part XIII endeavors to strike a balance between the freedom of all states to conduct research, and the sovereignty and sovereign rights of coastal states in zones adjacent to their coasts,¹⁶ while concurrently seeking to enhance the scientific and technological capabilities of developing countries.¹⁷ Accordingly, while the principle of freedom to conduct research prevails on the high seas (Articles 87(1)(f) and 257) and in the Area (Article 256), coastal states have a degree of control over MSR conducted in the territorial sea and exclusive economic zone (EEZ), and on the continental shelf—collectively, areas under national jurisdiction (AUNJ).¹⁸ The specific rights and obligations of coastal states in each of these AUNJ are established in the “consent regime” set out in Articles 245, 246, 248, and 249.¹⁹ In addition, Part XIII is intricately

¹³ IOC-UNESCO, *Global Ocean Science Report 2020—Charting Capacity for Ocean Sustainability* (UNESCO Publishing, 2017), 130–150 at: <https://unesdoc.unesco.org/ark:/48223/pf0000250428> (accessed 14 December 2022); Lucia Fanning, Robin Mahon, Sanya Compton et al., “Challenges to Implementing Regional Ocean Governance in the Wider Caribbean Region” (2021) 8 *Frontiers in Marine Science* 667273, 15–16.

¹⁴ Tommy T. B. Koh, “A Constitution for the Oceans,” remarks adapted from statements made by the President on 6 and 11 December 1982 at the final session of the Conference at Montego Bay, reproduced in *The Law of the Sea. Official Text of the United Nations on the Law of the Sea with Annexes and Index. Final Act of the Third United Nations Conference on the Law of the Sea* (United Nations, 1983), xxxiii–xxxvii, at: https://www.un.org/depts/los/convention_agreements/texts/koh_english.pdf (accessed 11 March 2024).

¹⁵ “Resolution on the Development of National Marine Science, Technology and Ocean Service Infrastructures,” *Draft Final Act of the Third United Nations Convention on the Law of the Sea*, UN Doc A/Conf.62/121 (1982) 21 ILM 1245, Annex VI.

¹⁶ Lucius Cafilisch and Jacques Piccard, “The Legal Regime of Marine Scientific Research and the Third United Nations Conference on the Law of the Sea” (1978) 38 *zaöRV* 848, 897; Myron H. Nordquist, Neal R. Grandy, Shabtai Rosenne et al., *United Nations Convention on the Law of the Sea 1982: A Commentary, Vol IV* (Martinus Nijhoff, 1990), 433; Nele Matz-Lück, “Article 238: Right to Conduct Marine Scientific Research” in Alexander Proelss (ed), *United Nations Convention on the Law of the Sea: A Commentary* (CH Beck/Hart/Nomos, 2017), 1605, 1608.

¹⁷ Charlotte Salpin, “The Law of the Sea: A Before and an After Nagoya?” in Elisa Morgera, Matthias Buck and Elsa Tsioumani (eds), *The 2010 Nagoya Protocol on Access and Benefit-sharing in Perspective: Implications for International Law and Implementation Challenges* (Martinus Nijhoff Publishers, 2013), 149, 153, 157; Coelho, note 6, 519–524.

¹⁸ Cafilisch and Piccard, note 16; Daniel P. O’Connell, *The International Law of the Sea: Vol II* (Oxford University Press, 1988), chapter 26, 1026–1032; Maria Gavouneli, *Functional Jurisdiction in the Law of the Sea* (Martinus Nijhoff Publishers, 2007), 64; Robert Jennings and Arthur Watts, “The High Seas, Marine Scientific Research” in Robert Jennings and Arthur Watts (eds), *Oppenheim’s International Law: Volume 1 Peace* (Oxford University Press, 9th ed, 2008), Part 2, chapter 6, 809, 809–811.

¹⁹ P. K. Mukherjee, “The Consent Regime of Oceanic Research in the New Law of the Sea” (1981) 5 *Marine Policy* 98, 101–105; Elie Jarmache, “Sur quelques difficultés de la recherche scientifique marine” in *La mer et son droit*.

linked with Part XIV, governing the development and transfer of marine technology, so the implementation of one part positively influences the other.

The central inquiry of this article is: What is the state practice of Caribbean SIDS regarding the consent regime for MSR under UNCLOS? This question arises from the recognition of an information gap with respect to the interpretation and application of the MSR consent regime in contemporary state practice, particularly regarding SIDS.²⁰ This gap is significant given the observed imbalance in the influence that the practice of developed states has had in the development of international law.²¹ The importance of state practice for elucidating the provisions governing the consent regime for MSR is underscored by Article 297(2), which grants a coastal state the option to abstain from accepting the submission of disputes related to the exercise of a right or discretion under Article 246 or the decision to order the suspension or cessation of an MSR activity to the compulsory dispute settlement mechanisms in Part XV of UNCLOS.²² Through an examination of Caribbean SIDS' practices, the article identifies trends, best practices, and implementation gaps, and also emphasizes potential interpretative changes that could enhance the involvement of these states in MSR projects.

This article consists of five sections. The first section outlines the methods employed to gather information on the practice of the Caribbean SIDS. The second section analyzes the Caribbean SIDS' practice in relation to (i) the definition of MSR, encompassing an assessment of three activities with ambiguous definitions; (ii) the exercise of jurisdiction over MSR; (iii) the obligations to grant consent under normal circumstances and provide relevant information; (iv) the right to withhold consent; (v) the obligations to be adhered to during and after the research; and (vi) the right to suspend or terminate the project. The fourth section discusses the findings and proposes recommendations to both coastal states and states conducting MSR ("researching states"). Finally, the fifth section offers closing remarks, emphasizing the common interest of states in advancing MSR and proposing adjustments in MSR governance to enhance the efficiency of the consent process while enhancing marine scientific knowledge, research capacity, and the share of marine technology transferred to Caribbean SIDS.

Before proceeding, some clarifications are warranted. First, for the purpose of this article, state practice denotes a consistent conduct reflecting the state's interpretation

Mélanges offerts à Laurent Lucchini et Jean-Pierre Quéneudec (Pedone, 2003), 303, 305–307; Tullio Treves, "Marine Scientific Research" in Rüdiger Wolfrum (ed), *Max Planck Encyclopedia of International Law* (Oxford University Press, 2008), [8]–[15], at: <http://www.mpepil.com> (accessed 30 November 2022).

²⁰ IOC-UNESCO, Elizabeth J. Tirpak, "Results of IOC Questionnaire No 3 on the Practice of States in the Fields of Marine Scientific Research and Transfer of Marine Technology: An Update of the 2003 Analysis by Lt. Cdr. Roland J. Rogers" (2005) IOC/ABE-LOS V/7; IOC-UNESCO, Elizabeth J. Tirpak, "Practices of States in the Fields of Marine Scientific Research and Transfer of Marine Technology: An Update of the 2005 Analysis of Member State Responses to Questionnaire No 3" (2008) IOC/ABE-LOS VIII/8; Alfred H. A. Soons, "The Legal Regime of Marine Scientific Research: Current Issues" in Myron Nordquist, Ronan Long, Tomas Heidar et al. (eds), *Law, Science & Ocean Management* (Martinus Nijhoff Publishers, 2007), 139, 162.

²¹ Michael Byers, "Introduction: Power, Obligation, and Customary International Law" (2001) 11(1) *Duke Journal of Comparative and International Law* 81, 84; Dire Tladi, "State Practice and the Making and (Re)Making of International Law: The Case of the Legal Rules Relating to Marine Biodiversity in Areas Beyond National Jurisdiction" (2014) (1) *Journal of State Practice and International Law Journal* 105, 104–105; B. S. Chimni, "Customary International Law: A Third World Perspective" (2018) 112(1) *American Journal of International Law* 1, 5.

²² Scholars have suggested that Article 297(2) would not exclude from judicial review disputes involving the obligations to provide consent in "normal circumstances" or to establish rules and procedures ensuring consent will not be delayed or denied unreasonably. See J. Ashley Roach, *Excessive Maritime Claims* 4th edn (Brill Nijhoff, 2021), 519. Nonetheless, no case law related to the consent regime has been identified.

of UNCLOS, not contingent upon uniformity or a specific time span.²³ Second, the article focuses on the implementation of the consent regime in the EEZ and on the continental shelf, considering that the rights of coastal states in the territorial sea regarding MSR are less contentious.²⁴ Third, while Part XIII regulates MSR conducted in AUNJ by both states and international organizations, the latter are only mentioned when necessary, as they follow a specific procedure for obtaining consent from the coastal state. Likewise, the analysis only tangentially refers to the framework governing the installation and use of equipment for MSR.

Materials and Methods

The state practice analyzed for this study was obtained from national laws and policy instruments, questionnaires, and secondary sources. Notably, these are within the acceptable means to ascertain the subsequent practice of states outlined by the International Law Commission (ILC).²⁵

The starting point for the selection of states for analysis was the classification of SIDS by the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries, and Small Island Developing States. This list was cross-referenced with United Nations membership and ratification of UNCLOS. Certain countries were excluded from the analysis due to difficulties in contacting relevant authorities and accessing legislative information. As a result, the analysis focuses on the practice of Antigua and Barbuda, (the) Bahamas, Barbados, Belize, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Jamaica, Saint Christopher and Nevis (St. Kitts and Nevis), Saint Lucia (St. Lucia), Saint Vincent and the Grenadines (SVG), and Trinidad and Tobago.

Legislative Database

The legal analysis relies on a database developed for this study encompassing domestic and regional laws, policies, guidelines, and template forms relevant to the application of the consent regime for MSR within the 14 states under consideration. These documents were sourced from the official websites of the respective governments and the following platforms: Ecolex, Global Lex, FAO Lex, the United Nations Division for Ocean Affairs and the Law of the Sea (DOALOS), U.S. Department of State, Commonwealth Caribbean Law Research Guide, Digital Library of the Caribbean, and Lexadin. The search utilized the following keywords: marine scientific research, scientific research, scientific permit, research permit, marine collection permit, bioprospecting, genetic resources, hydrographic survey, ocean observation, and bathymetric survey. This systematic approach yielded a total of 53 laws, 10 policy instruments, and 10 guidelines, which are set out in Table 1.

²³ International Law Commission, *Report of the International Law Commission, Seventieth Session, Subsequent Agreements and Subsequent Practice in Relation to the Interpretation of Treaties*, UN Doc A/73/10 (2018), Conclusion 5.

²⁴ Tim Stephens and Donald R. Rothwell, "Marine Scientific Research" in Donald R. Rothwell, Alex Oude Elferink, Karen Scott et al. (eds), *The Oxford Handbook of the Law of the Sea* (Oxford University Press, 2015), 559, 575.

²⁵ International Law Commission, note 23, Conclusion 4 [18].



Table 1. Legislation database.

Country	Legislation/policy instrument	Responsible authority to provide consent for MSR
Antigua and Barbuda	Environmental Protection and Management Act, 2019 Fisheries Regulations, 2013 Fisheries Act, 2006 The Maritime Areas Act, 1982 Application for Access to Genetic and Biological Resources in Antigua and Barbuda Application to Conduct Marine Research in Antigua and Barbuda	Minister of Agriculture, Fisheries and Barbuda Affairs Department of Environment Minister of Agriculture, Fisheries and Barbuda Affairs (approved by the Chief Fisheries Officer)
Bahamas (The)	Biological Resources and Traditional Knowledge Protection and Sustainable Use Act, 2021 Environmental Planning and Protection Bill, 2017 The Bahamas' National Maritime Policy, 2015 Fisheries Resources (Jurisdiction and Conservation) Regulations, 2009 Marine Mammal Protection Act, Chapter 244A, 2008 Archipelagic Waters and Maritime Jurisdiction Act, 1993 Fisheries Resources (Jurisdiction And Conservation) Act, 1977 Bahamas Guide for Applicants for Research and ABS Permits, 2021 Application to Conduct Scientific Research, Survey or Experimental Projects in the Bahamas	Department of Environmental Planning and Protection Department of Marine Resources Minister of Agriculture and Marine Resources Minister responsible for wild animals Department of Environmental Planning and Protection (DEPP)
Barbados	Coastal Zone Management Act, Chapter 394, 1998 Marine Boundaries and Jurisdiction Act, 1995 Fisheries Act, 1993 Marine Areas (Preservation and Enhancement) (Restricted Areas), Regulations, 1981	The Coastal Zone Management Unit* The Cabinet Minister responsible for fisheries
Belize	Fisheries Resources Act, 2020 High Seas Fishing Act, 2013 Coastal Zone Management Act, Chapter 329, Revised Edition 2000 Maritime Areas Act, Chapter 11, Revised Edition, 2000 Guidelines for writing a marine scientific research project proposal Scientific Research Permits Administrative Requirement Law 129 on Fisheries, 2019	Fisheries Department Belize Fisheries Department

Country	Legislation/policy instrument	Responsible authority to provide consent for MSR
Cuba**	<p>Decree 1, regulating the Law 129, 2019 Resolution 17 on Procedures for Granting Fishing Licenses, 2022 Decree-Law 2 regulating the EEZ, 1977 Resolution 111, about the Access to Biological Diversity, 1996 Maritime, River and Lake Navigation Act 115, 2013 Decree 317, regulating the Maritime, River and Lake Navigation Act 115, 2013</p>	<p>Ministry of Food Industry, with previous authorization by the Ministry of Science, Technology and Environment</p>
Dominica	<p>National Ocean Policy of 2019 Climate Change, Environment and Natural Resource Management Bill, 2016 Fisheries Act, 1987 Territorial Sea, Contiguous Zone, Exclusive Economic and Fishery Zones Act, 1981</p>	<p>Fisheries Director Minister of Science, Technology and Environment Minister of Defense</p> <p>Biodiversity and Conservation Authority Minister responsible for fisheries</p>
Dominican Republic	<p>Law 573 on the Territorial Sea, Contiguous Zone, EEZ and Continental Shelf, 1977 Act 219 on Biotechnology Security, 2015 Act 333 on Biodiversity, 2015 Guidelines on Research in Marine Protected Areas (MPA) and Biodiversity Act 307-04, which establishes the Council for Fishing and Aquaculture (Codopecsa), 2004 Template to request consent for research activities in the marine coastal zone</p>	<p>Minister of Environment and Natural Resources</p> <p>Minister of Environment and Natural Resources Minister of Environment and Natural Resources Subsecretary of MPA and Biodiversity Council for Fishing and Aquaculture</p> <p>Minister of Environment and Natural Resources</p>
Grenada	<p>Draft National Ocean Policy of 2019 Integrated Coastal Zone Management Act, 2019 Integrated Coastal Zone Management Policy for Grenada, Carriacou and Petite Martinique, 2015 Grenada Territorial Sea and Maritime Boundaries Act, 1989 Fisheries Regulations, 1987 Fisheries Act, 1986 Environmental Protection (Bio-prospecting) Regulations, 2001</p>	<p>Minister responsible for the environment</p>
Guyana	<p>Maritime Zones Act, 2010 Fisheries Act, 2012 Environmental Protection Act, 1996</p>	<p>Minister of Fisheries</p> <p>Minister of Fisheries</p>
Jamaica	<p>Endangered Species (Protection, Conservation and Regulation of Trade) Act, 2000 Towards Ocean and Coastal Zone Management in Jamaica, 2000 Maritime Areas Act, 1996 Exclusive Economic Zone Act, 1991 Beach Control Act, 1956 Mining Act, 1947 Guidelines for conducting Marine Scientific Research in Areas under Jamaica's Maritime Jurisdiction Wildlife Research Application Form</p>	<p>National Environment and Planning Agency</p> <p>Minister of Agriculture and Fisheries Minister with responsibility for mining</p> <p>Natural Resources Conservation Unit</p>

(Continued)



Table 1. Continued.

Country	Legislation/policy instrument	Responsible authority to provide consent for MSR
Saint Kitts and Nevis	Draft National Ocean Policy Fisheries Management Act, 1998 Fisheries Aquaculture and Marine Resources Act, 2016 National Maritime Policy and Action Plan, 2015 Maritime Areas Act, 1984 Fisheries Act, 1984 Application to Conduct Marine Scientific Research in St. Kitts and Nevis Draft National Ocean Policy, 2019	Minister responsible for fisheries, aquaculture, and marine resources*** Minister of Fisheries Department of Marine Resources Minister of Fisheries Fisheries Division Biosafety Board Minister of Fisheries Biosafety Board Director of Fisheries The President
Saint Lucia	Fisheries Act, 1984 Maritime Areas Act, 1984 Scientific Research Proposal Permit Application	
Saint Vincent and the Grenadines	National Ocean Policy and Strategic Action Plan, 2018 Biosafety Act, 2012 Fisheries Act, 1986 Amended by Act 32, 1986 and Act 25, 1989 Maritime Areas Act, 1984 Scientific Research Proposal Permit Application	
Trinidad and Tobago	Draft National Maritime Policy and Strategy The Fisheries Management Bill, 2020 Archipelagic Waters and Exclusive Economic Zone Act, 1986	

Source: Prepared by author.

*The Unit is responsible for handling the request; however, it is unclear if it is also in charge of issuing the consent for non-fisheries-related MSR.

**It was not possible to access the Fisheries Act 129 of 2019 or Resolution 1 of 2019, which further regulates the Fisheries Act.

***The 1984 Fisheries Act was repealed by the 2016 Fisheries Aquaculture and Marine Resources Act. While the former points to the Minister of Fisheries having the mandate for consenting to fisheries research and setting conditions in exchange for consent, the latter is silent on the matter (Article 63(1)(f)). The 2016 Act provides for the continuity of regulations and agreements prescribed under the 1984 Act in certain situations, but it is unclear whether the granting of fisheries research permits would fall within these.

Questionnaires

The Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO) distributed a questionnaire (hereinafter Q3) to all its member states between 2002 and 2008 to collect information on the implementation of Part XIII of UNCLOS.²⁶ Among the Caribbean SIDS included in this study, the Bahamas, Dominican Republic, Jamaica, and Saint Lucia responded to Q3.

Using Q3 as a template, a second questionnaire was developed for this study (hereinafter QA) covering the period from 2009 to 2021. While replicating many questions from Q3, QA introduces additional inquiries to elucidate the interpretation of activities with uncertain classification and to gather qualitative insights on the implementation of the consent regime in each national jurisdiction.

Initially, QA was planned for in-person application during international events with the participation of Caribbean SIDS representatives. However, due to the COVID-19 pandemic and resulting social distancing measures, data collection had to be adapted to a virtual format. Acknowledging concerns in the literature about low response rates to online questionnaires, trusted intermediaries played a crucial role in facilitating access to government officials responsible for implementing the consent regime in Caribbean SIDS.²⁷ The trusted intermediaries included not only individuals, but also international, subregional, and regional organizations and knowledge groups. Such an approach resulted in a network of 70 stakeholders from the institutions outlined in Table 2.²⁸ In 2022, with the easing of restrictions on international gatherings, in-person attendance at a regional workshop in Dominica organized by the World Maritime University (WMU) and the United Nations Ocean Conference in Lisbon provided an opportunity to gather the final responses to QA.

As a result of such efforts, QA garnered completed responses from the following 10 countries: Antigua and Barbuda, Bahamas, Barbados, Belize, Cuba, Dominica, Guyana, Jamaica, Saint Vincent and the Grenadines, and Trinidad and Tobago. Additionally, Saint Kitts and Nevis provided a partial response to QA. Figure 1 illustrates the Caribbean SIDS participating in this study and the level of responses to QA.

The analysis also relies on responses to Q3 from the Dominican Republic and Saint Lucia. Therefore, the only Caribbean SIDS from which the study was unable to collect response to any of the questionnaires was Grenada. To supplement the primary data, secondary sources such as academic literature and the websites of the U.S. Department of State and the University of Hamburg were consulted.²⁹

²⁶ Tirpak, note 20.

²⁷ Jessica Daikeler, Michael Bošnjak and Katja Lozar Manfreda, "Web Versus Other Survey Modes: An Updated and Extended Meta-Analysis Comparing Response Rates" (2020) 8 *Journal of Survey Statistics and Methodology* 513.

²⁸ The questionnaire was approved by the World Maritime University (WMU) Ethical Committee. The participants consented to having their responses shared in this article without the disclosure of names or personal data.

²⁹ See Montserrat Gorina-Ysern, *An International Regime for Marine Scientific Research* (Transnational Publishers, 2003); Roach, note 22.

Table 2. Organizations and groups contacted.

Multilateral	Regional	Cross-regional	Knowledge groups	Nongovernmental organizations
DOALOS	IOCaribe	Commonwealth Secretariat	World Maritime University Alumni	Nature Conservancy
International Seabed Authority	Organisation of Eastern Caribbean States (OECS)	Archipelagic and Island States Forum	DOALOS Alumni	Oceana in Belize
IOC-UNESCO	Caribbean Community	Alliance of Small Island States	International Foundation for the Law of the Sea Alumni	
UN Environment Program	Economic Commission for Latin America and the Caribbean		Rhodes Academy Alumni	
	University of West Indies		Organization of American States Alumni	
	The Institute of Marine Affairs			
	Caribbean Natural Resources Institute			

Source: prepared by author.

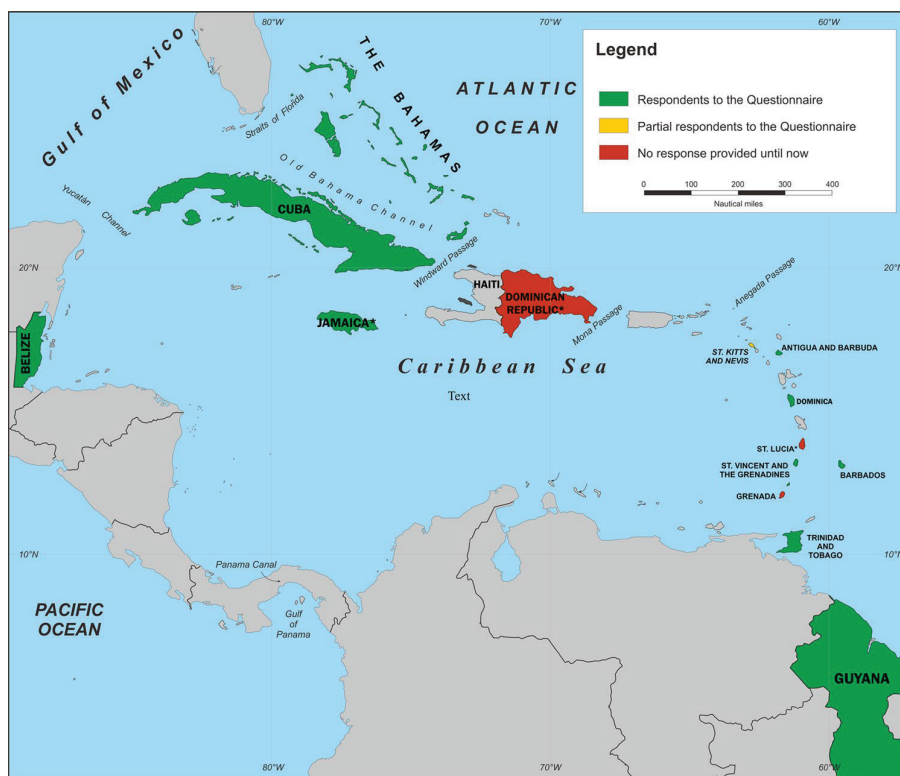


Figure 1. Map of the Caribbean Sea depicting the respondents to QA. (Prepared by Andi Arsana.)

How Are the Caribbean SIDS Interpreting and Applying the Consent Regime for MSR under UNCLOS?

The analysis of the state practice of the Caribbean SIDS on the consent regime for MSR begins by checking which activities have been interpreted as MSR. It proceeds by examining the exercise of jurisdiction over MSR. Finally, it investigates the interpretation and application of the rights and obligations before, during, and after the research cruise.

What Activities Constitute MSR?

UNCLOS provides a precise framework for categorizing activities as MSR compared to its precursor, the 1958 Geneva Convention on the Continental Shelf.³⁰ Under the UNCLOS framework, MSR projects must have the primary aim of increasing the knowledge about the marine environment, be conducted for peaceful purposes, employ appropriate means and methods, refrain from interfering with other uses of the sea, and comply with relevant regulations, including for the protection and preservation of the marine environment (Article 240).³¹ Furthermore, UNCLOS makes clear that MSR activities do not provide a legal basis for claiming any part of the marine environment or its resources (Article 241). Despite this guidance, the classification of certain activities remains disputed, with the main divergence relating to the extent to which activities that are claimed to be MSR may have “direct significance for the exploration and exploitation of resources” and the distinction between MSR and prospecting and exploration. An additional challenge to the classification of activities arises from technological advancements enabling the collection of data for various purposes.³² Consequently, coastal states have significant flexibility in determining which foreign activities constitute MSR and are subject to prior consent.³³

The analysis reveals that Caribbean SIDS typically apply Part XIII of UNCLOS to all activities involving the in situ collection of samples and data in AUNJ with the aim of contributing to the expansion of knowledge about the ocean space. For instance, a respondent to QA stated that “in practice [MSR] has been interpreted as any research, in any discipline being undertaken within the marine waters of [the state].” Furthermore, it seems that Caribbean SIDS do not differentiate between MSR, scientific research, and research. For example, the concept of “scientific research” and “research” in the Bahamian laws overlaps with the understanding of MSR. Similarly, Belize defines “research” or “scientific research” as synonyms for MSR, while St. Kitts and Nevis only refers to “research,” and Trinidadian law refers to “fisheries scientific research.” Other

³⁰ Stephens and Rothwell, note 24, 569.

³¹ Alfred H. A. Soons, *Marine Scientific Research and the Law of the Sea* (Kluwer Law and Taxation Publishers TMC Asser Instituut, 1982), 5–8, 118–125; Yoshifumi Tanaka, *The International Law of the Sea*, 3rd edn (Cambridge University Press, 2019), 433–434.

³² Robert Beckman and Tara Davenport, “The EEZ Regime: Reflections after 30 Years,” in *Securing the Ocean for the Next Generation* (UC Berkeley–Korea Institute of Ocean Science and Technology Conference, Seoul, Korea, 2012), 29–30; Luciana Fernandes Coelho and Roland Rogers, “The Use of Marine Autonomous Systems in Ocean Observation under the LOSC: Maintaining Access to and Sharing Benefits for Coastal States,” in Tafsir Matin Johansson, Dimitrios Dalaklis, Jonatan Echebarria Fernández et al. (eds), *Smart Ports and Robotic Systems: Navigating the Waves of Techno-Regulation and Governance* (Palgrave Macmillan, 2023), 111, 113–116.

³³ Nordquist, Grandy, Rosenne et al., note 16, 518; O’Connell, note 18, 1029; Jarmache, note 19, 311.

domestic instruments lack any specific definitions, and appear to interchangeably use these terms when implementing Part XIII. This assumption was confirmed by QA responses. It is noteworthy that Dominica and Guyana are exceptions, because their laws expressly refer to MSR as research activities studying the marine environment.

Examining the intricacies related to the definition of MSR, the study investigates the interpretation of three activities with disputed classification, namely, bathymetric surveys, ocean observation, and scientific research involving access to marine genetic resources (MGRs).³⁴ Bathymetric surveys are a kind of hydrographic survey primarily utilized for safety of navigation. Based on the language of Articles 19(2)(j) and 40, some scholars consider that they fall outside the purview of Part XIII.³⁵ As a consequence, bathymetric surveys unrelated to the exploration and exploitation of living resources in the EEZ or on the continental shelf would be considered to fall within the freedom of navigation.³⁶ In contrast, an alternative interpretation includes these surveys within the ambit of Part XIII, as the data collected can serve both management and scientific studies, as well as contribute to the exploitation of marine resources.³⁷ This interpretation aligns with the stance of countries like China and India, which mandate prior notification for bathymetric surveys.³⁸ Interestingly, the majority of Caribbean SIDS seem not to adhere to the Chinese and Indian interpretation, with only approximately one-third of respondents indicating a requirement for prior consent to such activities (Antigua and Barbuda, the Bahamas, Barbados, and Jamaica).

Ocean observation is an integral component of operational oceanography,³⁹ playing a pivotal role in the analysis and prediction of climate patterns and ocean conditions. During the Third United Nations Conference on the Law of the Sea, the Chairman of the Third Committee asserted that Part XIII would not impede the coverage of meteorological data.⁴⁰ Based on this statement, some states interpret operational oceanography as being excluded from the purview of Part XIII.⁴¹ However, negotiations on guidelines for Argo Floats revealed divergent views regarding this interpretation,

³⁴ Soons, *Marine Scientific Research and the Law of the Sea*, note 31, 118–125; Beckman and Davenport, note 32, 24–31; Paul Gragl, “Marine Scientific Research” in David J. Attard, Malgosia Fitzmaurice and Norman A. Martínez Gutiérrez (eds), *The IMLI Manual on International Maritime Law: Volume I: The Law of the Sea* (Oxford University Press, 2014), 396, 404–408. The term “bioprospecting” is avoided in this article, because it implies that commercialization is the main aim of the activities from the outset.

³⁵ Florian H. T. Wegelein, *Marine Scientific Research. The Operation Status of Research Vessels and Other Platforms in International Law* (Martinus Nijhoff Publishers, 2005), 160; Sookyeon Huh and Kentaro Nishimoto, “Article 246: Marine Scientific Research in the Exclusive Economic Zone and on the Continental Shelf” in Alexander Proelss (ed), *United Nations Convention on the Law of the Sea: A Commentary* (Beck/Hart/Nomos, 2017), 1649, 1656–1657; Roach, note 22, 26, 37, 452.

³⁶ Stephens and Rothwell, note 24, 570–572; Roach, note 22, 492–493.

³⁷ International Hydrographic Organization, *Manual on Hydrography, Publication C-13* (2005, Corrections to February 2011), 4.

³⁸ Sam Bateman, “Hydrographic Surveying in the EEZ: Differences and Overlaps with Marine Scientific Research” (2005) 29 *Marine Policy* 163, 167; Guifang Xue, “Marine Scientific Research and Hydrographic Survey in the EEZs: Closing up the Legal Loopholes?” (2009) 13 *Center for Oceans Law and Policy* 209, 221; Erik Franckx, “American and Chinese Views on Navigational Rights of Warships” (2011) 10 *Chinese Journal of International Law* 187, 197.

³⁹ Fraser Davidson, Alvera-Azcárate Aida, Barth Alexander et al., “Synergies in Operational Oceanography: The Intrinsic Need for Sustained Ocean Observations” (2019) 6 *Frontiers in Marine Science* 1, 1.

⁴⁰ Third United Nations Conference on the Law of the Sea, *46th Meeting of the Third Committee, Report of the Chairman on the Work of the Committee*, UN Doc.A/CONF.62/C.3/SR.46 (1980).

⁴¹ Huh and Nishimoto, note 35, 1657; Roach, note 22, 417–418; Beckman and Davenport, note 32, 29–31.

highlighting the unsettled nature of such classification.⁴² The practice of the Caribbean SIDS reinforces the divergence of perspectives on this issue, as half of the respondents to this question consider Part XIII applicable to ocean observation (Antigua and Barbuda, the Bahamas, Barbados, Cuba, Dominica, Jamaica, and SVG).

In recent decades, the research into and utilization of MGRs has garnered increasing attention, driven by the economic benefits involved, the disparate capacities of states to engage in such activities, and potential regulatory gaps. In AUNJ, the 1992 Convention on Biological Diversity (CBD)⁴³ and the 2010 Nagoya Protocol⁴⁴ govern the access, utilization, and benefit sharing of MGRs. Despite provisions aimed at harmonizing the relationship between UNCLOS and the CBD, there are divergent views on whether the in situ collection of MGRs in AUNJ falls within the scope of Part XIII or exclusively within the CBD and Nagoya Protocol framework. In effect, both frameworks can be reconciled, with the caveat that UNCLOS provides greater discretion for coastal states to deny access to MGRs, while the CBD requires access on mutually agreed terms.⁴⁵ Interestingly, the majority of the respondents (63 percent) encompass research, utilization, and commercialization of MGRs within the definition of MSR (Antigua and Barbuda, Barbados, Belize, Cuba, Dominica, Guyana, and St. Lucia). However, a few differentiate between bioprospecting and MSR (Bahamas, Dominican Republic, St. Kitts and Nevis, and Trinidad and Tobago).

In summary, the Caribbean SIDS have adopted an “expansive” approach to the interpretation of MSR activities, often using the terms “research,” “scientific research,” and “MSR” interchangeably. Regarding the classification of activities, a prevailing trend requires prior consent in accordance with Part XIII for research involving the collection of MGRs and ocean observation. In a limited number of cases, prior consent is deemed necessary for bathymetric surveys. With these insights, the logical progression involves an examination of how these states have exercised jurisdiction over MSR.

Jurisdictional Claims over MSR

Part XIII of UNCLOS establishes the rights and obligations of coastal states in relation to researching states, aiming to address the divisions between developing and developed states that were prominent during the negotiation of UNCLOS.⁴⁶ In the territorial sea and archipelagic waters, coastal states exercise sovereignty and possess exclusive rights to regulate, authorize, and conduct MSR activities. They have the authority to require explicit consent for any research activity, even during innocent or transit passage (Articles 19 and 40), and can impose conditions on such activities (Articles 49 and

⁴² Aurora Mateos and Montserrat Gorina-Ysern, “Climate Change and Guidelines for Argo Profiling Float Deployment on the High Seas” (2010) 14 *ASIL Insights*, at: <https://www.asil.org/insights/volume/14/issue/8/climate-change-e-and-guidelines-argo-profiling-float-deployment-high-seas> (accessed 10 June 2023).

⁴³ Convention on Biological Diversity (CBD), adopted 5 June 1992, entered into force 29 December 1993, 1760 UNTS 79.

⁴⁴ 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, entered into force 12 October 2014, CBD Decision X/1 (2010), Annex I.

⁴⁵ Joanna Mossop, “Marine Bioprospecting” in Rothwell, Elferink, Scott et al. (eds), note 24, 826, 836–837.

⁴⁶ Mukherjee, note 19, 98; Ram Prakash Anand, *Origin and Development of the Law of the Sea* (Martinus Nijhoff Publishers, 1982), 240–241; Joanna Mossop, *The Continental Shelf Beyond 200 Nautical Miles: Rights and Responsibilities* (Oxford University Press, 2016), 153.

245).⁴⁷ In contrast, in the EEZ and on the continental shelf, coastal states enjoy jurisdiction over MSR activities, but only to the extent specified in the relevant provisions of UNCLOS (Articles 56(1), 77(1), and 246).⁴⁸ In these areas, while other states are required to seek the coastal state's consent to conduct MSR, the coastal state's right to refuse consent is limited, and consent can be deemed to be implied in certain cases. On the continental shelf extending beyond 200 nautical miles the coastal state's right to withhold consent is further restricted, as will be further explained.⁴⁹

To some extent, all Caribbean SIDS assert their rights to regulate, authorize, and conduct MSR activities in AUNJ. In more nuanced terms, their practices align with the trends identified by Wegelein in the context of global practices.⁵⁰ The first trend corresponds to states that replicate the provisions of UNCLOS in their domestic laws without further elaboration of the rights and duties involved (Cuba, Belize, Dominica, and the Dominican Republic). The second trend involves states that, in domesticating UNCLOS, diverge from Part XIII in the terminology or substance of powers. This is the case for St. Kitts and Nevis and St. Lucia, which assert "exclusive rights" for authorizing, regulating, and conducting MSR in the EEZ and on the continental shelf. In a similar vein, Grenada establishes "exclusive jurisdiction" to regulate, authorize, and control MSR in the EEZ and on the continental shelf, while Antigua and Barbuda claim "jurisdiction" in the EEZ and "exclusive jurisdiction" on the continental shelf. Furthermore, Guyana claims sovereign rights over MSR in the territorial sea. The third trend includes states whose legislation is silent regarding jurisdiction over MSR in a maritime zone. For example, SVG asserts "control" over MSR only in the EEZ, and Barbados claims "all rights and jurisdiction" regarding MSR in the EEZ. Similarly, the legislation of Jamaica and Trinidad and Tobago affirms jurisdiction in the EEZ without any reference to MSR on the continental shelf, while the legislation of the Bahamas does not explicitly assert jurisdiction over MSR.

Overall, the assertion of powers by Caribbean SIDS regarding MSR demonstrates a lack of conformity with Part XIII, also noted in previous studies.⁵¹ The following subsections examine the extent to which this lack of conformity has impacted the exercise of the related rights and obligations by coastal and researching states.

The Obligation to Grant Consent in Normal Circumstances

As previously articulated, the consent regime establishes a framework of rights and obligations between coastal and researching states. In the territorial sea, foreign MSR requires express consent from the coastal state, which holds the right to impose any condition in exchange (Article 245). Differently, in the EEZ and on the continental shelf, foreign MSR necessitates a prior request for coastal state consent, which must be granted under "normal circumstances" for projects enhancing knowledge of the marine environment for humankind's benefit (Article 246(4)), and may be considered

⁴⁷ Malcolm N. Shaw, *International Law* (Cambridge University Press, 2008), 556–575; Caflich and Piccard, note 16, 855–859; Stephens and Rothwell, note 24, 571.

⁴⁸ Wegelein, note 35, 199–200; Tanaka, note 31, 153–158.

⁴⁹ Mossop, note 46, 166.

⁵⁰ Wegelein, note 35, 276–277; Stephens and Rothwell, note 24, 579.

⁵¹ Gorina-Ysern, note 29, 32–34; Wegelein, note 35, 276.

implied if there is no response from the coastal state within four months of the clearance request (Article 252). In this respect, coastal states must establish rules and procedures for MSR requests in the EEZ and on the continental shelf to prevent unreasonable delays or denials of clearance (Article 246(3)). Conversely, researching states must provide a comprehensive description of the project at least six months in advance, including its nature, objectives, methods, description of the research vessel and equipment used, geographical area, dates of appearance and departure, sponsoring institution information, and the extent of the coastal state's participation (Article 248).⁵² If the information provided is deemed unsatisfactory, coastal states may request supplementary information (Article 252(c)).

Assessing the practice of the Caribbean SIDS may assist in the interpretation and implementation of the details of such provisions, especially concerning the EEZ and continental shelf. For instance, it can assist to identify how the expression "normal circumstances" has been interpreted, as currently, the only situations deemed "abnormal" for the purpose of Article 246 pertain to proposals to conduct MSR in areas subject to jurisdictional disputes or facing an imminent possibility of armed conflict.⁵³ As assessment of practice can also provide information about the adoption of dedicated rules and guidance to avoid delayed consent. Furthermore, it can clarify whether the list of information required before conducting MSR and the obligations that apply after the consent for MSR is granted should be considered open for additions since, in contrast with views supporting the exhaustive character of this list, there have been instances where additional requirements have been accepted.⁵⁴

This study did not identify dedicated laws regulating MSR in any Caribbean SIDS. Usually, the requirement for prior consent to MSR is incorporated within fisheries regulations, underscoring the significance of the fishing sector for these countries (e.g., Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Dominican Republic, Grenada, Guyana, Jamaica, SVG, St. Kitts and Nevis, St. Lucia, Trinidad and Tobago).⁵⁵ In some cases, the scope of the legislation in which MSR is regulated extends beyond fisheries, encompassing the broader regulation of marine biodiversity and living resources as well (e.g., Antigua and Barbuda and St. Lucia). In this respect, there is an emerging trend of integrating scientific research regulations into biodiversity laws, accompanied by stipulations on benefit-sharing (e.g., Belize and Bahamas). Notably, there is a similarity in the provisions regulating MSR in the fisheries acts of the OECS member states, such as Antigua and Barbuda, Dominica, Grenada, St. Lucia, and St. Vincent and the Grenadines. This highlights the significance of regional organizations in coordinating a common regulatory and policy approach to MSR, in accordance with Article 123(c).

The practice of Caribbean SIDS regarding the granting of consent for MSR can be categorized into three approaches. The first category includes countries that have implemented guidelines, procedures, and consent templates that address the information

⁵² DOALOS, "Marine Scientific Research: A Revised Guide to the Implementation of the Relevant Provisions of the United Nations Convention on the Law of the Sea" (2010), 29, 40, 45, at: <https://digitallibrary.un.org/record/702302?ln=en> (accessed 11 March 2024).

⁵³ *Ibid.*, 41.

⁵⁴ *Ibid.*, 40.

⁵⁵ Anand, note 46, 199–200; Anderson, note 7, 94–97.

required under Article 248 and add new requirements (Bahamas, Belize, Jamaica, and the Dominican Republic). Belize has a template form and guidelines, delineating the steps required to obtain a permit in accordance with UNCLOS and related treaties such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).⁵⁶ In a positive development since Q3, Jamaica has adopted guidelines, procedures, and a template form for seeking consent under Part XIII, with specific requirements for projects falling under Article 246(5). The Dominican Republic has established rules governing MSR in marine protected areas (MPAs) and introduced a consent form for fisheries research. The Bahamas, under the Biological Resources and Traditional Knowledge Act, has developed a purposeful online application guide consolidating criteria for obtaining research permits under various international instruments, including UNCLOS, CITES, the Specially Protected Areas and Wildlife Protocol,⁵⁷ and the Nagoya Protocol. However, certain aspects of the new law have faced criticism nationally and internationally due to the imposition of a substantial nonrefundable annual registration fee for researchers and institutions (in addition to individual permit charges), as well as the lack of consultation with civil society during the adoption process.⁵⁸ Scientists have emphasized that such requirements have rendered it impractical to conduct MSR activities in the country, jeopardizing conservation partnerships, especially those involving nongovernmental organizations and international institutes.⁵⁹ The matter is under discussion, with the potential for the adoption of a more straightforward procedure for not-for-profit research as a possible breakthrough.

The second category consists of countries that have implemented consent forms, with general information required prior to the research expedition (Antigua and Barbuda, St. Lucia, St. Kitts and Nevis). Of particular note, Guyana and Trinidad and Tobago are currently in the process of developing guidelines and application forms. The third category encompasses countries where no guidelines, procedures, or templates relating to MSR were identified (Barbados, Cuba, Dominica, Grenada, and SVG). Despite being within this group, Barbados has expressed its acceptance of the template forms prepared by DOALOS.

Concerning the introduction of new requisites in the precruise phase, four observations merit consideration. First, the submission of risk assessments or environmental impact assessments (EIAs) in this phase has garnered international support and is found within the practice of some of Caribbean SIDS. Second, there is a prevailing trend of seeking information regarding the use of the research or its implications for traditional and indigenous knowledge, signifying the influence of other legal regimes (e.g., the CBD) within the law of the sea. Third, the practice of requiring payment of

⁵⁶ Convention on International Trade in Endangered Species of Wild Fauna and Flora, adopted 3 March 1973, entered into force 1 July 1975, 993 UNTS 243.

⁵⁷ Protocol Concerning Specially Protected Areas and Wildlife to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, adopted 18 January 1990, entered into force 18 June 2000, at: <https://wedocs.unep.org/20.500.11822/27271> (accessed 28 February 2024).

⁵⁸ Rashad Roller, "AG: Minnis Administration Passed Research Law without Proper Consultation" 2 June 2022, *Eyewitness News* at: <https://ewnews.com/ag-minnis-administration-passed-research-law-without-proper-consultation> (accessed 10 June 2023).

⁵⁹ Candace Fields, "We Need 'A New Day' for Science in The Bahamas" 15 November 2021, *The Tribune* at: <http://www.tribune242.com/news/2021/nov/15/we-need-new-day-science-bahamas> (accessed 10 June 2023); Neil Hartnell, "Ex-Minister: Civil Servants Hijacked New Research Act" 11 April 2022, *The Tribune*, at: <http://www.tribune242.com/news/2022/apr/11/ex-minister-civil-servants-hijacked-new-research-a> (accessed 10 June 2023).

administrative fees to process consent requests, widespread among Caribbean SIDS, is supported by scholarship and United Nations documents,⁶⁰ finding no opposition in the literature consulted or in the manuals regulating foreign MSR in the United Kingdom and United States.⁶¹ Fourth, there is general support for requesting the documentation in the precruise phase and the presentation of preliminary and final reports in a language readable by the coastal state.⁶² Table 3 summarizes the specific requirements for consent applied by each state according to its respective laws and regulations.

Establishing formal channels to handle MSR requests is a significant measure to streamline the process of granting consent and facilitate the monitoring of compliance with pre- and postconsent obligations.⁶³ The analysis reveals that the Bahamas, Barbados, and Jamaica have established dedicated departments for MSR (see Table 1), while Antigua and Barbuda, Belize, Dominica, Guyana, and SVG have designated channels for processing MSR applications.

With regard to the practice of processing the consent requests, the responses to QA reveal a shared interest among Caribbean SIDS in promoting and advancing MSR in compliance with UNCLOS. The approval rate for foreign MSR requests is at 96.7 percent, reinforcing the findings of previous studies.⁶⁴ Among the respondents to QA, 60 percent reported processing research applications in less than four months (Antigua and Barbuda, the Bahamas, Barbados, Belize, Guyana, and SVG), and the guidelines from Belize and St. Lucia suggest an approximate processing time of around 20 days. Approximately one-third of QA respondents advised that the information submitted by researching states needs to be supplemented in only 20 percent of the requests (Figure 2), generally to help the coastal state discern the nature and purpose of the activity (Figure 3). Furthermore, conducting MSR projects under implied consent remains exceptional, only reported by Belize, Cuba (QA), and the Dominican Republic (Q3). In a statement that seems to summarize the Caribbean SIDS' approach to the consent regime for MSR, a respondent to QA affirmed that the country avoids unnecessarily restricting MSR; instead, the stakeholders involved rely on direct contacts and ad hoc agreements to achieve a balanced alignment between national interests and the promotion of scientific research.

In general, more than half of the Caribbean SIDS have implemented guidelines and procedures to prevent unjustified denial or delay of consent. Some have adopted comprehensive tools to consolidate information on research requests based on various legal frameworks. Also, several have established official channels for processing foreign MSR applications. However, none of them have provided further clarification on the interpretation of "normal circumstances" or adopted dedicated legislation to govern MSR. In addition to the requirements listed in Article 248, these countries have sought

⁶⁰ DOALOS, note 52, 28; Stephens and Rothwell, note 24, 571; Sookyoon Huh and Kentaro Nishimoto, "Article 255: Measures to Facilitate Marine Scientific Research and Assist Research Vessels" in Proelss (ed), note 35, 1713, 1716.

⁶¹ National Oceanography Centre, "Chief Scientist Guidance Notes" (2019), available at: <https://www.ukri.org/publications/chief-scientists-on-nerc-research-ships-guidance-and-guidelines> (accessed 11 March 2024); US Department of State, "About the Research Application Tracking System," available at: <https://www.state.gov/research-application-tracking-system> (accessed 10 June 2023).

⁶² DOALOS, note 52, 40.

⁶³ Ronán Long, "Regulating Marine Scientific Research in the European Union: It Takes More than Two to Tango" in Myron H. Nordquist, John Norton Moore and Alfred H.A. Soons et al. (eds), *The Law of the Sea Convention: US Accession and Globalization* (Martinus Nijhoff Publishers, 2012), 428, 479.

⁶⁴ Gorina-Ysern, note 29, 37–38; DOALOS, note 52, 29–30.



Table 3. Caribbean SIDS additional requirements to grant consent for foreign MSR projects

	Indicate the benefits	Submit EIA	Commitment to share data, preliminary and final reports	Guarantee the participation of local researchers	Submit documents in national language	Information on use of traditional knowledge	Payment of fee/bond	Commitment to marine technology transfer	Inform Coast Guard about the start and end of the research	Apply for working permit	Inform if the research will cover MPAs
Antigua and Barbuda (research concerning living resources)	X	X	X	Assign a nationalscientific counterpart for monitoring							
The Bahamas (research concerning biodiversity and MGRs)	X				X	X	Permit fees: (i) annual for researcher and institutions (ii) individual permit charges			X	X
Barbados	X	X	X	X			Permit fees per: (i) project (ii) foreign student or volunteer (iii) unit sample collected			X	X
Belize	X	X	X	X							
Cuba			X	X	X					X	
Dominican Republic (research concerning biodiversity)			Request co-authorship in publications		X		Also for non-biodiversity research				
Jamaica		X	X	X	X				X		
St. Kitts and Nevis			X	X			The bond is returned if the project is conducted as informed				X
St. Lucia	X	X				X					
SVG											
Trinidad and Tobago								X			

Source: prepared by author.

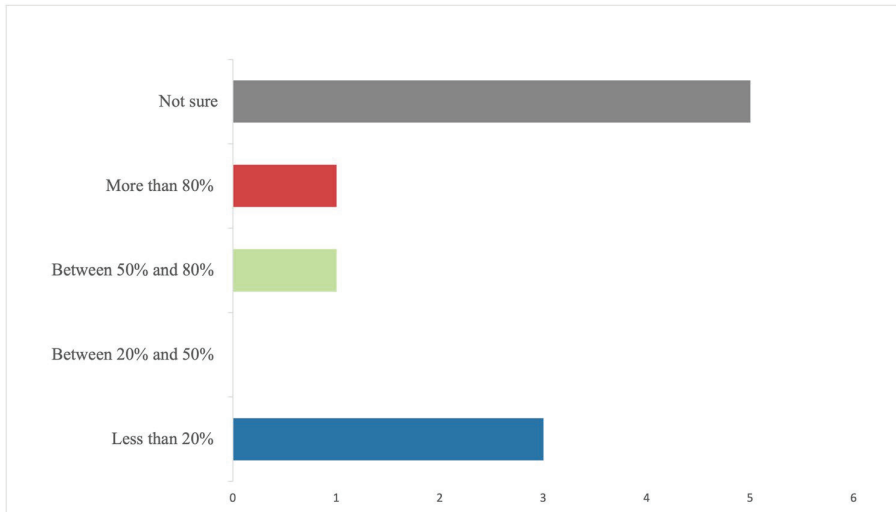


Figure 2. Number of cases in which supplementary information was required to support MSR request. (Prepared by author.)

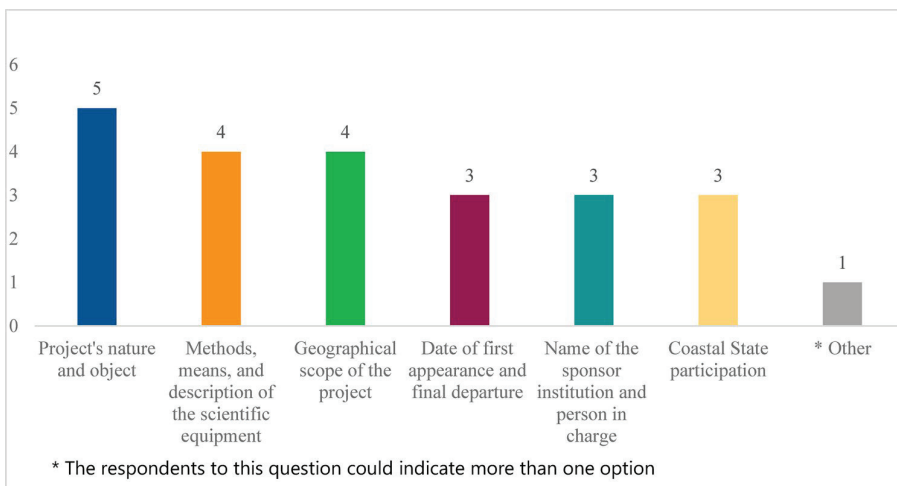


Figure 3. Reason for requesting supplementary information. (Prepared by author.)

information regarding the impact of research on traditional knowledge, payment of research fees, and submission of documents in a language understandable to state officials and scientists. The Caribbean SIDS have generally processed the MSR requests in a reasonable time, providing a high rate of approvals.

The Right to Withhold Consent

The coastal state's authority to deny consent for foreign MSR in AUNJ varies depending on the maritime zone. In the territorial sea, the coastal state possesses broader

discretion in refusing consent, while in the EEZ and on the continental shelf, consent may only be denied based on grounds outlined in UNCLOS. These include when the research (i) lacks a peaceful purpose or its primary objective does not involve advancing knowledge for humankind; (ii) unreasonably interferes with the coastal state's activities within its sovereign rights and jurisdiction; (iii) involves drilling or introducing harmful substances into the marine environment; (iv) includes the construction, operation, or use of artificial islands, installations, and structures; and (v) is of direct significance for the exploration and exploitation of natural resources (Articles 240 and 246(3), (5), and (8)). On the extended continental shelf, the last condition applies only within the areas publicly designated by the coastal state of interest for exploration and exploitation in a reasonable period of time. Additional grounds for withholding consent may apply (vi) in abnormal circumstances; (vii) where the information about the project's nature and objectives submitted during the precruise stage is deemed inaccurate; and (viii) if the researching state or relevant international organizations have pending obligations from previous projects (Article 246(3)(5)). In such instances, rather than outright denying permission, coastal states may choose to impose additional requirements on researching states, such as restrictions on the public dissemination of results from research with economic significance (Article 249(2)).⁶⁵

Despite the limited legal grounds for denying consent, the open language used in these provisions allows for multiple interpretations, prompting claims that the coastal state holds discretion over consent for all types of MSR in AUNJ.⁶⁶ In response to this criticism, this examination of the practice of Caribbean SIDS was carried out in order to reveal any common interpretative trends, particularly concerning the term "direct significance" for the exploration and exploitation of natural resources. Additionally, the study sought to explore whether the absence of opportunities for coastal state participation in MSR has been utilized as a trade-off for granting consent—a perspective endorsed by Gorina-Ysern, who argues that such participation has evolved into customary international law.⁶⁷ Moreover, by examining the implementation of the consent regime by Caribbean SIDS, the study also sought to explore the suggestion that there is an obligation to negotiate consent in cases where the coastal state has discretion to deny it.⁶⁸

Notwithstanding the high rate of approvals (as noted above), nearly half of the respondents to the QA disclosed instances of consent for foreign MSR being denied. The primary ground for refusal was inadequate information regarding the nature and objective of the project, hindering the assessment of the project's bona fides. This was followed by cases where the proposed activity would have economic significance for the exploration or exploitation of natural resources, cause harm to the marine environment, or unjustifiably interfere with the sovereign rights and jurisdiction of the coastal state (Figure 4).

⁶⁵ Soons, note 31, 188; Stephens and Rothwell, note 24, 571; Sookyeon Huh and Kentaro Nishimoto, "Article 249: Duty to Comply with Certain Conditions," in Proelss (ed), note 35, 1679, 1681.

⁶⁶ O'Connell, note 18, 1028; Stephens and Rothwell, note 24, 571.

⁶⁷ See Gorina-Ysern, note 29, 334–335. Against this view: Huh and Nishimoto, "Article 249," note 65, 1681; Wegelein, note 35, 192.

⁶⁸ Montserrat Gorina-Ysern, "International Law of the Sea, Access and Benefit Sharing Agreements, and the Use of Biotechnology in the Development, Patenting and Commercialization of Marine Natural Products as Therapeutic Agents" (2006) 20 *Ocean Yearbook* 221, 244.

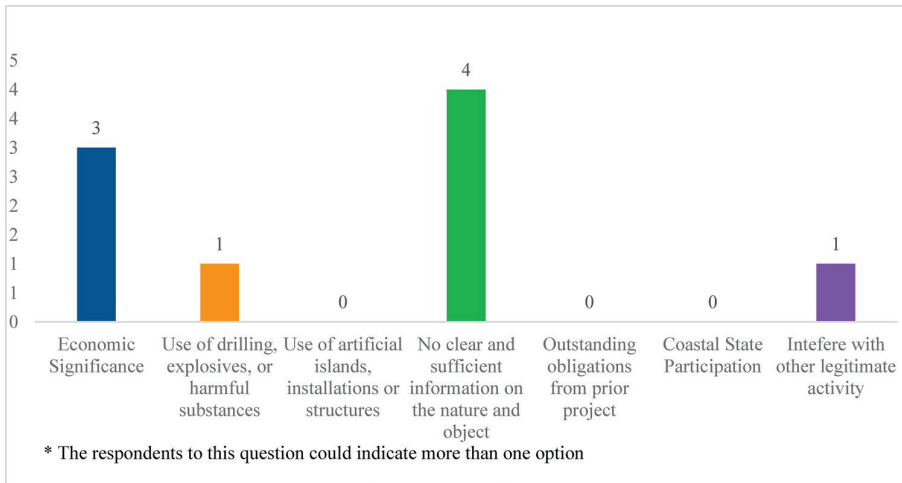


Figure 4. Reason for withholding consent. (Prepared by author).

Altogether, the Caribbean SIDS have generally exercised their right to deny consent on the bases provided by UNCLOS. No discernible trend or specific approach could be identified concerning the interpretation of the term “direct significance” for the exploration and exploitation of natural resources, and no evidence suggests that consent requests have been declined due to the absence of opportunities for coastal state participation. Lastly, notwithstanding the earlier affirmation that Caribbean SIDS generally favor the approval of consent requests, sometimes through direct contact and ad hoc agreements, it remains unclear whether engaging in such informal negotiations has been understood as an obligation.

The Obligations During and After the Research Cruise

In the territorial sea, the coastal state may require compliance with any kind of obligation in exchange for granting consent, whereas in the EEZ and on the continental shelf, the postconsent obligations are outlined in Article 249. This provision was significant for the adoption of Part XIII,⁶⁹ as it enables coastal states to ensure the bona fides of the research, safeguard security, defense, and national interests, prevent harm to the marine environment, and receive benefits from the research.⁷⁰ Accordingly, researching states are required to fulfill several obligations, including (i) ensuring the participation of the coastal state, particularly onboard vessels, crafts, or installations; (ii) providing preliminary reports promptly and submitting final results; (iii) granting access to data and samples collected during the research; and (iv) assisting in the assessment of data, samples, and research findings. Additionally, they must (v) ensure the international availability of research results, unless otherwise agreed; (vi) inform the coastal state of any significant changes in the research program; and (vii) remove

⁶⁹ Soons, note 31, 406; Tanaka, note 31, 438.

⁷⁰ Gorina-Ysern, note 29, 324–328; DOALOS, note 52, 38; Coelho, note 6, 516–519.

scientific installations and equipment, unless otherwise agreed. The prevailing interpretation asserts that this list of obligations is exhaustive, meaning that additional requirements can only be included in cases where the MSR project falls within the exceptions permitting denial.⁷¹ As a consequence of the failure to fulfill these obligations, the coastal state may request the suspension of the research activity or withhold future consent applications from the researching state.

One important criticism of Article 249 revolves around the open language used in its obligations, which can be interpreted as allowing options for opting out from compliance (e.g., “when practicable”), being contingent on a prior request by the coastal state, and hindering the monitoring of compliance (“undertake to provide”).⁷² Considering this, the examination of the Caribbean SIDS’ practice sought to identify whether such an open language has allowed researching states to avoid meeting international obligations. It also sought to verify whether the obligation to enable coastal state participation in the research cruise has been interpreted as a customary norm. Furthermore, the analysis aimed to understand how the Caribbean SIDS have monitored compliance, and whether they have interpreted the obligations under Article 249 as constituting an exhaustive or indicative list.

The laws and regulations of almost all the Caribbean SIDS analyzed present an upfront statement of interest in participating in the research. Responses to the QA and Q3 indicate that, with the exception of Antigua and Barbuda and SVG, Caribbean SIDS have actively pursued and, to some extent, derived benefits from capacity-building opportunities for deploying their scientists on vessels, crafts, and installations. Although none of the respondents appear to have denied consent due to the absence of opportunities for participation, the widespread practice of requesting participation, supported by the inclusion of this right in many domestic laws, reinforces views about the customary status of this right.⁷³ However, the details regarding the extent of this right (e.g., the scope and meaning of the right to participate) remain unresolved. For instance, while involving the coastal state in the planning stage of the research has been praised as a good practice, it lacks support in the general practice of states or historical negotiation records.⁷⁴ Furthermore, it is unclear whether the expenses associated with the observer’s transportation are included in the costs borne by the researching state.⁷⁵ Similarly, certain requisites associated with the right to participate, such as hiring a specific number of local scientists per foreign scientist or applying for work permits, do not seem to find support in the legal doctrine, in the general practice of states, or in a reasonableness test.

The laws and regulations in many Caribbean SIDS require the sharing of data, information, samples, and reports resulting from the research. It is worth noticing that this requirement is imposed in spite of the soft language used in the framing of the Article 249 obligation to share data (that may be copied) and samples (that may be divided). Responses to the QA reinforced that the majority of the participant states—80 percent—have sought access to the data and samples collected during research projects

⁷¹ Soons, note 31, 188; Stephens and Rothwell, note 24, 571; Huh and Nishimoto, “Article 249,” note 65, 1681.

⁷² Huh and Nishimoto, “Article 249,” note 65, 1687.

⁷³ Gorina-Ysern, note 29, 335.

⁷⁴ *Ibid.*; Huh and Nishimoto, “Article 249,” note 65, 1685; DOALOS, note 52, 43; Soons, note 31, 189.

⁷⁵ DOALOS, note 52, 43.

(Antigua and Barbuda, the Bahamas, Barbados, Belize, Cuba, Dominica, Guyana, Jamaica, and SVG). Therefore, the subsequent practice of these states has strengthened the requirement to fulfill such an obligation, notwithstanding its voluntary language.

Part XIII omits the time frame in which preliminary and final reports from the research should be shared with the coastal state, probably because it would vary depending on the research. Drawing from the global practices of states and insights from scientists, it has been proposed that a 30-day period would be a reasonable timeframe for the preliminary report.⁷⁶ While the analysis did not reveal a shared interpretation of this issue among Caribbean SIDS, it is noteworthy that Jamaica adheres to the 30-day rule for the preliminary report and additionally mandates the sharing of the final report within 12 months of the completion of the research. None of the instruments refer to the need for negotiating consent or prior agreement for publishing results of resource-related MSR, but Belize reserves the right to publish information derived from research in its AUNJ within two years of completion.

On the other hand, just 54 percent of the QA respondents have requested assistance in assessing the collected data and samples (Barbados, Cuba, Dominica, Dominican Republic, Guyana, St. Kitts and Nevis, and St. Lucia) and only a few of the regulatory instruments analyzed put forward this requirement. Hence, it remains unclear whether the Caribbean SIDS have been able to store and process the data and information received, as well as whether such material corresponds to the emergent needs of these countries.

Another interesting finding of the analysis is the inclusion of novel obligations in addition to the list set out in Article 249 (see Table 3). Among the less contested new requirements are the imposition of additional restrictions to perform MSR in locations governed by area-based management tools (ABMTs) and the requirement for submitting risk assessments or EIAs. These requirements reflect a shift in international law from merely balancing the interests of states toward the protection of common goods,⁷⁷ based on Articles 206 and 240(c) and (d), state practice, judicial precedents, scholarly opinions, and other treaties governing scientific research.⁷⁸ The imposition of a requirement to inform the national coastal guard about the commencement and conclusion of the research is also less controversial because it aligns with Article 248(d).

Moving to more contentious requirements, it has been increasingly common to find laws and consent templates concerning the monetary and nonmonetary benefits arising from the research—particularly if the study involves biodiversity and MGRs—beyond the obligations stated in Article 249 and the cases of coastal state discretion of Article 246(5). Taking the Bahamian guidelines as example, nonmonetary benefits would include access to data and samples, workshops, training, academic and knowledge exchange, shared publications, joint ownership of intellectual property rights, and

⁷⁶ Gorina-Ysern, note 29, 335.

⁷⁷ Yoshifumi Tanaka, *A Dual Approach to Ocean Governance: The Cases of Zonal and Integrated Management in International Law of the Sea* (Ashgate, 2008), 21–24.

⁷⁸ Philomène Verlaan, “Experimental Activities That Intentionally Perturb the Marine Environment: Implications for the Marine Environmental Protection and Marine Scientific Research Provisions of the 1982 United Nations Convention on the Law of the Sea” (2007) 31 *Marine Policy* 210, 211; DOALOS, note 52, 72–76; *Pulp Mills on the River Uruguay (Argentina v. Uruguay)*, Judgment (2010) ICJ Rep p. 14 [204]; *Certain Activities Carried out by Nicaragua in the Border Area (Costa Rica v. Nicaragua) and Construction of a Road in Costa Rica along the San Juan River (Nicaragua v. Costa Rica)*, Merits (2015) ICJ Rep p. 665 [104] and [153]; *Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area*, Advisory Opinion (2011) ITLOS Rep p. 10 [145].

technology transfer. On the other hand, monetary benefits would include access fees, up-front payments or royalties, joint ventures, and research funding.

The extent of international acceptance of the benefit-sharing approach to the consent regime remains unclear, although this article argues that it is a sound approach since it aligns with the objectives of Part XIII.⁷⁹ During the negotiation of UNCLOS, promoting coastal states' participation, sharing data, samples, information, and reports, and providing support for data and sample assessment were agreed measures to achieve the purpose of Part XIII. With the development of international law, marked by the adoption of subsequent agreements like the CBD, Nagoya Protocol, and BBNJ Agreement, additional avenues to enhance the research capacities of developing countries emerged. Consequently, the practice of Caribbean SIDS is coherent with the developments in sustainability and equity taking place in other legal realms and remains consistent with the purpose of UNCLOS.

Overall, in exchange for granting access to the marine environment of AUNJ to foreign MSR vessels, Caribbean SIDS have been seeking opportunities to share in the knowledge produced and enhance their autonomous MSR capacities. Their practice demonstrates a concerted effort to strengthen the language of obligations under Article 249 by explicitly requesting opportunities to participate in research activities and the sharing of reports, data, and samples generated from foreign research projects. However, the extent to which these measures have effectively served to address knowledge and management gaps in these countries is unclear, as is their potential to trigger sustained positive changes. *De lege ferenda* practice by Caribbean SIDS includes seeking information on the benefits accrued from research extending beyond the obligations specified in Article 249 for all types of research, the imposition of additional requirements for MSR projects in ABMT, and requests for the submission of risk assessments or EIAs.

The Right to Request Suspension or Cessation

The last aspect under consideration involves the coastal state's authority to request the suspension or cessation of a foreign MSR project in AUNJ. These mechanisms, along with the right to withhold consent for unfulfilled obligations, serve as enforcement measures within this framework.⁸⁰

Suspension is applicable when the activity deviates from the information provided in the preconsent phase under Article 248, or in cases of noncompliance with obligations under Article 249 (Article 253(1)). It is considered a temporary measure, allowing for the continuation of activities once the misconduct is rectified (Article 253(5)). However, if the researching state fails to address the situation that led to the suspension within a reasonable period, the coastal state may request the permanent discontinuance of the activity. Cessation may also be requested if deviations from the information provided under Article 248 amount to a major change in the research project or activity, thus undermining the basis on which consent was granted.⁸¹ For

⁷⁹ Coelho, note 6, 511–516; Salpin, note 17, 153.

⁸⁰ Wegelein, note 35, 238; Sookyeon Huh and Kentaro Nishimoto, "Article 253: Suspension or Cessation of Marine Scientific Research Activities" in Proelss (ed), note 35, 1700, 1701–1702.

⁸¹ *Ibid.*, 1705.

example, this would be the case if the researching state fails to inform the coastal state about the need to construct artificial islands as part of the project.

Responses to QA and Q3 revealed that only 15 percent of the Caribbean SIDS have ever requested the suspension or cessation of an MSR activity. This reinforces their favorable approach toward promoting foreign MSR, but it is important to note that one-third of the respondents were unable to provide a response to this question, casting doubts on the accuracy of this result and on the effectiveness of the databases within these countries regarding foreign MSR requests. The responses also revealed that instances justifying suspension or cessation were primarily triggered by the realization that the activity had exploitative intentions rather than the scientific purpose initially communicated.

Closing this section, the findings thus far have identified trends, best practices, and potential challenges faced by the Caribbean SIDS in the implementation of the consent regime for MSR. Expanding on this analysis, the following section discusses the significance of these findings and presents recommendations for improving the consent regime.

Discussion and Recommendations Arising from the Identified Trends and Gaps

The BBNJ Agreement, Ocean Decade, SDG 14, and other current developments in ocean governance seeking to enhancing the scientific and technological capacities of SIDS are not occurring in isolation; they are intricately tied to and enabled by the existing framework. To date, the interpretation and application of the consent regime for MSR under UNCLOS have attracted little attention from state officials, scientists, and scholars. In order to bring awareness to this issue, this section discusses key insights gleaned from this study and links them to ongoing initiatives, leading to recommendations for streamlining the process of granting consent while bolstering scientific and technological capacities in MSR within the Caribbean region.

One of the main conclusions of the study is that the practice of the Caribbean SIDS is in accordance with their duty under Article 239 of UNCLOS to promote and facilitate MSR within their AUNJ. In spite of the expansive interpretation of activities requiring prior consent, the findings concerning high rates of timely consent approval, low rates of denial, and reduced instances of research suspension or cessation suggest compliance with the obligation to grant consent under normal circumstances. Additionally, the use of direct communications and ad hoc agreements to address legislative gaps or conflicts during the consent process reflects a generally positive approach to research, even though an obligation to negotiate consent is not clearly evident. The analysis also identifies that while there is a general practice among the Caribbean SIDS of establishing rules and procedures to prevent undue delays or denials in the consent process, a few of them still handle consent requests on an ad hoc basis, and there are instances of failure to register information regarding foreign MSR requests. Therefore, establishing formal channels to handle foreign MSR requests is recommended as a good practice to improve data storage on the consent regime, streamline this process, and facilitate the monitoring of compliance.⁸²

Curiously, while their laws and guidelines on the specific question of exercising jurisdiction over MSR—such as fisheries acts and consent templates—are generally

⁸² Long, note 63, 479.

aligned with UNCLOS, almost all the domestic laws by which the Caribbean SIDS establish and assert jurisdiction over their maritime zones—such as maritime zones acts—do not follow the language used in UNCLOS.⁸³ Adjusting their maritime zone laws to clarify the substance of powers over MSR under UNCLOS and elaborate on the rights and obligations related to consent would provide greater legal certainty both to the coastal state officials involved in the consent and researching states. It would also likely have a ripple effect throughout the consent process. To improve the consent procedure, the Caribbean SIDS should consider disseminating their laws, guidelines, and templates related to MSR through platforms such as the DOALOS legislative database, regional organizations, or national websites.

The preceding section suggests that researching states have generally fulfilled the obligations under Articles 248 and 249. Nonetheless, the instances where supplementary information was required or consent was denied due to a lack of sufficient basis for assessing the nature and objectives of the research emphasize the need for researching states and principal investigators to enhance efforts in providing a detailed account of the research to support the coastal state's decision. In effect, establishing a cooperative approach between researching and coastal states is essential to streamline the consent process by fostering trust⁸⁴ and avoiding practices considered “colonial science.”⁸⁵ Good cooperative practices in international MSR include promoting the meaningful participation of scientists from the coastal state in the project from its early stages, considering national and regional knowledge gaps and socioeconomic aspects during the project planning, monitoring compliance with postconsent obligations, and maintaining a list of noncompliant research institutes.

The analysis above also highlights the dynamism of Articles 248 and 249, influenced by developments in other areas of international law and technological advances. The development of additions to the obligations established in these Articles aligns with the right of all states to promote MSR under Article 238 and with the concept of UNCLOS as a living instrument. Consequently, when seeking consent, researching states must be aware that domestic regulations may impose additional requirements to those listed in Article 248. For example, it is increasingly common and accepted to inquire about how the research will impact on and use traditional knowledge, request a risk assessment or an EIA, impose stringent measures for ecologically significant areas, require documentation in a language readable by the coastal state, and request payment of fees based on

⁸³ For instance, Belize has a template for soliciting consent to conduct MSR involving living resources, aligning with the provisions of Part XIII of UNCLOS. However, the Maritime Areas Act of Belize lacks specificity regarding the exercise of jurisdiction over MSR activities in the continental shelf. In Antigua and Barbuda, while the Fisheries Act and the template for conducting MSR involving living resources align with the stipulations of UNCLOS under Part XIII, the Maritime Areas Act asserts exclusive right to regulate, authorize, and conduct MSR activities on the continental shelf, contrary to UNCLOS.

⁸⁴ DOALOS, note 52, 39–40; World Resources Institute, Henrik Österblom, Colette C. C. Wabnitz, Dire Tladi et al., “Towards Ocean Equity” (2020), at: <https://oceanpanel.org/wp-content/uploads/2022/05/Towards-Ocean-Equity.pdf> (accessed 10 June 2023); Harriet Harden-Davies, Diva J. Amon, Marjo Vierros et al., “Capacity Development in the Ocean Decade and beyond: Key Questions about Meanings, Motivations, Pathways, and Measurements” (2022) 12 *Earth System Governance* 100138, 2.

⁸⁵ “Colonial science” refers to the practice of researchers from developed states undertaking MSR in areas under the jurisdiction of developing states without involving the local scientific community, disregarding traditional knowledge, and failing to invest in human capacity or infrastructure, thereby perpetuating power imbalances reminiscent of colonial relations. See, e.g., Coelho, note 6, 497; Asha de Vos, “The Problem of ‘Colonial Science’” 1 July 2020, *Scientific American* at: <https://www.scientificamerican.com/article/the-problem-of-colonial-science> (accessed 10 January 2023).

Table 4. Recommendations in a nutshell

Caribbean SIDS should	Researching states should
<ul style="list-style-type: none"> • Ensure their domestic laws align with the jurisdiction established in UNCLOS • Adopt and publicise domestic laws to implement Part XIII • Establish guidelines concerning the application for consent to conduct MSR • Establish dedicated points of contact to handle MSR consent requests • Create databases about the consent regime for MSR (in national or regional level) • Make use of regional and cross-regional mechanisms as platforms to share practices, enhance cooperation and knowledge exchange 	<ul style="list-style-type: none"> • Engage in communications through official channels regarding the need to obtain consent for research activities • Provide detailed information about the project, including its implications for traditional knowledge and the marine environment • Maximize efforts to include representatives of the Caribbean SIDS in all stages of research • Consider the MSR project as a two-way process, which should benefit all participating states • Monitor compliance with postcruise obligations, list noncompliant institutes, and adopt remedies for noncompliant practices

Source: prepared by author.

a reasonableness test (see Table 3). Once given consent, researching states must promote the coastal state's participation—an obligation that may have acquired customary status—and share reports, information, data, and samples—a requirement commonly found in instruments of the Caribbean SIDS. Expanding on the list of capacity-building opportunities in Article 249, there is a growing trend to inquire about the benefits that the MSR project will bring to the country (see Table 3), and how opportunities for increased cooperation will be created, including in contexts where consent is discretionary and trade-offs may therefore be able to be negotiated.

Regional organizations are well positioned to serve as platforms for adopting necessary regulations, storing and sharing scientific data, and establishing a community of practice.⁸⁶ For instance, the OECS, as demonstrated by the analysis, holds significant importance in establishing fisheries laws within its member states. Furthermore, it has taken measures related to MSR, exemplified by initiatives like the 2016 OECS Code of Conduct for Marine Research,⁸⁷ 2016 OECS Marine Research Strategy,⁸⁸ and 2016 Developing OECS Ocean Data Standards and Best Practices,⁸⁹ although efforts toward the consent regime are yet to be initiated. In the broader Caribbean region, the Regional Seas Programs also play a crucial role in promoting the exchange of practices pertaining to MSR, in compliance with Article 123 of UNCLOS.⁹⁰

Table 4 summarizes the recommendations for the Caribbean SIDS and researching states.

⁸⁶ Genevieve C. Quirk and Harriet Harden-Davies, "Cooperation, Competence and Coherence: The Role of Regional Ocean Governance in the South West Pacific for the Conservation and Sustainable Use of Biodiversity beyond National Jurisdiction" (2017) 32 *International Journal of Marine and Coastal Law* 672, 701–703; Glen Wright, Julien Rochette, Janna Shackeroff et al., *Partnering for a Sustainable Ocean: The Role of Regional Ocean Governance in Implementing Sustainable Development Goal 14* (PROG: IDDRI, IASS, TMG & UN Environment, 2017) at: https://www.prog-ocean.org/wp-content/uploads/2017/03/PROG_Partnership-for-a-Sustainable-Ocean_Report.pdf (accessed 10 January 2023); Ibukun Jacob Adewumi, "Exploring the Nexus and Utilities Between Regional and Global Ocean Governance Architecture" (2021) 8 *Frontiers in Marine Science* 1, 11–15.

⁸⁷ OECS Commission, OECS Code of Conduct for Responsible Marine Research (2016), at: <https://www.oecs.org/en/our-work/knowledge/library/ogu-code-of-conduct/viewdocument/522> (accessed 10 January 2022).

⁸⁸ OECS Commission, OECS Marine Research Strategy (2016), at: <https://www.oecs.org/en/our-work/knowledge/library/ogu-marine-research-strategy/viewdocument/524> (accessed 10 January 2022).

⁸⁹ OECS Commission, Developing OECS Ocean Data Standards and Best Practices (2016), at: <https://www.oecs.org/en/our-work/knowledge/library/ocean-governance/og-standards-best-practices> (accessed 10 January 2022).

⁹⁰ Barker, note 7, 76–78; Luciana Fernandes Coelho and Nata Tavonvunchai, "Regimes for Ocean Management: Regional Seas Programmes and Blue Carbon Ecosystems" in Paul G. Harris (ed), *Routledge Handbook of Marine Governance and Global Environmental Change* (Taylor & Francis, 2022), 51, 59–60.

Concluding Remarks

Initiatives like SDG 14, the Ocean Decade, and the BBNJ Agreement underscore the necessity of promoting capacity building, transferring marine technology, and ensuring equity within ocean governance to address vulnerabilities arising from the special circumstances of SIDS. As elucidated in this article, it is crucial to recognize that these initiatives are grounded in the framework laid by UNCLOS, which identifies the enhancement of scientific and technological capacities in developing countries as one of its objectives and has instituted tools, such as the consent regime, to accomplish this objective.

The analysis of the state practice of the Caribbean SIDS discloses their positive inclination to promote and facilitate the development of foreign MSR in their AUNJ. Moreover, in accordance with the dynamic nature of UNCLOS, these countries have adjusted the consent regime to reflect advancements in biodiversity and environmental law—such as ABMT, EIA, and considerations pertaining to the impact of Western science on traditional knowledge—and to incorporate a benefit-sharing perspective into the postconsent obligations. Nevertheless, the Caribbean SIDS have not fully realized their right to conduct MSR.

As described in this article, there is significant potential to streamline the consent process within Caribbean SIDS, concurrently amplifying their engagement in proposed foreign MSR projects and ultimately advancing their autonomous scientific capabilities. The recommendations articulated herein act as a catalyst for this transformative process, underscoring that the essential element for change rests in cultivating a collaborative perspective between researching states and the Caribbean SIDS.

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Paper III



Developing and Reframing UNCLOS in Changing Circumstances: the Practice of Small Island Developing States on the Consent Regime for Marine Scientific Research

Luciana Fernandes Coelho¹

Abstract: This paper investigates the State practice of 31 Small Island Developing States (SIDS) on the consent regime for marine scientific research (MSR) under the 1982 United Nations Convention on the Law of the Sea (UNCLOS) between 2005 and 2020. Through an analysis of domestic laws and responses to questionnaires by state officials, research vessel operators, and research institutes, the study ascertain trends in the interpretation of the rights and obligations within the consent regime for MSR, as well as challenges encountered in its implementation. It concludes that the framework remains operational in light of changing circumstances, with SIDS interpreting it in alignment with developments in other areas of international law. Additionally, it offers recommendations to enhance the implementation of this framework.

Keywords: small island developing states, marine scientific research, consent regime, State practice, UNCLOS.

Introduction

Small Island Developing States (SIDS) constitute a group of States characterized by small populations, limited land territory, geographical remoteness, and heightened susceptibility to external shocks². Additionally, these countries have deep-rooted connections to the ocean, which play a central role in their histories, livelihoods, and economies³. Marine scientific research (MSR) is indispensable for generating the requisite knowledge to build resilience and adaptation within SIDS, thereby securing their sustained existence. Despite international activities and political commitments aimed at enhancing the scientific and technological capacities of SIDS⁴, these nations persistently grapple with restricted autonomous marine scientific and technological

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² Stewart Firth, 'Sovereignty and Independence in the Contemporary Pacific' (1989) 1 *The Contemporary Pacific* 75; Tekau Frere, Clement Yow Mulalap and Tearinaki Tanielu, 'Climate Change and Challenges to Self-Determination: Case Studies from French Polynesia and the Republic of Kiribati' (2020) 129 *The Yale Law Journal Forum* 648; Ilan Kelman, 'Islandness within Climate Change Narratives of Small Island Developing States (SIDS)' (2018) 13 *Island Studies Journal* 149; Ronald M Sanders, 'The Growing Vulnerability of Small States: The Caribbean Revisited' (1997) 86 *The Round Table* 361; Clive Schofield and David Freestone, 'Islands Awash Amidst Rising Seas: Sea Level Rise and Insular Status under the Law of the Sea' (2019) 34 *The International Journal of Marine and Coastal Law* 391.

³ Lino Briguglio, 'Small Island Developing States and Their Economic Vulnerabilities' (1995) 23 *World Development* 1615; Robin Mahon and Patrick McConney, 'Managing the Managers: Improving the Structure and Operation of Small Fisheries Departments, Especially in SIDS' (2004) 47 *Ocean & Coastal Management* 529; Clement Yow Mulalap and others, 'Traditional Knowledge and the BBNJ Instrument' [2020] *Marine Policy* 104103; Pawan G Patil and others, 'Toward a Blue Economy: A Promise for Sustainable Growth in the Caribbean' (World Bank 2016) <<https://openknowledge.worldbank.org/handle/10986/25061>> accessed 30 November 2022.

⁴ Joachim Claudet and others, 'A Roadmap for Using the UN Decade of Ocean Science for Sustainable Development in Support of Science, Policy, and Action' (2020) 2 *One Earth* 34; Harriet Harden-Davies and others, 'Capacity Development in the Ocean Decade and beyond: Key Questions about Meanings, Motivations, Pathways, and Measurements' (2022) 12 *Earth System Governance* 100138; Edward J Hind and others, 'Fostering Effective International Collaboration for Marine Science in Small Island States' (2015) 2 *Frontiers in Marine Science* 86.

capabilities, encountering obstacles in accessing marine information, data, and knowledge⁵. In this context, this paper investigates the fitness-for-purpose of the framework governing MSR under the 1982 United Nations Convention on the Law of the Sea (UNCLOS), often referred to as the 'constitution of the ocean,'⁶ in assisting to enhance the autonomous scientific capabilities of SIDS and adapting to techno-scientific advancements.

UNCLOS regulates MSR in Part XIII granting all States and competent international organizations the right to engage in research and the obligation to promote and facilitate MSR in accordance with the Convention. Part XIII comprises 27 articles, organized into five sections: general provisions, international cooperation, the conduct and promotion of MSR, the use of scientific research installations or equipment in the marine environment, and issues of responsibility and liability. Coastal State jurisdiction over MSR varies depending on specific maritime zones, with the coastal State consent required for MSR in areas under national jurisdiction (AUNJ), while freedom prevails in areas beyond national jurisdiction (ABNJ).

This paper investigates the State practice of SIDS on consent regime for MSR in AUNJ under UNCLOS animated by controversies surrounding its object and purpose and futureproofing. According to the traditional understanding, the consent regime is designed to provide coastal States with mechanisms to evaluate the bona fides of research activities and ensure researching States are not unduly constrained in the right to conduct MSR⁷. From this standpoint, the provisions regulating the consent regime are perceived as static and potentially unresponsive to emerging methodologies in MSR and developments in other legal frameworks.⁸ Conversely, it has been suggested that the jurisdiction of coastal States under UNCLOS is more nuanced than a simple balance of rights and duties⁹ and that UNCLOS is a 'living instrument' able to incorporate changing circumstances¹⁰. Aligned with this perspective, the consent regime would also serve to diffuse rights, such as the preservation of marine biodiversity and ecosystems¹¹, and to foster measures that enhance the autonomous scientific capability of coastal States, in particular

⁵ Hind and others (n 3); Ronán Long, 'Marine Science Capacity Building and Technology Transfer: Rights and Duties Go Hand in Hand under the 1982 UNCLOS' in Myron Nordquist and others (eds), *Center for Oceans Law and Policy* (Martinus Nijhoff Publishers 2007); RJ Morrison and others, 'Developing Human Capital for Successful Implementation of International Marine Scientific Research Projects' (2013) 77 *Marine Pollution Bulletin* 11; Rebecca Zitoun and others, 'Review of the Scientific and Institutional Capacity of Small Island Developing States in Support of a Bottom-up Approach to Achieve Sustainable Development Goal 14 Targets' (2020) 1 *Oceans* 109.

⁶ Tommy TB Koh, 'Negotiating a New World Order for the Sea' [1983] *Virginia Journal of International Law* 761.

⁷ Myron Nordquist and others, *United Nations Convention on the Law of the Sea 1982: A Commentary, Articles 192 to 278, Final Act, and Annex V*, vol IV (Myron Nordquist and others eds, Martinus Nijhoff 1985) 433; Alfred HA Soons, 'The Legal Regime of Marine Scientific Research: Current Issues' in Myron Nordquist and others (eds), *Law, Science & Ocean Management* (Martinus Nijhoff Publishers 2007) 142.

⁸ James Kraska, Guillermo Ortuño Crespo and David W Johnston, 'Bio-Logging of Marine Migratory Species in the Law of the Sea' (2015) 51 *Marine Policy* 394.

⁹ Camille Goodman, *Coastal State Jurisdiction over Living Resources in the Exclusive Economic Zone* (Oxford University Press 2021) 347–348 <<https://doi.org/10.1093/oso/9780192896841.001.0001>> accessed 14 April 2023.

¹⁰ Tomas Heidar, 'How Does the Law of the Sea Adapt to New Knowledge and Changing Circumstances?', *New Knowledge and Changing Circumstances in the Law of the Sea* (Brill Nijhoff 2020).

¹¹ Yoshifumi Tanaka, 'Obligation to Co-Operate in Marine Scientific Research and the Conservation of Marine Living Resources' (2005) 65 *Zeitschrift für Ausländisches Öffentliches Recht und Völkerrecht* 937; Philomène Verlaan, 'Experimental Activities That Intentionally Perturb the Marine Environment: Implications for the Marine Environmental Protection and Marine Scientific Research Provisions of the 1982 United Nations Convention on the Law of the Sea' (2007) 31 *Marine Policy* 210; Anna-Maria Hubert, 'The New Paradox in Marine Scientific Research: Regulating the Potential Environmental Impacts of Conducting Ocean Science' (2011) 42 *Ocean Development & International Law*, 329.

developing States¹². Additionally, the consent regime would be flexible to accommodate new circumstances from legal, scientific and technological developments. In this sense, an examination of State practices regarding the consent regime for MSR yields valuable insights into the present understanding of its object and purpose as well as its resilience over time.

This study examines the State practice concerning the consent regime for MSR across 31 SIDS situated in the Caribbean, Pacific, and Indian ocean from 2005 to 2020. State practice constitutes a fundamental aspect of international law-making also being significant in elucidating the original and contemporaneous interpretation of a framework, and evidencing the modification of existing norms.¹³ Despite its significance, the development of international law through State practice has faced criticism for relying mostly on information from a limited number of States.¹⁴ It has been suggested that, unequal access to knowledge and technology potentially hinders the majority of States from establishing international practice.¹⁵ In addition, obstacles, such as limited human and financial resources, language barriers, and expertise shortage in international law further impede the documentation, compilation and public dissemination of information on State practice of developing States.¹⁶ Acknowledging this asymmetry in information availability, the study compiles information on the State practice of SIDS from domestic laws and regulations and responses to questionnaires by state officials from SIDS and researching States.

The paper is organized as follows. Section 2 outlines the methodology employed to identify and compile the information on the State practice of 31 SIDS on the consent regime for MSR. Section 3 provides an overview of the framework governing the consent regime for MSR under UNCLOS and relevant regional frameworks. Section 4 analyses the compiled information, discerning trends in the current understanding of the object and purpose of the consent regime for MSR and its adaptability over time, and the challenges faced during implementation. Section 5 discusses key findings and provides recommendations to improve the implementation of the legal framework. The paper concludes that SIDS have considered the enhancement of their MSR

¹² Charlotte Salpin, 'The Law of the Sea: A before and an after Nagoya?' in E Morgera, M Buck and E Tsioumani (eds), *The 2010 Nagoya Protocol on Access and Benefit-sharing in Perspective: Implications for International Law and Implementation Challenges* (Martinus Nijhoff Publishers 2013); C Von Kries and G Winter, 'Harmonizing ABS Conditions for Research and Development under UNCLOS and CBD/NP.', *Research and development on genetic resources: Public domain approaches in implementing the nagoya protocol* (Routledge 2015) <<https://www.taylorfrancis.com/chapters/edit/10.4324/97811315717838-5/harmonizing-abs-conditions-research-development-unclos-cbd-np-caroline-von-kries-gerd-winter?context=ubx&refId=d84038a1-4325-474b-853f-18b416ad2396>>; Nele Matz-Lück, 'Article 238: Right to Conduct Marine Scientific Research' in Alexander Proelss (ed), *United Nations Convention on the Law of the Sea: a Commentary* (CH Beck/Hart/Nomos 2017) 1606; Luciana Fernandes Coelho, 'Marine Scientific Research and Small Island Developing States in the Twenty-First Century: Appraising the United Nations Convention on the Law of the Sea' (2022) 37 *The International Journal of Marine and Coastal Law* 493.

¹³ Dire Tladi, 'State Practice and the Making and (Re)Making of International Law: The Case of the Legal Rules Relating to Marine Biodiversity in Areas Beyond National Jurisdiction' (2014) 1 *State Practice and International Law Journal* 97; Irina Buga, *Modification of Treaties by Subsequent Practice*. (Oxford University Press 2018); Irina Buga, 'Between Stability and Change in the Law of the Sea Convention: Subsequent Practice, Treaty Modification, and Regime Interaction' in D Rothwell and others (eds), *The Oxford Handbook of the Law of the Sea* (Oxford University Press 2015).

¹⁴ Michael Byers, 'Introduction Power, Obligation, and Customary International Law' (2001) 11 *Duke Journal of Comparative and International Law* 81; BS Chimni, 'Customary International Law: A Third World Perspective' (2018) 112 *American Journal of International Law* 1; George Rodrigo Bandeira Galindo and César Yip, 'Customary International Law and the Third World: Do Not Step on the Grass' (2017) 16 *Chinese Journal of International Law* 251; Anthony Carty, 'The Need to Be Rid of the Idea of General Customary Law' (2018) 112 *AJIL Unbound* 319.

¹⁵ Tladi (n 11).

¹⁶ *ibid*; Chimni (n 12); Galindo and Yip (n 12).

capability within the purpose of the consent regime and have interpreted the consent regime for MSR in alignment with developments in other areas of international law.

Materials and Methods

Domestic laws serve as the traditional and most convenient source for discerning the practice of a State; nonetheless it often falls short in capturing the everyday expressions of international law reflected in non-written administrative procedures¹⁷. In an endeavor to offer a comprehensive picture of the practice of SIDS on the consent regime for MSR, this study relies on information obtained from domestic laws and regulations, as well as responses to questionnaires provided by state officials, research vessel operators, and scientists.

In more details, the practice of SIDS analysed in the study stem from: (i) national laws, policy instruments and regulations (see Table 1)¹⁸; (ii) responses from State officials to a Questionnaire submitted by the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO) to its member-States during the interval from 2005 to 2008 (thereafter Q3)¹⁹; (iii) responses provided by State officials to a questionnaire formulated for this investigation, built upon Q3, covering the years 2009 to 2020 (thereafter QA)(see Table 2)²⁰; and (iv) responses by research vessel operators and research institutions about their experience engaging in MSR at SIDS between 2009 to 2020 (thereafter QB) (see Table 3)²¹.

Table 1 Legislative Database (Source: prepared by author)

Country	Legislation/Policy Instrument	Authority Responsible to provide Consent for MSR
Antigua and Barbuda	Environmental Protection and Management Act, 2019	
	Fisheries Regulations, 2013	
	Fisheries Act, 2006	Minister of Agriculture, Fisheries and Barbuda Affairs
	The Maritime Areas Act, 1982	

¹⁷ Luis Eslava and Sundhya Pahuja, 'Beyond the (Post)Colonial: TWAIL and the Everyday Life of International Law' (2012) 45 *Verfassung in Recht und Übersee* 195.

¹⁸ The instruments were sourced from the following websites: Ecolex, Global Lex, FAO Lex, UN The Division for Ocean Affairs and the Law of the Sea (DOALOS), US Department of State, Commonwealth Caribbean Law Research Guide, Digital Library of the Caribbean, Pacific Islands Legal Information Institute, Lexadin and the University of Hamburg. The following keywords were used when consulting the web sources: marine scientific research, scientific research, scientific permit, research permit, marine collection permit, bioprospecting, genetic resources, hydrographic survey, ocean observation, and bathymetric survey.

¹⁹ Only 7 of the SIDS under this study responded to Q3, these are identified in Table 2. When considered in the analysis, such responses are indicated.

²⁰ QA was approved by the Ethic Committee of World Maritime University on July 2021. Considering the limitations to social gathering imposed by the Covid-19 restrictions, QA was distributed solely in virtual format using the software *Formsite* between August 2021 and March 2022. Bi-weekly reminder were sent using the software *MergeMail*. When social gatherings were officially resumed, attendance at a regional workshop in Dominica in April 2022, the UN Ocean Conference in June 2022, and the 5th Intergovernmental Conference on an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (IGC-BBNJ) provided fruitful opportunities to connect with stakeholders and collect additional information.

²¹ QB was approved by the Ethic Committee of World Maritime University on September 2021. It was distributed solely in virtual format using the software *Formsite* between October and December of 2021 and March 2022. Bi-weekly reminders were sent using the software *Mergemail*.

	Application for Access to Genetic and Biological Resources in Antigua and Barbuda	Department of Environment
	Application to Conduct Marine Research in Antigua and Barbuda	Minister of Agriculture, Fisheries and Barbuda Affairs (approved by the Chief Fisheries Officer.)
Bahamas	Biological Resources and Traditional Knowledge Protection and Sustainable Use Act, 2021	Department of Environmental Planning & Protection and Department of Marine Resources
	Environmental Planning and Protection Bill, 2017	
	The Bahamas' National Maritime Policy, 2015	
	Fisheries Resources (Jurisdiction and Conservation) Regulations, 2009	Minister of Agriculture and Marine Resources
	Marine Mammal Protection Act, Chapter 244A, 2008	Minister responsible for wild animals
	Archipelagic Waters and Maritime Jurisdiction Act, 1993	
	Fisheries Resources (Jurisdiction and Conservation) Act, 1977	
	Bahamas Guide for Applicants for Research and ABS Permits, 2021	Department of Environmental Planning and Protection (DEPP)
	Application to Conduct Scientific Research, Survey or Experimental Projects in the Bahamas	
Barbados	Coastal Zone Management Act, Chapter 394, 1998	The Coastal Zone Management Unit
	Marine Boundaries and Jurisdiction Act, 1995	The Cabinet
	Fisheries Act, 1993	Minister responsible for Fisheries
	Marine Areas (Preservation and Enhancement) (Restricted Areas), Regulations, 1981	
Belize	Fisheries Resources Act, 2020	Fisheries Department
	High Seas Fishing Act, 2013	
	Coastal Zone Management Act, Chapter 329, Revised Edition 2000	
	Maritime Areas Act, Chapter 11, Revised Edition, 2000	
	Guidelines for writing a marine scientific research project proposal	Belize Fisheries Department
	Scientific Research Permits Administrative Requirement	
Cabo Verde	Legislative Decree 2 regulating fishing activities in national waters and the high seas, 2020	
	Decree-Law 59, 2021 Establishes the Ministry of the Sea	
	Legislative Decree 14, 2010	Maritime Authority
	Law 66/IV, 1992	
	QA	Ministry of Foreign Affairs

Cook Islands	Guiding principles for research in the Cook Islands, 2022	National Research Committee after authorization by the Secretary of Ministry of Marine Resources and by the Research Ethics Committee
	Maritime Zones Act 1, 2018	
	Marae Moana Act, 2017	
	Research Policy and Supporting Documents, 2015	
	Marine Resources Act, 2005	The Minister of Marine Resources
	Seabed Minerals Act, 2009	Seabed Minerals Authority
Cuba	Law 129 on Fisheries, 2019	
	Decree 1, regulating Law 129, 2019	Ministry of Food Industry, with previous authorization by the Ministry of Science, Technology and Environment
	Resolution 17 on Procedures for Granting Fishing Licenses, 2022	Fisheries Director
	Resolution 111, about the Access to Biological Diversity, 1996	Minister of Science, Technology and Environment
	Maritime, River and Lake Navigation Act 115, 2013	Minister of Defense
	Decree 317, regulating the Maritime, River and Lake Navigation Act 115, 2013	
	Decree-Law 2, on the EEZ, 1977	
Dominica	National Ocean Policy, 2019	
	Climate Change, Environment and Natural Resource Management Bill, 2016	Biodiversity and Conservation Authority
	Fisheries Act, 1987	Minister responsible for Fisheries
	Territorial Sea, Contiguous Zone, Exclusive Economic and Fishery Zones Act, 1981	
Dominican Republic	Law 573 on the Territorial Sea Contiguous Zone, EEZ and Continental Shelf, 1977	
	Act 219 on Biotechnology Security, 2015	Minister of Environment and Natural Resources
	Act 333 on Biodiversity, 2015	Minister of Environment and Natural Resources
	Guidelines on Research in Marine Protected Areas (MPA) and Biodiversity	Subsecretary of MPA and Biodiversity
	Act 307 which establishes the Council for Fishing and Aquaculture (CODOPESCA), 2004	CODOPESCA
	Template to request consent for research activities in the coastal zone	Minister of Environment and Natural Resources
Fiji	Offshore Fisheries Management Decree, 2012	Permanent Secretary of Fisheries
	Fiji Offshore Fisheries Management Regulation 2014	Permanent Secretary of Fisheries
	Continental Shelf Act 1970	Minister of Foreign Affairs
	Marine Spaces Act, 1978	Minister of Foreign Affairs

	Republic of Fiji National Ocean Policy 2020-2030	
Grenada	Draft National Ocean Policy of 2019	
	Integrated Coastal Zone Management Act, 2019	Minister responsible for the Environment
	Integrated Coastal Zone Management Policy for Grenada, Carriacou and Petite Martinique, 2015	
	Grenada Territorial Sea and Maritime Boundaries Act, 1989	
	Fisheries Regulations, 1987	
	Fisheries Act, 1986	Minister of Fisheries
	Environmental Protection (Bio-prospecting) Regulations, 2001	
Guyana	Maritime Zones Act, 2010	
	Fisheries Act, 2012	Minister of Fisheries
	Environmental Protection Act, 1996	
Jamaica	Endangered Species (Protection, Conservation and Regulation of Trade) Act, 2000	National Environment and Planning Agency
	Towards Ocean and Coastal Zone Management in Jamaica, 2000	
	Maritime Areas Act, 1996	
	Exclusive Economic Zone Act, 1991	Minister of Agriculture and Fisheries
	Beach Control Act, 1956	
	Mining Act, 1947	Minister with responsibility for Mining
	Guidelines for conducting Marine Scientific Research in Areas under Jamaica's Maritime Jurisdiction	
	Wildlife Research Application Form	Natural Resources Conservation Unit
Kiribati	Seabed Minerals Act, 2017	Ministry responsible for Seabed Minerals
	Marine Zones (Declaration) Act, 2011	
	Environment Act, 1999	
	Environment (Amendment) Act, 2007 and Regulations, 2017	
	Fisheries Act, 2010	Director of Fisheries
	Fisheries (Amendment Act), 2021	Director of Fisheries
	QA	Marine Scientific Research Coordinating Committee
	Application to Conduct Environmental Scientific Research (Environment (Amendment) Act, 2007)	
	Application for Consent to Conduct MSR	
Marshall Islands	Fishing Access And Licensing Act, 2014	Director of the Marine Resources Authority
	Marine Zones Declaration Act, 2016	

	Marine Resources Act, 1997	Director of the Marine Resources Authority
	Fisheries Regulation of 1998	
Mauritius	Maritime Zones (Conduct Of Marine Scientific Research) Regulations, 2017	
	Maritime Zones (Amendment) Act, 2012 Joint Agreement Between Seychelles and Mauritius to Govern The Mascarene Plateau Region	
	Maritime Zones Act, 2005	Prime Minister
	Application for consent to conduct MSR by States or Competent International Organizations	Department for Continental Shelf, Maritime Zones Administration and Exploration (CSMZAE)
Micronesia	Seabed Resources Act, 2014	National Seabed Resources Authority (territorial sea) and National Oceanic Resource Management Authority (continental shelf)
	Maritime Boundaries Act, 2017	
	Marine Resources Act, 2002	National Oceanic Resource Management Authority
	Research Permit Application Form*	
	YAP Research Permit Application Form	
Nauru	Seabed Resources Act, 2014	
	Fisheries Regulations, 1998	Nauru Fisheries & Marine Resources Authority
	International Seabed Minerals Act, 2015	Nauru Fisheries & Marine Resources Authority
Palau	Marine Protection Act, 1994	Bureau of Oceanic Fishery Management
	Palau National Marine Sanctuary Act, 2015	President
	Environmental Quality Protection Act, 1981	President
PNG	Conditions and Guidelines for Overseas Researchers in PNG	
	National Ocean Policy 2020-2023	MSR Committee
	Maritime Zone Act, 2015	MSR Committee
St. Kitts and Nevis	Fisheries Management Act 1998	
	Draft National Ocean Policy	
	Fisheries Aquaculture and Marine Resources Act, 2016	
	National Maritime Policy and Action Plan, 2015	
	Maritime Areas Act 1984	Minister of Fisheries
	Fisheries Act, 1984	Department of Marine Resources
	Application to Conduct Marine Scientific Research in St. Kitts and Nevis	
St. Lucia	Fisheries Act, 1984	Minister of Fisheries
	Draft National Ocean Policy, 2019	

	Maritime Areas Act 1984	
	Scientific Research Proposal Permit Application	Fisheries Division
SVG	Maritime Areas Act 1984	
	Scientific Research Proposal Permit Application	Biosafety Board
	National Ocean Policy and Strategic Action Plan, 2018	Minister of Fisheries
	Biosafety Act, 2012	
Samoa	Fisheries Management Act 2016	Chief Officer of the Ministry of Fisheries
	Samoa Maritime Zones Act 1999	
	Marine Wildlife Protection Regulation, 2009	Chief Executive Officer of the Ministry of Natural Resources and Environment
	Samoa Ocean Strategy 2020 - 2030	
Seychelles	Fisheries Act, 2014	Seychelles Fishing Authority after approval by the Minister of Fisheries
	Maritime Zones Act, 1999	
	Seychelles Coastal Management Plan 2019-2024	
	Maritime Zones (Continental Shelf) Order, 2012: Joint agreement between Seychelles and Mauritius to Govern The Mascarene Plateau Region	Department of Blue Economy
	QA	Seychelles Bureau of Standards
	Application to carry out research work in Seychelles	Seychelles Bureau of Standards
	Application for entry into Seychelles by air and sea	Public Health Authority
Solomon Islands	Fisheries Management Act, 2015	Minister of Fisheries
	Delimitation of Marine Waters, Chapter 95, (Marine Scientific Research) Regulations, 1994	Minister of Foreign Affairs
	Research Application Form	
	Guidelines for Research in the Solomon Islands	Ministry of Education and Human Resources Development
Timor Leste	Decree-Law 2, 2020, on Biodiversity Protection and Conservation	
	Law 7, 2002, Maritime Borders of Timor-Leste	
	Decree-Law 5, 2004 Regulates the Management of Fisheries and Aquaculture	Minister of Fisheries
	Decree-Law 6, 2004 General Rules of Fisheries	Minister of Fisheries
Tonga	Maritime Zones Act, 2009	Prime Minister
	Seabed Minerals Act, 2014	Tonga Seabed Minerals Authority
	Fisheries Management Act 2002	Minister of Fisheries
	Tonga Government Research Permit (TGRP) Requirements, 2021	Prime Minister
	Application for MSR Consent	Ministry of Land and Natural Resources
Trinidad and Tobago	Draft National Maritime Policy and Strategy	

	The Fisheries Management Bill, 2020	Director of Fisheries
	Archipelagic Waters and Exclusive Economic Zone Act, 1986	The President
Tuvalu	Seabed Minerals Act, 2014	Minister of Natural Resources and Fisheries
	Maritime Zones Act, 2012	
	Marine Resources Act, 2006	
	Research Application Form	
Vanuatu	Maritime Zones Act, 2010	The Minister responsible for the Maritime Zones
	Fisheries Act, 2014	Director of the Fisheries Department
	Fisheries Regulation, 2009	Director of the Fisheries Department
	Vanuatu National Ocean Policy, 2016	

Table 2 Respondents to QA and Q3 (Source: Prepared by Author)

<i>Caribbean</i>	<i>Q3</i>	<i>QA</i>	<i>Pacific</i>	<i>Q3</i>	<i>QA</i>	<i>Atlantic and Indian Ocean</i>	<i>Q3</i>	<i>QA</i>
Antigua and Barbuda		✓	Cook Islands*	✓	✓	Cabo Verde		✓
Bahamas	✓	✓	Timor-Leste			Mauritius	✓	✓
Barbados		✓	Micronesia **		✓	Seychelles	✓	✓
Belize		✓	Fiji*		✓	Rate of responses to QA: 100%		
Cuba		✓	Kiribati		✓			
Dominica		✓	Marshall Islands					
Dominican Republic	✓		Nauru		✓			
Grenada			Palau		✓			
Guyana		✓	PNG *		✓			
Jamaica	✓	✓	Samoa*		✓			
St. Kitts and Nevis*		✓	Solomon Islands		✓			
St. Lucia	✓		Tonga		✓			
SVG		✓	Tuvalu					
Trinidad and Tobago		✓	Vanuatu*		✓			

Rate of responses to QA: 78%

Rate of responses to QA: 78%

* Partial Responses.

** Micronesia's contribution took place in the approval stage of QA, therefore, before its submission to WMU ethics committee.

Table 3 Organizations and Groups Contacted (Source: Prepared by Author)

Multilateral Organisations	Knowledge Groups	Regional Organisations	Cross-regional Organisations and Groups	Non-governmental Organisations
DOALOS	World Maritime University (WMU) Alumni	IOCaribe	Commonwealth Secretariat	Nature Conservancy
International Seabed Authority (ISA)	DOALOS Alumni	Organisation of Eastern Caribbean States (OECS)	Archipelagic and Island States Forum	Oceana
IOC-UNESCO	International Foundation for the Law of the Sea (IFLOS) Alumni	Caribbean Community (CARICOM)	Alliance of Small Island States (AOSIS)	
	Rhodes Academy Alumni	Economic Commission for Latin America and the Caribbean (ECLAC)	UN Environmental Programme	
	Organisations of the American States Alumni	SPC		
	University of West Indies (UWI)	Secretariat of the Pacific Regional Environment Programme (SPREP)		
	The Institute of Marine Affairs (IMA)	Pacific Islands Forum		
	Caribbean Natural Resources Institute (CANARI)	Pacific Islands Forum Fisheries Agency (FFA)		
	University of South Pacific (USP)			

Private individuals, international, sub-regional, and regional organizations and knowledge groups were key in fostering connections with government officials in SIDS and instilling confidence to solicit responses to QA (listed in Table 4). Notably, responses from the Cook Islands, Fiji, and Vanuatu were facilitated by the Pacific Community (SPC).

Table 4 Research Vessel Operators and Researching Institutes Contacted (Source: Prepared by Author)

RevOceans, Norway	Woods Hole Oceanographic Institution, US	National Institute of Water and Atmospheric Research (NIWA), New Zealand	Finish Environment Institute*
Caladan Oceanic, US	Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER)	Royal Netherlands Institute for Sea Research (NIOZ), The Netherlands	University of Washington, US
Nekton Mission, UK	Institut de recherche pour le Développement (IRD/IMAGO)	Tara Expedition*	International Research Ship Operators' Forum
Schmidt Ocean Institute, US	Helmholtz Centre for Ocean Research Kiel (GEOMAR), Germany	Institute of Marine Research, Norway	Pink Flamingo Society
National Oceanography Centre (NOC), UK	Fisheries and Oceans Canada (DFO)	Chinese Academy of Science	Philanthropic Ocean Research Vessel Operators
National Oceanic and Atmospheric Administration (NOAA), US	Irish Marine Institute	The International SeaKeepers Society	

* Partial response

Secondary sources were utilized to supplement missing information from the primary sources. These encompassed resources available at the website of the United States Department of State, the German Research Fleet Coordination Centre, along with works authored by Gorina-

Ysern²², Harden-Davies et al.²³, Salpin²⁴, and Roach²⁵. Contextual background was garnered through informal dialogues and correspondence exchanges with local scientists from SIDS and research vessel operators.

The identification of the States under consideration for this study commenced by considering the roster of countries listed on the website of the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries, and Small Island Developing States. This initial list was refined by considering both United Nations membership and ratifications of the United Nations Convention on the Law of the Sea (UNCLOS). Constraints in locating relevant legislation and establishing communication with stakeholders in specific jurisdictions further led to a reduction in the list. Ultimately, the study delves into the State practices of **Antigua and Barbuda**, Commonwealth of the **Bahamas**, **Barbados**, **Belize**, Republic of **Cabo Verde**, **Cook Islands**, Republic of **Cuba**, Commonwealth of **Dominica**, **Dominican Republic**, Republic of **Fiji**, **Grenada**, Republic of **Guyana**, **Jamaica**, Republic of **Kiribati**, Republic of the **Marshall Islands**, Republic of **Mauritius**, Federal States of **Micronesia**, Republic of **Nauru**, Republic of **Palau**, Independent State of Papua New Guinea (**PNG**), Saint Christopher and Nevis (**St. Kitts and Nevis**), Saint Lucia (**St. Lucia**), Saint Vincent and the Grenadines (**SVG**), Independent State of **Samoa**, Republic of **Seychelles**, **Solomon Islands**, Democratic Republic of **Timor Leste**, Kingdom of **Tonga**, Republic of **Trinidad and Tobago**, **Tuvalu** and the Republic of **Vanuatu**. Despite still retaining the status of a self-governing territory in free association with New Zealand, the Cook Islands was included in the list because it ratified UNCLOS, in accordance with Article 305(1)(3), and responded to Q3²⁶.

The International and Regional Frameworks Governing MSR within the SIDS

The international framework governing MSR in UNCLOS emerged against the backdrop of recently independent States expressing discontentment with the principle of the freedom governing the seas, seeking a framework capable of advancing their developmental aspirations²⁷. MSR is mostly regulated in Part XIII of UNCLOS, although provisions in other parts, such as articles 19, 21, 56, 143, as well as Part XII and Part XIV, also bear significance²⁸.

The Convention refrains from providing a specific definition for MSR, yet it articulates fundamental principles and qualifications governing the activity. As outlined, MSR must be characterized by peaceful purposes, contribute to the advancement of knowledge concerning the

²² *An International Regime for Marine Scientific Research* (Transnational Publishers 2003).

²³ 'Science in Small Island Developing States Capacity Challenges and Options Relating to Marine Genetic Resources of Areas Beyond National Jurisdiction, Report for the Alliance of Small Island States' (University of Wollongong 2020).

²⁴ 'Marine Scientific Research in Pacific Small Island Developing States' (2018) 95 *Marine Policy* 363.

²⁵ *Excessive Maritime Claims* (4th ed, Brill Nijhoff 2021).

²⁶ In 2022, the government of the United States of America (USA) recognised Cook Islands' sovereignty at a summit with Pacific Islands Countries (PIC) Leaders in Washington Pita Ligaiula, 'U.S Confirms Recognition of the Cook Islands as a Sovereign State' (*Pacific News Service*, 30 September 2022) <<https://pina.com.fj/2022/09/30/u-s-confirms-recognition-of-the-cook-islands-as-a-sovereign-state/>>.

²⁷ Ram Prakash Anand, *Origin and Development of the Law of the Sea* (Martinus Nijhoff Publishers 1982) 240–241; Coelho (n 10); Joanna Mossop, 'Marine Scientific Research', *The Continental Shelf Beyond 200 Nautical Miles: Rights and Responsibilities* Joanna (Oxford University Press 2016); PK Mukherjee, 'The Consent Regime of Oceanic Research in the New Law of the Sea' (1981) 5 *Marine Policy* 98.

²⁸ Long (n 4); Ronán Long, 'Regulating Marine Scientific Research in the European Union: It Takes More than Two to Tango' in M Nordquist and others (eds), *The Law of the Sea Convention: US Accession and Globalization* (Martinus Nijhoff Publishers 2012).

marine environment, apply appropriate means and methods, aim to have its findings shared, not impede other lawful uses of the sea, and conform to other applicable rules (articles 240 and 246(3)). Despite these provisions, uncertainties persist in categorizing numerous activities²⁹. For instance, controversies persist regarding whether activities like bathymetric surveys³⁰, ocean observation³¹, and research involving the collection marine genetic resources (MGRs) for scientific purposes³² fall within the realm of MSR. Ultimately, coastal States possess the flexibility to determine which activities fall under the purview of MSR within their respective jurisdictions, as long as such determinations align with the principles set forth by the Convention³³. Accordingly, activities in AUNJ classified as MSR by the coastal State necessitate prior consent before commencement.

The following subsection reviews the intricate web of rights and obligations within the consent regime for MSR under UNCLOS. The next one analyses pertinent sub-regional and regional instruments of SIDS in the context of adapting general norms on MSR to local realities.

The Consent Regime for MSR under UNCLOS

The consent regime corresponds to a gradient of rights and obligations of coastal vis-à-vis researching States differing in each maritime zone, mostly disciplined in articles 245, 246, 248 and 249³⁴. In the territorial sea and archipelagic waters, coastal States have the exclusive right to regulate, authorize and conduct MSR (article 245). Consent for research in these areas must be explicitly expressed, affording coastal States discretion to impose conditions as prerequisites for

²⁹ Paul Gragl, 'Marine Scientific Research' in David J Attard, Malgosia Fitzmaurice and Norman A Martínez Gutiérrez (eds), *The IMLI Manual on International Maritime Law: Volume I: The Law of the Sea* (Oxford University press 2014); Alfred HA Soons, *Marine Scientific Research and the Law of the Sea* (Kluwer Law and Taxation Publishers TMC Asser Instituut 1982) 118–125; Tullio Treves, 'Marine Scientific Research' in Rüdiger Wolfrum (ed), *Max Planck Encyclopedias of International Law [MPIL]* (Oxford University Press 2008) <<http://hdl.handle.net/2434/140196>>.

³⁰ Sam Bateman, 'Hydrographic Surveying in the EEZ: Differences and Overlaps with Marine Scientific Research' (2005) 29 *Marine Policy* 163; Erik Franckx, 'American and Chinese Views on Navigational Rights of Warships' (2011) 10 *Chinese Journal of International Law* 187; Guifang Xue, 'Marine Scientific Research and Hydrographic Survey in the EEZs: Closing up the Legal Loopholes?' (2009) 13 *Center for Oceans Law and Policy* 209.

³¹ Robert Beckman and Tara Davenport, 'The EEZ Regime: Reflections after 30 Years', *Securing the Ocean for the Next Generation* (2012); Harriet Harden-Davies, 'The Regulation of Marine Scientific Research: Addressing Challenges, Advancing Knowledge' in R Warner and S Kaye (eds), *Routledge Handbook of Maritime Regulation and Enforcement* (Routledge 2015); S Huh and K Nishimoto, 'Article 246 Marine Scientific Research in the Exclusive Economic Zone and on the Continental Shelf' in Alexander Proelss (ed), *Convention on the Law of the Sea: a Commentary* (Beck/Hart/Nomos 2017) 1656–1657; Aurora Mateos and Montserrat Gorina-Ysern, 'Climate Change and Guidelines for Argo Profiling Float Deployment on the High Seas' (2010) 14 *ASIL Insights* <<https://www.asil.org/insights/volume/14/issue/8/climate-change-and-guidelines-argo-profiling-float-deployment-high-seas>>.

³² Arianna Broggiato and others, 'Fair and Equitable Sharing of Benefits from the Utilization of Marine Genetic Resources in Areas beyond National Jurisdiction: Bridging the Gaps between Science and Policy' (2014) 49 *Marine Policy* 176; Lyle Glowka, 'Putting Marine Scientific Research on a Sustainable Footing at Hydrothermal Vents' (2003) 27 *Marine Policy* 303; Montserrat Gorina-Ysern and Martin Tsamenyi, 'Defence Aspects of Marine Scientific Research, *Maritime Studies*' (1997) 96 13; Joanna Mossop, 'Marine Bioprospecting' in Donald R Rothwell and others (eds), *The Oxford Handbook of the Law of the Sea* (2016); Robin Warner, 'Protecting the Diversity of the Depths: Environmental Regulation of Bioprospecting and Marine Scientific Research Beyond National Jurisdiction', *Ocean Yearbook Online*, vol 22 (2008).

³³ Elie Jarmache, 'Sur Quelques Difficultés de La Recherche Scientifique Marine', *La Mer et son Droit* (Pedone 2003) 311; Nordquist and others (n 6) 518; Daniel P O'Connell, 'Jurisdiction Respecting Marine Scientific Research' in Daniel P O'Connell and Ivan Anthony Shearer (eds), *The International Law of the Sea: Volume II (1st Edition)* (Oxford University press 1988) <<http://opil.ouplaw.com>> accessed 10 October 2019.

³⁴ Salpin and others (n 26).

consent.³⁵ In the EEZ and on the continental shelf, the coastal States' jurisdiction to regulate, authorize and conduct MSR is limited to the extent provided for in UNCLOS,³⁶ resulting in a more delicate balance of rights and obligations that warrants detailed examination.

In the EEZ and on the continental shelf, the process of obtaining consent entails the researching State submitting a comprehensive description of the MSR project six months prior to its initiation in a language intelligible to the coastal States. The information must elucidate the (i) nature and objectives of the project; (ii) methods and means to be employed; (iii) geographical scope of the project; (iv) dates of the research vessel and equipment first appearance and final departure; (v) names of the sponsoring institution, its director, and the person in charge of the project; and (vi) the degree of participation provided to the coastal State (article 248)³⁷. In normal circumstances, consent shall be granted if the information demonstrates the project's peaceful purpose, aims to enhance marine knowledge for humanity's benefit, uses appropriate scientific methods, complies with relevant regulations, and ensures the preservation of sovereign rights and other lawful uses of the sea. Conversely, coastal States shall establish rules and procedures for obtaining consent, preventing delays or unreasonable denials (articles 246(3) and 255). Researching States may proceed with MSR activities six months after submitting the project description, unless within four months of submission, the coastal State denies consent, contests the activity's nature and objectives, requests additional information, or claims outstanding obligations from prior MSR projects (article 252).

The legal grounds for withholding consent encompass situations where the activity: (i) lacks a peaceful purpose and the pursuit of increasing knowledge of the marine environment for the benefit of humankind; (ii) unjustifiably interferes with activities undertaken by coastal States in the exercise of their sovereign rights and jurisdiction; (iii) involves drilling in the shelf or the introduction of harmful substances into the marine environment; (iv) entails the construction, operation, or use of artificial islands, installations, and structures; (v) holds direct significance for the exploration and exploitation of living or non-living natural resources, allowing the coastal State to request limitations on the public release of findings in exchange for consent. Consent may also be denied when (vi) circumstances are abnormal; (vii) the information provided about the project's nature and objective is inaccurate; and (viii) the researching State has pending obligations from prior projects (articles 246(3)(5)(8) and 249(2)). On the extended continental shelf, the coastal State's prerogative to withhold consent for MSR projects bearing direct economic significance is contingent upon a prior identification of specific areas where exploration and exploitation are anticipated in the foreseeable future (article 246(6))³⁸. Gorina-Ysern asserts that, in cases allowing

³⁵ Malcolm N Shaw, *International Law* (Cambridge University Press 2008) 556–575; Treves (n 22); Tim Stephens and Donald R Rothwell, 'Marine Scientific Research' in Donald R Rothwell and others (eds), *The Oxford Handbook of the Law of the Sea* (Oxford University Press 2015).

³⁶ Florian H Th Wegelein, *Marine Scientific Research. The Operation Status of Research Vessels and Other Platforms in International Law* (Martinus Nijhoff Publishers 2005) 199–200; Yoshifumi Tanaka, *The International Law of the Sea* (Cambridge University Press 2019) 153–158.

³⁷ DOALOS, '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 2010) 29, 40–45; Luciana Fernandes Coelho and Roland Rogers, 'The Use of Marine Autonomous Systems in Ocean Observation under the LOSC: Maintaining Access to and Sharing Benefits for Coastal States' in Tafsir Matin Johansson and others (eds), *Smart Ports and Robotic Systems: Navigating the Waves of Techno-Regulation and Governance* (1st edn, Palgrave Macmillan 2023) <https://link.springer.com/chapter/10.1007/978-3-031-25296-9_6>.

³⁸ Mossop (n 29) 165.

consent withholding, an obligation to engage in consent negotiation arises, thereby coastal States might choose to institute ad-hoc requirements for compliance in exchange for consent³⁹.

Upon successfully obtaining consent, researching States and competent international organizations must comply with several obligations to ensure the bona fides of the activity, no violation of security, defence and national interest, prevent harm to the marine environment, and training and capacity building⁴⁰. These obligations encompass (i) ensuring the coastal State's participation, if requested and when practicable without obligation to contribute towards the costs of the project; (ii) sharing preliminary reports, as soon as practicable, and final results if solicited; (iii) undertaking to provide access to data and samples, when requested; (iv) providing assessment or assistance to assess the data, samples and research findings, when solicited; (v) ensuring the international availability of research results as soon as practicable, if not otherwise agreed; (vi) informing of any major change in the research program; and (vii) removing scientific installations and equipment, if not otherwise agreed (article 249).

Part XIII establishes three measures compelling compliance with the consent regime by researching States⁴¹. The first is the right to deny consent when the researching State has outstanding obligations from preceding projects. The second is the right to request the suspension of the activity applicable when it differs from the information communicated under article 248 or in case of non-compliance with the obligations under article 249 (article 253(1)). The third is the right to request the cessation of the activity when the misconduct justifying suspension remains unresolved within a reasonable timeframe, or non-compliance during the pre-cruise phase undermines the basis of consent (article 253(2)(3))⁴².

Despite the comprehensiveness of the consent regime for MSR under UNCLOS, the interpretation of open terms and the delineation of rights and obligations depend on national and regional features. Taking this into account, the following subsection examines the regional governance for MSR within SIDS.

The Regional Governance for MSR within SIDS

SIDS usually engage in international negotiations and the implementation of international law through regional or cross-regional common approaches. Concerning MSR, SIDS have predominantly coordinated their efforts at the regional level, particularly within the Caribbean and Pacific SIDS.

The cooperation between the Caribbean SIDS in the exercise of the rights and duties under UNCLOS, encompassing the coordination of their scientific research policies and the undertaking of joint research activities, is essential due to their adjacency to a semi-closed sea (article 123(c)), as well as their historical and social ties. Amidst numerous institutions tasked with MSR-related mandates in the Caribbean's regional oceanscape, the Organization of Eastern Caribbean States

³⁹ 'International Law of the Sea, Access and Benefit Sharing Agreements, and the Use of Biotechnology in the Development, Patenting and Commercialization of Marine Natural Products as Therapeutic Agents' (2006) 20 *Ocean Yearbook Online* 221, 244.

⁴⁰ Coelho (n 10); DOALOS (n 39); Gorina-Ysern (n 24) 324–328.

⁴¹ Huh S. and Nishimoto K., 'Article 253 Suspension or Cessation of Marine Scientific Research Activities' in Proelss Alexander (ed), *United Nations Convention on the Law of the Sea: a Commentary* (CH Beck/Hart/Nomos 2017) 1701–1702; Wegelein (n 38) 238.

⁴² S. and K. (n 44) 1705.

(OECS) distinguishes itself by adopting the Eastern Caribbean Regional Ocean Policy (ECROP)⁴³ and the Caribbean Regional Oceanscape Project (CROP).⁴⁴ These initiatives aim to foster joint MSR projects, leverage innovative technologies to address common challenges faced, galvanize to the formulation of blue economic needs assessments between member States. Other organizations with work related to MSR within the region include the Caribbean Community, IOCaribe, Caribbean Environment Program, Caribbean Sea Commission, and the Caribbean Large Marine Ecosystem Project.

In the Pacific, the Secretariat of the Pacific Regional Environment Programme (SPREP) assumes a central role in the regional ocean governance through the adoption of the Pacific Islands Regional Ocean Policy (PIROP)⁴⁵ and the Pacific Oceanscape Framework.⁴⁶ Both documents underscore the imperative of fostering capacity-building and generating new knowledge about the marine environment for the sake of sustainable development, alongside the enhancement of ocean resilience. Although less variegated in comparison to the Caribbean region, the regional oceanscape governing MSR within the PSIDS includes other relevant organizations such as the Pacific Islands Forum Fisheries Agency (FFA), and the Pacific Community (SPC).

The Implementation of the Consent Regime for MSR under UNCLOS by SIDS

This section analyses the State practice of SIDS on the consent regime for MSR under UNCLOS as follows. Initially, it explores the classification of activities falling under the umbrella of MSR. Subsequently, it investigates the assertion of jurisdiction under MSR by SIDS. Thirdly, it investigates the implementation of the rights and obligations applicable prior to obtaining consent. Following this, it evaluate the application of the rights and obligations applicable after the consent is granted. Finally, it assesses the use of the right to request the suspension or cessation of MSR activities.

Definition of MSR

The collection of data and samples in the ocean space may be undertaken for several purposes. For instance, it can be part of an activity monitoring the status of a fishery, measuring the ocean acidification in a marine region, or prospecting for oil and gas. Nonetheless, not all those activities are considered MSR nor would require the consent regulated under Part XIII. Hence, the first question meriting attention for this study is what activities SIDS consider as MSR.

The analysis reveals a general trend between SIDS to embrace a broad interpretation of activities falling under the purview of 'MSR', often eschewing a clear distinction between 'MSR' 'scientific research' and 'research' (e.g. Antigua and Barbuda, Bahamas, Barbados, Cabo Verde, Cook Islands, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Jamaica, Kiribati, Mauritius, Micronesia, Nauru, Palau, PNG, SVG, St. Lucia, Seychelles, Solomon Islands, Tuvalu, Tonga and Vanuatu). Illustrating this expansive stance, the 2015 Cook Islands' Research Policy and Supporting Documents elaborate that research encompasses any 'creative and systematic work to increase the stock of knowledge or its use or application'. Likewise, for the 2017 Mauritius

⁴³ Eastern Caribbean Regional Ocean Policy, adopted in 2014, available at: <http://www.caribbeanelections.com/eDocs/strategy/oecs_strategy/OECS_Eastern_Caribbean_Ocean_Policy_2013.pdf>.

⁴⁴ Caribbean Regional Oceanscape Project, adopted in 2017, available at: <<https://oecs.org/crop>>.

⁴⁵ Pacific Islands Regional Ocean Policy, adopted in 2001, available at: <http://coastfish.spc.int/Asides/Other_orgs/SPOCCMSG/PIROP_overview_seremaia.pdf>.

⁴⁶ Pacific Oceanscape Framework, adopted in 2010, available at: <<https://www.forumsec.org/wp-content/uploads/2018/03/Framework-for-a-Pacific-Oceanscape-2010.pdf>>.

Regulations "marine scientific research" or "research" means any research or study, whether fundamental or applied, intended to increase knowledge about the marine environment, including all its resources and living organisms and embraces all related scientific activity for the benefit of mankind and for peaceful purposes'. Similarly, the 2010 Vanuatu Maritime Zones Act informs that 'research means marine scientific research'. Correspondingly, a respondent to QA informed that MSR is 'anything related to marine or any scientific research above and within the ocean, seabed and underneath the seabed'. Of notice, responses to QB indicate that research institutions and research vessel operators are cognizant of this interpretation and typically seek consent for almost all activities collecting data at sea.

Nevertheless, this trend is not universally consistent. Certain SIDS choose a more limited characterization of MSR associating it solely with fisheries research (Fiji, Marshall Islands, Belize, St. Kitts and Nevis and Trinidad and Tobago) or to research directed to fisheries and access to living resources (Samoa and Timor-Leste). Interestingly, Barbados and Seychelles tie their MSR definition under UNCLOS to activities conducted by research vessels, thereby excluding investigations that solely involve new technologies, like marine autonomous systems.

There are also numerous examples in which national laws and regulations examined in this study provide definitions of MSR (e.g. Bahamas, Belize, Cook Islands, Fiji, Kiribati, Mauritius, Micronesia, PNG, St. Kitts and Nevis, Timor Leste, Trinidad and Tobago, Tuvalu, Tonga and Vanuatu). Some of these legal frameworks outline the general attributes of MSR in accordance with the Convention, followed by illustrative lists of activities falling under this definition (Antigua and Barbuda, Bahamas, Barbados, Cuba, Fiji, SVG and St. Lucia). Conversely, Nauru and Tonga, exclude activities capable of substantially impacting the marine environment from the scope of MSR.

Upon analysing the classification of bathymetric surveys, ocean observation, and scientific projects collecting MGRs across SIDS, it becomes evident that no uniform approach has been adopted. Within the cohort examined, 42% impose the prerequisite of prior coastal State consent for activities categorized as ocean observation (Antigua and Barbuda, Bahamas, Barbados, Cabo Verde, Cuba, Dominica, Jamaica, Kiribati, Mauritius, Palau, PNG, SVG, Solomon Islands). Meanwhile, just 25% of the surveyed SIDS request prior consent in the case of bathymetric surveys (Antigua and Barbuda, Bahamas, Barbados, Guyana, Kiribati, Jamaica, Solomon Islands and Tonga). In a similar vein, an equivalent 25% of the participants—particularly those situated in the Caribbean and the Atlantic—apply the consent regime delineated in Part XIII for research projects focused on the collection of MGRs for scientific purposes (Antigua and Barbuda, Barbados, Belize, Cabo Verde, Cuba, Dominica, Guyana, St. Lucia, Timor-Leste).⁴⁷ Despite the general propensity to solicit consent for a broad spectrum of data collection activities at sea undertaken for scientific purposes, certain respondents to QB have contested the necessity of such consent in the context of bathymetric surveys.

In summary, a thorough examination of the legislative frameworks of SIDS along with the insights gleaned from responses to QA and QB unveils the following cross-regional patterns: (i) the terms MSR, research and scientific research are frequently employed interchangeably, (ii) there is a prevailing trend among SIDS to adopt a broad interpretation of MSR, which finds validation from research institutions, (iii) a discernible tendency is emerging wherein the categorization of

⁴⁷ The main treaty regulating the access and sharing of benefits benefit of MGRs is the 2011 Nagoya Protocol under the regime of 1992 Convention on Biological Diversity. In this sense, SIDS's parties to the Nagoya Protocol are: Antigua and Barbuda, Bahamas, Cuba, Dominican Republic, Fiji, Guyana, Kiribati, Marshall Islands, Mauritius, Micronesia, Palau, Samoa, St. Kitts and Nevis, St. Lucia, Seychelles, Solomon Islands, Tonga, Tuvalu, and Vanuatu.

bathymetric surveys and research focused on the collection of MGRs for scientific purposes in AUNJ does not typically fall within the purview of Part XIII of UNCLOS.

SIDS Jurisdictional Claims over MSR

The analysis of the exercise of jurisdiction by SIDS regarding MSR is bifurcated into two distinct stages. This subsection is dedicated to the first one, which entails an exploration of SIDS' assertion of authority over foreign research activities in AUNJ in their respective domestic laws. The following subsections explore the manner in which SIDS exercised their jurisdiction over MSR.

In this sense, the analysed information can be categorized into three distinct strands. The first one encompasses SIDS that assert jurisdiction over MSR in accordance with the provisions of the Convention. This cluster is predominantly situated in the Pacific region and includes the Cook Islands, Kiribati, Marshall Islands, Mauritius, Micronesia, Tuvalu, and Vanuatu. However, it is noteworthy that only the Cook Islands, Mauritius and Vanuatu differentiate between the rights in the territorial sea, in the EEZ, and on the continental shelf. In many of them, the establishment of maritime zones and the corresponding rights and obligations are articulated in broad terms. The specific conditions required to obtain consent in each zone are detailed in other legislative instruments or guidelines.

The second strand pertains to SIDS that, in diverse manners, diverge both in their chosen terminology and the fundamental nature of their asserted jurisdiction over MSR within AUNJ. This grouping includes SIDS that assert 'exclusive jurisdiction' or 'exclusive right' to regulate, authorize and conduct MSR (Antigua and Barbuda, Cabo Verde, Grenada, Guyana, PNG, St. Kitts and Nevis, St. Lucia, and Seychelles). Additionally, this category incorporates SIDS vested with jurisdiction over MSR within the EEZ and on the continental shelf, albeit only asserting sovereign rights over MSR within the territorial sea (Tonga and Guyana). Furthermore, it encompasses SIDS asserting jurisdiction within the EEZ as prescribed by UNCLOS, yet only referring to 'exercisable rights' in relation to MSR on the continental shelf (Trinidad and Tobago).

The third strand encompasses SIDS in which the legal framework is omissive regarding the authority over where the legal framework lacks specificity regarding their jurisdiction over MSR. Some of these states exercise jurisdiction exclusively over MSR conducted within their EEZ (Barbados, Belize, Cuba, Dominica, Jamaica, Nauru, Samoa, Timor-Leste). Furthermore, this category pertains to SIDS that assert 'control' over MSR within their EEZ while remaining silent about their authority concerning the continental shelf (SVB). Lastly, this classification encompasses SIDS whose domestic laws do not explicitly delineate their authority over foreign MSR activities within their respective maritime zones (Bahamas, Dominican Republic, Fiji, Solomon Islands and Palau).

Amidst the broader panorama encompassing all SIDS, a conspicuous lack of precision emerges concerning the terminology and substance of powers regarding the jurisdiction over MSR in each maritime zone, despite a discernible inclination among the PSIDS to align their jurisdictional claims with the provisions of UNCLOS. While the omission of direct references in domestic laws about the jurisdiction over MSR and how it is exercised does not erode the rights conferred by UNCLOS, this imprecision can potentially spill over all stages of the permitting process. Indeed, a statement offered by a respondent in QB aptly encapsulates this predicament: 'we have not met with outright refusal, but have found that nations can sometimes be confused as to how to handle our application (...) no one says "no", but no one seems to have the confidence or authority to say "yes"'.

Rights and Obligations Prior to Granting Consent for MSR

Proceeding to examine how SIDS exercise their jurisdiction over MSR, it is pertinent to commence by further scrutinizing their exercise of prescriptive jurisdiction. This will be followed by an exploration of the routine processes of reviewing, approving or denying consent and monitoring foreign research.

In the territorial sea, the Cook Islands' Guiding Principles for Research stands alone among the analysed legislations in stressing the State's exclusive right to regulate, authorize, and conduct MSR therein. In addition, none of the examined laws regulate MSR activities in the territorial sea (article 21(g)). This concurs with the absence of references to special conditions for MSR within the territorial sea in responses to both QA and QB, suggesting that MSR in this area is implemented without distinction from MSR in the EEZ and on the continental shelf. Nevertheless, it remains plausible that special requirements may have been established on an ad hoc basis.

Five approaches are discernible regarding SIDS's fulfilment of the obligation to mitigate delays or unreasonable denials of consent. The first approach is exemplified by SIDS that have established laws, guidelines, procedures, and standardized forms governing MSR in AUNJ (Bahamas, Belize, Cook Islands, Dominican Republic, Kiribati, Jamaica, Mauritius, Micronesia, Nauru, PNG, Solomon Islands, Tonga and Tuvalu). The website developed by the Bahamas stands-out by providing a step-by-step instruction with the requirements for conducting research under various legal instruments (e.g. UNCLOS, the Nagoya Protocol, CITES, etc.). Despite this good practice, certain aspects of the country's recent legislation concerning MSR and the associated fee for foreign research have been subject to disputed⁴⁸. Guyana, Trinidad and Tobago and Micronesia are in the process of improving their regulation and procedures regarding MSR. Also, Cabo Verde is on the verge of adopting comprehensive new legislation addressing this subject. The second approach is represented by SIDS that have exclusively formulated standardized template forms for requesting MSR consent (Antigua and Barbuda, St. Kitts and Nevis, St. Lucia, Seychelles and Vanuatu). The third approach encompasses SIDS with legislative provisions offering guidance on the process of seeking consent for MSR, although missing detailed procedural protocols and standardized forms (Marshall Islands and Timor Leste). The fourth approach pertains to countries that regulate MSR within the framework of sector-specific laws, mostly fisheries and seabed minerals (Barbados, Belize, Cabo Verde, Cuba, Fiji, Kiribati, Micronesia, Nauru, Samoa, Trinidad and Tobago, and Vanuatu, also see Table 1). The application of such rules, protocols, and standardized forms to other research domains remains uncertain. The final group encompasses SIDS for which no substantiated evidence regarding their regulatory practices concerning MSR was identified (Dominica, Fiji, Grenada, Cabo Verde, Palau, Samoa, SVG). To navigate this diversity of approaches, numerous vessel operators and research institutes have developed internal protocols aimed at expediting the fulfilment of clearance requirements and cruise reports. Among these, four have devised standardized template forms (NOAA, NOC, GEOMAR, and IFREMER). Additionally, DOALOS has formulated template forms that have been validated and accepted by select SIDS⁴⁹.

The subsequent practice of SIDS unveil a series of inclusions to the information under article 248. These additions are primarily intended to support the assessment of the research's

⁴⁸ see: Candace Fields, 'We Need "A New Day" for Science in The Bahamas' (*The Tribune*, 15 November 2021) <<http://www.tribune242.com/news/2021/nov/15/we-need-new-day-science-bahamas/>>; Neil Hartnell, 'Ex-Minister: Civil Servants Hijacked New Research Act' (*The Tribune*, 11 April 2022) <<http://www.tribune242.com/news/2022/apr/11/ex-minister-civil-servants-hijacked-new-research-a/>>.

⁴⁹ (n 39) 49.

ecological and societal impacts, its economic significance, as well as its relevance for capacity building (Table 5). Environmental considerations are manifested through inquiries regarding the potential effects on the marine ecosystem, whether the research encompasses drilling activities, the harvesting of endangered species or the coverage of protected areas or areas under special management arrangements. Such concerns are additionally evident in requests for the submission of environmental impact assessments and/or adherence to the precautionary approach. Societal and ethical considerations emerge in the form of queries about the use of traditional and local knowledge within the research and the associated implications thereof. Concerns about the economic implications surrounding the activity are articulated through requests for information pertaining to potential intellectual property rights stemming from the MSR project. Diverging from the mainstream interpretation⁵⁰, many SIDS have been understanding their participation or representation within the research project as an essential condition for granting consent. Of notice, at times they specify that such engagement should occur throughout every phase of the research enterprise. Likewise, certifying the sharing of data, information, samples, and the fulfillment of designated fees are frequently mentioned as prerequisites for consent. Expanding the capacity building modalities within Part XIII, a considerable number of SIDS interrogate the benefits they stand to accrue from the research and the project's alignment with their national scientific needs and priorities.

Responses to QB revealed minimal opposition to the requisites presented by SIDS for granting consent. In the context of SIDS' concerns to derive benefits from the MSR activity, research institutes reported that the co-creation of research projects and promoting the participation of local scientists, at times through Memoranda of Understandings, are common practices. Furthermore, QB respondents indicated that additional conditions encompass proof of complying with the duty to share final reports from preceding projects, alongside comprehensive disclosures regarding novel technologies employed and personnel embarked upon the research vessel - including pictures. Particularly noteworthy are instances wherein SIDS have proactively sought cooperation with research institutions to monitor and report the activities of suspicious vessels observed in adjacent waters. A notable departure from this positive trend, however, emerged in one instance, herein, the granting of consent was contingent upon the recognition of sovereign rights over a contested territory - a condition that was not acquiesced to by the researching States.

According to the information derived from QA, SIDS's day-to-day practice in reviewing clearance requests show a trend towards granting consent in between 90 to 100 per cent of the cases. Echoing these findings, as per responses to QB, the percentage of cases in which consent was denied between 2009 and 2020 amounted to only 30%. Reinforcing an apparent approach favourable to promoting MSR, one respondent of QA underscored a propensity to eschew the withholding of consent, opting instead for a agreeing on solutions on a case-by-case basis. In a similar vein, remarks attesting to the high incidence of granted permissions, along with expressions of goodwill and cooperation from SIDS authorities, recurrently surfaced in QB. Illustrative instances were also highlighted wherein consent was secured despite the request being communicated a mere two months prior to the commencement of the research. The involvement of local scientists from the host country at the planning phase of the research process was frequently mentioned as a significant measure to streamline the process of obtaining clearance. When additional information was solicited, it mostly centred on clarifying aspects related to the

⁵⁰ DOALOS (n 39); S Huh and K Nishimoto, 'Article 248 Duty to Provide Information to the Coastal State' in Alexander Proelss (ed), *United nations Convention on the Law of the Sea: a Commentary* (CH Beck/Hart/Nomos 2017) 1681.

nature and object of the project; its method, means and scientific equipment used; the project's geographical scope; and the participation of national participants (Figures 1 and 2).

Figure 1 Frequency of Supplementary Information Needed between 2009-2020 according to QA

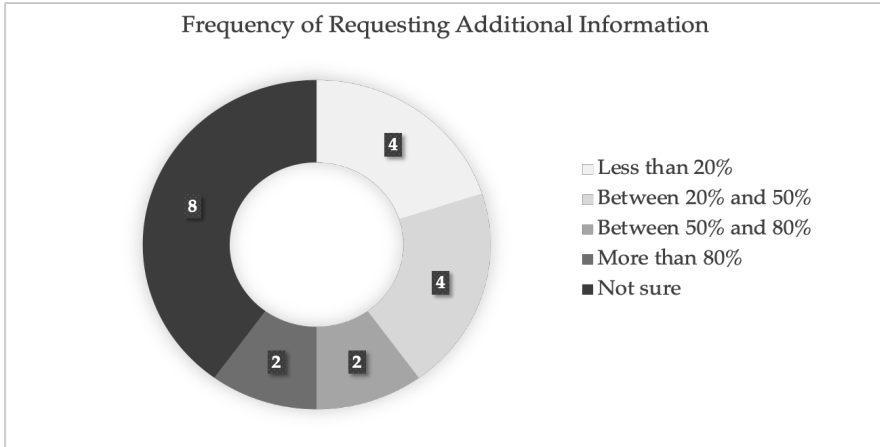
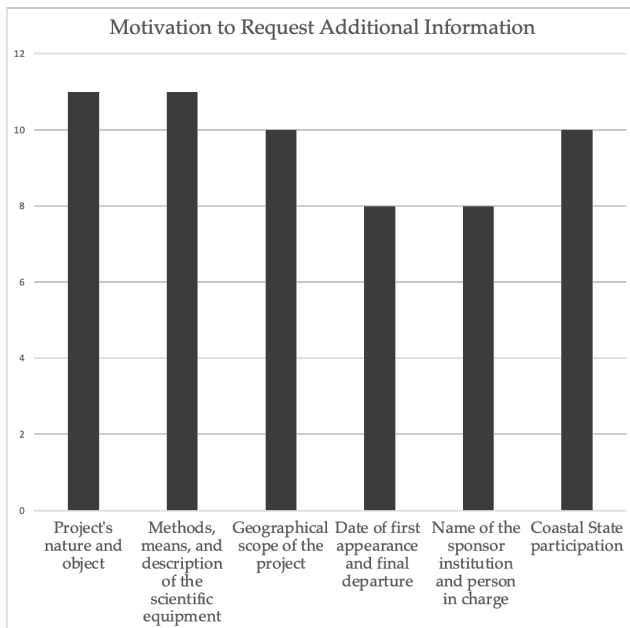


Figure 2 Motivation to Request Supplementary Information between 2009-2020 according to QA



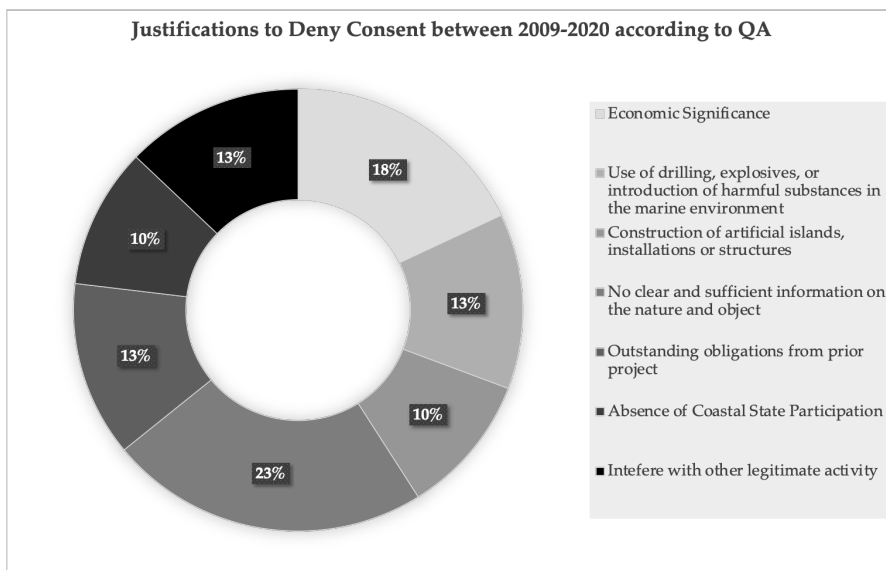
Despite the prevailing effectiveness observed within the procedure to grant consent, instances of procedural delay and ambiguity in the authorization process were documented in QB. Examples encompass cases wherein consent was secured a mere few weeks prior to the

commencement of the research expedition, as well as situations wherein SIDS faced impediments in timely processing due to personnel shortages. Respondents to QB underscored that securing consent from SIDS encountered added complications during the year 2020, owing to the exigencies stemming from Covid-19 pandemic. Also of notice, private and philanthropic research vessels informed extra challenges in attaining permission.

A few of the legal instruments analysed expanded the list of legal grounds for denying consent for MSR under article 246(5). These new modalities allowing for the withholding of consent encompass scenarios where an MSR project could potentially: impinge upon extant management and conservation measures (Cabo Verde, Dominican Republic, Trinidad and Tobago, Tuvalu); disrupt other legitimate uses of the marine environment (Micronesia); pose a threat to national defense (Cabo Verde); and contravene either national laws or international commitments (Trinidad and Tobago). Of particular note, only Mauritius and PNG have addressed the prerogative to deny consent in specified areas of the extended continental shelf. Aligned with this, the legal instruments under scrutiny commonly incorporate an all-encompassing provision that vests the coastal State with the prerogative to prescribe conditions deemed necessary. Furthermore, these instruments usually establish the entitlement to an appeal process in instances where consent is denied, or alternatively, the right to resubmit the request after rectification.

In the limited instances where consent was withheld, the main motivation for such denials were the insufficiency of information provided to substantiate the decision and research projects bearing immediate economic significance (Figure 3). Respondents to QB indicated experiencing refusal triggered by factors not explicitly articulated in Part XIII, including the absence of personnel within coastal States to assess the request, the imposition of the precondition of recognizing sovereign rights over contested territories, concerns stemming from the Covid-19 pandemic, and occasionally, no justification was provided for the refusal.

Figure 3 Motivation to Withhold Consent for Foreign MSR between 2009-2020 according to QA



None of the respondents to QB confirmed having exercised the prerogative to undertake MSR under the umbrella of implied consent. Conversely, responses elicited through QA confirmed that implied consent has been invoked in cases of MSR projects conducted by SPC. Furthermore, implied consent has been employed when mutually agreed upon between the countries involved, particularly in cases marked by urgency and significance of the collection.

Altogether, the approach of SIDS is indicative of collaborative efforts to foster MSR and to adjust the consent regime to new circumstances. Virtually all SIDS have taken measures to regulate the procedural prerequisites for granting consent to foreign research, albeit to varying extents and these nations frequently devise customized solutions to facilitate the conduct of foreign MSR. Notably, the practices of select SIDS that have established specialized bodies or committees tasked with processing and overseeing MSR consent are commendable initiatives. However, a notable fragmentation of authorities participating in the MSR consent process is the rule for the majority of these countries. Furthermore, only half of the SIDS have formally enacted dedicated legislation, guidelines, procedures, and templates designed for this specific purpose. The practices of SIDS have broadened the scope of requisite information during the pre-cruise phase and have expanded the situations in which consent can be withheld. Lastly, the utilization of implied consent appears to be an infrequent occurrence, typically employed with the endorsement of the respective coastal States.

Rights and Obligations After Granting Consent for MSR

The legal instruments analysed informed that SIDS introduced new obligations to be observed during and after the research cruise to the enumeration under article 249 (see Table 5). These additions have ranged from reinforcing the cogency of existing obligations to expanding their scope and incorporating entirely new responsibilities.

The examination of responses to QA and Q3 concerning the provision for capacity building and training opportunities under Article 249 has unveiled encouraging trends regarding the daily practice of enjoying training and capacity building opportunities. In this regard, a substantial 81% of the surveyed respondents affirmed their respective country's active engagement in capitalizing on the opportunities presented by foreign MSR in its waters. Furthermore, a notable 86% of the participants indicated that they have benefited from the provision of data, samples, and both preliminary and final research reports originating from foreign MSR. Although slightly diminished in number, yet significant, 65% of respondents confirmed having sought and subsequently received assistance for the evaluation of data, samples, and research outcomes.

However, responses to open questions in QA and QB provided a more granular perspective. One entry in QA affirmed that 'cruise reports, research papers published and copies of data collected are promised but seldom presented post-cruise'. In a somehow complementary perspective, a few QB respondents mentioned that SIDS typically do not request a position onboard, and one response confirmed never having been requested for assistance in assessing data, samples, and results. These insights question the rosy percentages of benefit from foreign MSR reported earlier, suggesting potential gaps in the operationalization of the aforementioned obligations.

This scepticism is further corroborated by a disclosure shared during an informal conversation with a representative of a SIDS. The stakeholder conveyed that their office was replete with boxes of data from prior research projects, lamentably underutilized due to the dearth of personnel and requisite infrastructure for processing and applying the data. Moreover, it was noted that, on occasion, research outcomes are relegated to websites, with their addresses gradually

fading into obscurity over time. Another pertinent observation from QB is that international research initiatives often hinge on personal relationships with individual researchers or institutions, a dynamic that might primarily benefit specific clusters, thereby inhibiting the expansion of capacity-building opportunities at the national level. These nuanced accounts underscore the multifaceted challenges inherent in ensuring that SIDS can optimally derive benefits from MSR projects conducted within their waters.

In summary, while researching States appear to have usually been complying with the post-consent obligations enshrined in UNCLOS, SIDS have not fully reaped the training and capacity building opportunities due to limited scientific and technological capacities – precisely what the consent regime could assist these countries in addressing.

Table 5 *Obligation to be Complied with Before, During and After the MSR project According to the Practice of SIDS*

	Sectorial Legislation	Commitment to share data, samples, preliminary and final reports	Commitment to provide assessment in the assessment of data, samples and research results	Guarantee the participation of local researchers for training and capacity purposes	Prior permission for publishing resource-related research	Submit documents in national language	Indicate the benefits for the country	Submit EIA or assess the impact to the marine environment	Inform if the research will cover special management	Information on use of Traditional Knowledge	Payment of fee/bond	Information on Intellectual Property Rights aspects	Commit to Transfer Technology	Inform Coast Guard about the star and end of the research	Apply for a Work Permit	Other
Antigua and Barbuda	Biodiversity and Fisheries			X Assign a national scientific counterpart for monitoring			X	X								
Bahamas	MSR and Biodiversity	X		X			X			X	X					Full detail of the use to which specimens/ samples will be put
Barbados	Fisheries	X Share copies of publications arising from the research		X In all stages of the research												
Belize	Biodiversity and Fisheries	X		X			X		X		X				X	
Cabo Verde	Fisheries	X	X	X In all stages of the research	X						X					The national authority must have full control over the research activity and it must be in accordance with the national interests

Grenada	Fisheries																			
Guyana	Fisheries	X	X	In all stages of the research	X															
Jamaica	MSR	X	X	- Indicate a local host institution	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Kiribati	Fisheries Research and Seabed Minerals	X	X	- Samples should be handed to the national scientist before disembarkation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Marshall Islands	MSR	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mauritius	MSR	X	X	National participants must be provided with interim report of the expedition before living the vessel	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Grenada

Guyana

Jamaica

Kiribati

Marshall Islands

Mauritius

Fisheries

Fisheries

MSR

Fisheries Research and Seabed Minerals

MSR

MSR

- Samples should be handed to the national scientist before disembarkation

In all stages of the research

- Indicate a local host institution

National participants must be provided with interim report of the expedition before living the vessel

The bond is returned if all the rules are followed

Apply the precautionary approach

Avoid actions detrimental to IPR

- Request information about the use of new technologies

- Request information if the study involves protected species

Samples harvested for the research must be donated to the national authorities

- Meteorological observations must be reported

- The return of the participant of Mauritius must be facilitated

- Eventual economic activities related to the research are subjected to a separate agreement

Micronesia	MSR and Seabed Minerals	X	X	X	X	Apply the precautionary principle and best environmental practices		X	X	X	X	X								
Nauru	Fisheries and Seabed Minerals	X			X	Any result of research or survey operation	X	X												
Palau																				
Papua New Guinea	MSR				X	Affiliation with one national research institute	X	X	X	X	X	Include any intention or potential requirement on patent, Information on patent rights or gains	X							
Samoa	Fisheries and Wildlife				X	Establish a MoU with a local researcher		X												
Seychelles					X															
Solomon Islands	MSR	X	X	X	X	Affiliation with one national research institute	X	X												
																				- Special fee for bioprospecting a
																				- Special consent is needed to entry traditional land

St. Kitts and Nevis		X		X		X	X											
St. Lucia		X		X		X	X						X					- Consent applicants are advised to contact the Division of Fisheries to discuss the MSR proposal prior to submitting it - Information if the project will manipulate non-native species
SVG																		
Timor Leste	Biodiversity Research	X					X		X				X	Avoid being disrespectful with traditional and local knowledge when undertaking the research			X	

Tonga	Fisheries and Seabed Minerals	X	X	X	X	X	X	X	X	X	Apply the precautionary principle and best environmental practices									- Compliance with laws regarding safety and good working conditions. - Compliance with the national Ethics Policy
Trinidad and Tobago	Fisheries											X								
Tuvalu		X									X	Apply the precautionary approach. Comply with management measures in place	X							- Compliance with laws regarding safety. - Assurance of funds to meet the financial obligations related to the research. - Samples harvested not required for the research must be donated to the national authorities
Vanuatu	Fisheries	X									X		X							

The Right to Request the Suspension or Cessation of the MSR Project

The practice of SIDS on exercising their prescriptive jurisdiction regarding the suspension and cessation can be divided in three distinct approaches. The first pertains to SIDS whose legal instruments lack any reference to this right (Antigua and Barbuda, Cuba, Dominica, Palau, St. Lucia, St. Kitts and Nevis, Seychelles and Tuvalu). The second approach concerns legal instruments from SIDS that contain a provision allowing for the revocation of the permit in the event of a breach of its terms (Belize, Dominican Republic, Fiji, Guyana, Jamaica, Kiribati, Marshall Islands, Mauritius, Samoa, Solomons Islands, Tonga and Vanuatu). The third group comprises SIDS whose legal frameworks have introduced novel grounds for requesting the suspension or cessation of a foreign MSR. Notably, a recurring addition to these instruments is using this right to ensure the protection, management and conservation of the marine (Bahamas, Barbados, Cook Islands, Grenada, Micronesia, PNG and Trinidad and Tobago). Also, the legislation of Cabo Verde endows the right to request cancellation of the research if a force majeure event makes it impracticable. Lastly, the laws of the Cook Islands provide a basis for seeking the suspension and/or cessation of a foreign MSR on ethical grounds.

The examination of SIDS' practices, reveals that requests for suspension or cessation have been rare occurrences. Specifically, between 2009 and 2020, only 10% of QB respondents reported experiencing either of these requests. This observation is further solidified by the fact that nearly half of the SIDS respondents to QA and Q3 (including the Dominican Republic, St. Lucia, and Cook Islands) indicated that they have never sought either the suspension or cessation of a foreign MSR. However, it is noteworthy that 36% of QA respondents expressed uncertainty about whether their respective countries have exercised this right, what once again might suggest a deficiency in monitoring the execution of foreign MSR activities.

Overall, both the current and preceding subsections reveal that SIDS have embraced a favourable stance towards the advancement of MSR. This disposition is manifest in their substantial consent approval rates and good practices in the interpretation and implementation of the consent regime. Additionally, the subsections have underscored key considerations in the exercise of their authority to govern, authorize, and undertake MSR activities. The ensuing section discusses these findings and their implications.

Trends and Recommendations Informed by the Subsequent Practice of SIDS on the Consent Regime for MSR under UNCLOS

The examination of the implementation of the consent regime for MSR among SIDS unveils insightful trends and noteworthy challenges that these nations grapple with while translating the associated rights and obligations into action. While some of these findings reinforce insights from prior research, others illuminate less-explored aspects that are worthy of consideration. With this in mind, this section discusses the practices of the SIDS examined in the preceding section taking into account insight of earlier investigations related to the implementation of the consent regime under Part XIII of UNCLOS. The discussion culminates in recommendations aimed at streamlining the consent procedure and improving the benefits accruing to SIDS from foreign MSR conducted within their waters.

The findings inform that SIDS embrace an inclusive interpretation of the activities that should fall within the scope of the framework governing MSR. This outcome confirms and expands the findings of a previous study centred on Caribbean SIDS⁵¹, suggesting a cross-regional trend.

⁵¹ Coelho, LF (forthcoming), *The Practice of the Caribbean SIDS on the Consent Regime for Marine Scientific Research under UNCLOS: trends, gaps, and recommendations*.

Moreover, the findings aligns with the proposition put forth by Yu⁵² asserting that the deliberate omission of a definition for the term MSR by the negotiators was intended to allow for evolutionary interpretation in response to changing circumstances. Notwithstanding the expansive interpretation, the analysis demonstrate that SIDS tend to understand that bathymetric surveys and research activities involving MGRs for scientific purposes are lying outside the purview of the consent regime under UNCLOS, while ocean observation is generally included. Based on these observations, to mitigate potential ambiguity regarding the necessity of seeking consent for a specific activity, it is compelling to bolster communication between official channels and involve local scientists in all project stages. This recommendation finds support in the insights shared by respondents to QB, in the practice reported by⁵³ and it is also encouraged by DOALOS⁵⁴. Such measures can mitigate unnecessary permit applications and expedite the process of obtaining consent.

A more concerning discovery pertains to the persistent incongruities within SIDS about their jurisdictional claims over MSR in the territorial sea, EEZ and continental shelf, already identified in earlier investigations. For instance, Gorina-Ysern⁵⁵ informed that various SIDS asserted exclusive jurisdiction over MSR in all maritime zones, whereas others laid claim to jurisdiction over scientific research, and a minority just to 'fisheries research'. Wegelein⁵⁶ observed that the global practice of States in this regard tended to either: (i) replicate the provisions of UNCLOS without tailoring them to local realities, (ii) diverge from the Convention's terminology concerning coastal state jurisdiction, or (iii) depart from UNCLOS with regards to the substantive powers, even omitting reference to certain maritime zones⁵⁷. In a later study just focused on the PSIDS, Salpin⁵⁸ discerned that most of them were missing national policies and guidelines on MSR and their laws on the topic were restricted in scope or outdated. Drawing upon the insights garnered from these investigations, the present study underscored a predominant practice of domestic laws asserting jurisdiction differently from the substance of powers under UNCLOS. Notable exceptions to this pattern include the legal instruments of Cook Islands, Kiribati, Marshall Islands, Mauritius, Micronesia, Tuvalu, and Vanuatu, which align their jurisdictional claims with the authority established by the Convention. An implication of such a practice is that government officials tasked with implementing the consent regime encounter difficulties in ascertaining the corresponding rights and obligations applicable within each maritime zone⁵⁹. Consequently, it is advisable to review the domestic laws that assert jurisdiction over MSR to align them with the provisions of UNCLOS, even where dedicated laws and guidelines pertaining to MSR have been established.

The evidence pertaining to the SIDS's routine practice in managing consent requests and enactment of dedicated instruments on MSR reveals a collaborative approach aimed at promoting

⁵² *Marine Scientific Research and the Regulation of Modern Ocean Data Collection Activities under UNCLOS*, vol 100 (Brill Nijhoff 2022) 37–39; also see: H Zhang, 'Redefining Marine Scientific Research in UNCLOS: Could Evolutionary Interpretation Play Any Role?' in K Zou and A Telesetsky (eds), *Marine Scientific Research, New Marine Technologies and the Law of the Sea* (Brill Nijhoff 2021) 60.

⁵³ W Plesmann and V Röben, 'Marine Scientific Research: State Practice versus Law of the Sea?' in Rüdiger Wolfrum (ed), *Law of the Sea at the Crossroads: The Continuing Search for a Universally Accepted Regime* (Duncker & Humblot 1991).

⁵⁴ (n 39).

⁵⁵ (n 24) 32–33, 81,82, 101–105.

⁵⁶ (n 38) 276–77.

⁵⁷ also see: Stephens and Rothwell (n 37) 579.

⁵⁸ (n 26).

⁵⁹ Wegelein (n 38) 277.

research, while underscores the need to refine formal procedures for consent processing. While a few SIDS have adopted comprehensive principles (Cook Islands), research policies (Cook Islands), guidelines (Jamaica, PNG, Tonga, Bahamas), and dedicated regulations (Solomon Islands) to govern foreign-MSR, these instances are exceptions. In most cases, the consent regime is regulated in sectoral legislation, not specifying the requirements to be complied in the stages of research in each maritime zone. This creates doubts about the applicability of such legislations to all forms of MSR and leads to fragmentation among national agencies responsible for granting consent⁶⁰. Additionally, it is observed that many SIDS have developed consent request templates, although some of these templates are sector-specific, posing the same challenges mentioned earlier. In cases where no specific instrument or template exists, responses from QA and QB, along with the study by Polejack&Coelho suggest that SIDS have resorted to informal procedures resulting in elevated consent approval rates⁶¹. Nevertheless, such informality and uncertainties ultimately discourages MSR proposals, as reported in QB and in Plesmann and Röben⁶², and obstructs the compilation of valuable information related to the consent regime, including what data has been collected by previous research cruises and whether post-consent obligations have been fulfilled.

Considering the aforementioned observations, there is a compelling case for streamlining the consent procedure within SIDS. This streamlining can serve the purposes of enhancing transparency, facilitating the creation of a comprehensive dataset related to the consent regime, and maximizing the advantages gained from foreign research. In terms of recommendations, the propositions presented by Long⁶³ to the European Union regarding potential legislative and non-legislative approaches warrant consideration. The legislative approach would entail either the enactment of a comprehensive dedicated law on MSR or of a general law on MSR establishing fundamental principles, with further details to be specified through subordinate legal instruments. Conversely, non-legislative strategies would involve the development of dedicated policies, guidelines, principles, or comprehensive templates on MSR, all aimed at fostering a higher degree of administrative coordination. In both scenarios, it is essential to clearly delineate the prerequisites to be met before, during, and after a research cruise in each maritime zone, establish well-defined timelines to avoid delays, and designate the competent authority responsible for granting consent. Specific requirements depending on the type of research project and its location could be envisaged, as exemplified by Jamaica's guideline for conducting MSR. Furthermore, it would be advantageous for other SIDS to consider following the positive trend identified by Salpin⁶⁴ among the PSIDS, which involves centralizing the consent procedures for all MSR activities under a single authority or committee (for instance, Cook Islands, Kiribati, Marshall Islands, Micronesia, Nauru, and PNG). Long⁶⁵ extends this idea, suggesting that such a centralized body could potentially replace the use of diplomatic channels, thereby expediting the entire process.

The analysis of the content of SIDS' instruments on MSR consent regimes and responses to QA and QB indicates a trend of expanding the grounds for consent denial, the required pre-cruise information, and the post-consent conditions, without major opposition. This contradicts prevailing interpretations asserting exhaustive delineation of legal grounds for withholding

⁶⁰ Salpin and others (n 26).

⁶¹ 'Ocean Science Diplomacy Can Be a Game Changer to Promote the Access to Marine Technology in Latin America and the Caribbean' (2021) 6 *Frontiers in Research Metrics and Analytics* 34.

⁶² (n 59).

⁶³ (n 30).

⁶⁴ (n 26).

⁶⁵ (n 30).

consent within the EEZ and on the continental shelf for MSR under the Convention⁶⁶. It also challenges interpretations that suggest the static nature of lists in articles 248 and 249 for MSR projects falling outside the list of permitted consent denial⁶⁷. SIDS' practice regarding legal grounds for withholding consent implies an evolving interpretation of the right to deny permission for MSR projects planning to drill into the continental shelf, use explosives, or introduce harmful substances into the marine environment to accommodate projects potentially impacting management and conservation measures in a broader sense. This approach aligns with the languages of article 240(d), Part XII, other environmental and biodiversity law instruments, and with concerns over the environmental impact of MSR projects⁶⁸. Conversely, their practice provides limited insight into their interpretation of the terms 'normal circumstances' and 'direct significance for the exploration and exploitation of natural resources.' Also about this topic, Gorina-Ysern⁶⁹ suggests that when the coastal State holds discretion to withhold consent, a general obligation to negotiate clearance arises, where the mutually agreed terms become binding. The information analysed demonstrate that requirements deviating from UNCLOS wording are negotiated more in a cooperative rather than a contractual approach, as also informed by⁷⁰.

The dynamic interpretation realized by SIDS to articles 248 and 249 suggest an attempt to maintain the balance crafted within the consent regime to the passage of time. Such an interpretation seems to have been influenced by developments in other legal domains, particularly environment and biodiversity laws⁷¹, and by understanding that the consent regime serves the dual purpose of safeguarding coastal State sovereignty and jurisdiction while bolstering their scientific and technological capacities⁷². The recognition of UNCLOS as a living instrument, with internal and external mechanisms to incorporate changing circumstances⁷³ legitimize the solicitation of pieces and information and the compliance with measures concerning evolving rights and principles for the conservation and sustainable use of the marine environment and biodiversity. Similarly, the ethical imperative to respect indigenous and traditional knowledge raised by the Convention on Biological Diversity and confirmed in the BBNJ treaty, warrants its consideration within the consent regime. Additionally, the emergence of new methods for exploring and exploiting the marine environment and resources naturally prompts inquiries about the utilization of new technologies and potential property rights arising from the proposed research. Furthermore, the dynamic interpretation of article 249 is evident in inquiries about the 'benefits' derived from research and alignment with national marine science needs. While 'benefit sharing' has gained attention in other legal regimes⁷⁴, until its recently inclusion in the BBNJ treaty, it's noteworthy

⁶⁶ DOALOS (n 39) 10; S Huh and K Nishimoto, 'Article 249 Duty to Comply with Certain Conditions' in Proelss, Alexander (ed), *United Nations Convention on the Law of the Sea: a Commentary* (CH Beck/Hart/Nomos 2017) 1661; Soons (n 31) 169; Wegelein (n 38) 299.

⁶⁷ DOALOS (n 39) 13–14; Huh and Nishimoto, 'Article 248 Duty to Provide Information to the Coastal State' (n 57) 1676 and 1681; Soons (n 31) 184 and 188; Wegelein (n 38) 188.

⁶⁸ DOALOS (n 39) 21–22; Hubert (n 9); Anna-Maria Hubert, 'Marine Scientific Research' 933 <https://doi.org/10.1007/978-3-319-60156-4_50>.

⁶⁹ (n 43) 244.

⁷⁰ Plesmann and Röben (n 59).

⁷¹ Salpin (n 10).

⁷² as proposed in Coelho (n 10).

⁷³ Coelho and Rogers (n 39); Heidar (n 50); Chie Kojima, 'Marine Scientific Research and Informal Lawmaking' in Natalie Klein (ed), *Unconventional Lawmaking in the Law of the Sea* (1st edn, Oxford University Press/Oxford 2022) <<https://academic.oup.com/book/45396/chapter/389361681>> accessed 11 April 2023.

⁷⁴ Elisa Morgera, 'The Need for an International Legal Concept of Fair and Equitable Benefit Sharing' (2016) 27 *European Journal of International Law* 353; Elisa Morgera and Elsa Tsioumani, 'The Evolution of Benefit Sharing:

that article 242 already stipulates that international cooperation in MSR for peaceful purposes must mutually benefit participating countries. This observation reinforces remarks in QA and QB, along with informal discussions, indicating that the consent regime has been a tool to establish cooperation and trust among participants. For instance, some researching states referred to the co-creation of research projects, departing from the traditional applicant-receiving country model. Additionally, SIDS' representatives mentioned agreements with researching states to monitor activities of suspicious vessels in proximity.

Inspired by the proposals of Long⁷⁵ to the European Union and Oral⁷⁶ to Black Sea and Mediterranean Sea, a crucial topic for discussion revolves around the potential adoption of a regional or cross-regional approach to the consent regime for MSR within SIDS. This proposal holds significant promise for SIDS as it has the potential to overcome challenges stemming from limited human resources and expertise, and restricted research infrastructure and access to state-of-the-art technology. Regional cooperation is explicitly fostered by the Convention to elaborate rules, guidelines and practices for the protection and preservation of the marine environment (article 197-201); to facilitate MSR, the transfer of technology, research infrastructure, and funding for ocean research and development (article 197, 276, 277); and to coordinate MSR policies and conduct joint research between States bordering semi-closed seas (article 123). As a matter of fact, the evidence indicates that regional organizations have already assumed significant roles in marine science within these regions. For example, the only instance where implied consent was reported in the Pacific region is in scientific projects conducted by SPC and regional organizations in the Caribbean and the Pacific already adopted common ocean strategies. In this sense, regional organizations could increase the coordination of the legal and policy frameworks on MSR of member States. This may entail the establishment of harmonized guidance and practices, serving as clearinghouse mechanisms that connect experts seeking opportunities on research vessels with available positions, and providing infrastructure for the storage and sharing of information and data related to non-resource-related MSR. Additionally, these organizations could consider enhancing governance for MSR on a regional basis, which may include the development of a unified consent application process for research projects covering regional seas or expanding the scope for conducting MSR through implied consent.

In summary, the discussion leads to the following recommendations:

Table 6 Recommendations in a nutshell

<i>SIDS</i>	<i>Researching State</i>
Adjust and publicize the laws asserting jurisdiction over MSR	Promote transparent communication between official channels
Adopt and publicize dedicated instruments on MSR providing legal and administrative coordination to avoid unreasonable delay or denial of consent	Elucidate about the use of traditional and indigenous in the research project and related ethical implications
Designate a dedicated institution or committee to handle the consent requests and inform about the template used to solicit consent	Improved coordination with scientists and authorities from SIDS before sending the formal request elucidating the necessary pre-cruise information
Develop and share information about priority needs in MSR	Consider existing scientific needs assessments in the research's proposal
Inform the researching State about the motivation for withholding consent, allowing the possibility to rectify the request or to negotiate other conditions	Promote meaningful participation of local scientists in all stages of the project and share data, information and reports in a user-friendly format
Cooperate through regional organizations in the development of a regional or cross-regional approach to the consent regime	Maintain a list of non-compliant researchers and consider adopting stringent measures to avoid non-compliance

Linking Biodiversity and Community Livelihoods' (2010) 19 Review of European Community & International Environmental Law 150.

⁷⁵ (n 30).

⁷⁶ 'The Need for a Regional Framework for Marine Scientific Research in the Black Sea and Mediterranean Sea' (2014) 17 Marine Genomics 69.

Concluding remarks

This article examined the State practice of SIDS on the consent regime for MSR concluding that it remains well-suited to its intended purposes: safeguarding the sovereignty and jurisdiction of coastal States while facilitating the conduct of MSR, avoiding unnecessary disturbances in the marine environment and providing opportunities to strengthen the scientific and technological capacity of SIDS. An additional finding is that modifications to the obligations introduced by SIDS during the implementation of the consent regime have not been met with opposition from researching States. This observation aligns with the assertion of McLaughlin⁷⁷, that unforeseen problems and changing circumstances do not nullify treaty obligations, especially those integrated into a comprehensive compromise like UNCLOS. Instead, they instigate collaboration and trust among the involved stakeholders.

Drawing from the State practice of SIDS on the consent regime for MSR under UNCLOS, this study puts forth several recommendations for SIDS and researching States. These recommendations aim to streamline the consent regime's procedure, while promoting opportunities to enhance the scientific and technological capacities of SIDS. Additionally, it is noted that regional and sub-regional organizations should consider coordinating the MSR policies and legislation between member States, which would be particularly beneficial within the context of SIDS.

⁷⁷ 'Bio-Logging as Marine Scientific Research under the Law of the Sea: A Commentary Responding to James Kraska, Guillermo Ortuño Crespo, David W. Johnston, Bio-Logging of Marine Migratory Species in the Law of the Sea, *Marine Policy* 51 (2015) 394-400' (2015) 60 *Marine Policy* 178.

Paper IV



The use of Marine Autonomous Systems in Ocean observation under the LOSC: Maintaining access to and sharing benefits for Coastal States

Luciana Fernandes Coelho¹ and Roland Rogers²

Abstract:

The increasing use of marine autonomous systems (MAS) in ocean observation has improved the speed and quality of data collected. However, it is unclear whether the existing legal framework remains fit for purpose of regulating the employment of MAS used in sustained and experimental ocean observation. The reason for such uncertainty is that the framework governing marine scientific research (MSR) under the United Nations Convention on the Law of the Sea (LOSC), used here as a yardstick, was not drafted considering autonomous systems. Such a framework attempts to balance the freedom to conduct MSR and coastal states' jurisdiction. It also seeks to strengthen the scientific and technological capacities of developing States. The chapter argues that regulatory instruments from competent International Organisations and current practices of States and competent International Organisations concerning the use of MAS in MSR projects are setting subsequent practices and agreements for interpreting the LOSC in light of new technologies. Notably, such instruments and practices seem to consider the negotiators' purposes of strengthening developing countries' marine sciences and technological capacities. However, more effort is needed to solve the asymmetric distribution of scientific capacities.

Keywords: Marine Autonomous System, Ocean Observation, Marine Scientific Research, Benefit-sharing, Consent Regime, Cooperate

1. Introduction

Marine autonomous systems (MAS) have been used in ocean observation on the water surface, column, and sea floor, providing purposeful data in expedited time (Moltmann et al., 2019). For instance, tsunami warnings following the eruption of the volcano *Hunga Tonga-Hunga Ha'apai* prevented deadly consequences (NOAA, 2022). However, one might question the need for dedicated legislation regulating the use of MAS (Bax et al., 2018).

This chapter responds to such an inquiry by analysing whether the framework governing marine scientific research (MSR) under the United Nations Convention on the Law of the Sea (LOSC or Convention) could be a purposeful benchmark to regulate the use of MAS in ocean observation. It starts examining operational aspects of MAS deployed in ocean observation, then revises the framework governing MSR under LOSC, and ends analysing if and how to reconcile such framework and the use of MAS.

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For the purposes of this chapter, ocean observation refers to activities examining elements of the physical environment in the ocean space. Sustained observations are measurements taken on an ongoing basis for seven years or more, primarily serving the public good services and supporting research in the public interest (Cravatte et al., 2016, 4). Experimental observations are measurements taken for less than seven years for research and development purposes, advancing knowledge on the physical environment and climate, exploring technical innovation and/or leading to improvements in the effectiveness and efficiency of observing system programmes (Ibid.).

With the absent definition for MSR in the LOSC, States and scholars diverge on how to classify ocean observation (Huh/Nishimoto, 2017a; Mateos and Gorina-Ysern, 2010; Wegelein, 2005). De facto, the LOSC framework governing MSR does not conflict with ocean observation, the reason why the former could serve as a yardstick for the latter.

There is no legal definition for MAS. The term is used by the oceanographic community in relation to the six models of carriers of sensors discussed here. Scholars have examined the status of MAS (Bork et al., 2008; Hofmann and Proelss, 2015; Veal et al., 2019), with significance for military uses and ethical implications (Gorina-Ysern, 2003; Gorina-Ysern and Tsamenyi, 1997; Johansson, 2018). These have been followed by concerns over safety and risk to the marine environment (Klein et al., 2020). Less noticed, taking the MSR framework as a benchmark, the use of MAS might be detrimental to meeting the benefit-sharing obligations, which can justify coastal States' denial of permission for future research projects in their waters.

The chapter's findings are supported by documental analysis, perspectives substantiated by one of the author's experiences managing scientific programs by the National Oceanographic Centre in the UK and views from researchers. The study focuses on MAS applied for scientific and peaceful purposes, excluding those with commercial, military, or defence applications. It only considers research sponsored and promoted by States and competent IOs, excluding privately funded, philanthropic, and citizen science MSR. Competent International organisations are the ones whose mandate include coordinating and promoting MSR, including those listed in LOSC' Annex VIII (OALOS, 1991, 1).

2. Operational Aspects of MAS employed in Ocean Observation

We examine six types of MAS, determining in each case the measurements that can be made, potential sensors, capability of being launched, piloted and recovered independently of a mothership, traceability, range of modus operandi and autonomy (IMO, 2021). The MAS discussed are classified in the levels of autonomy D3 and D4.

Table 1 Degrees of autonomy proposed by the International Maritime Organisation

Degree	Description
D1	Some operations may be automated and unsupervised, but with seafarers on board ready to operate and control shipboard systems and functions.
D2	The ship is controlled and operated from another location, and seafarers are available onboard to take control and operate the shipboard systems and functions.
D3	The ship is controlled and operated from another location. There are no seafarers on board.
D4	The vessel's operating system can make decisions and determine actions by itself.

Source: Prepared by the authors

2.1 Marine Autonomous Surface Ship (MASS)

MASS (NOC, 2022a) have a length overall (LOA) ranging from 1m to 5m; some operated by commercial survey companies may have up to 70m. They are a mix of in-house and commercially produced MASS which can be deployed for months. Their power sources include solar, wave, wind, hybrid fuel cells and traditional marine engines. They are fitted with passive and active sensors covering measurements of meteorological, oceanographic, biological, photographic, and acoustic parameters. Some can deploy and recover other MAS, such as UUVs and ROVs (AutoNaut, 2020).

MASS have been launched and/or recovered from mother ships, researching States, coastal States, third-party States, or combinations thereof. The piloting has taken place on mother vessels and/or remote piloting centres located in researching States, coastal States, third-party States or a combination. They are controlled using satellite communications with access to the data collected via the same capability and tracked using AIS. Measured data is saved onboard the MASS.

They can be operated at autonomy level D4 but are commonly controlled at D3 level.

2.2 Unmanned Underwater Vehicles (UUV)

UUVs are either electric-powered, classed as Autonomous Underwater Vehicle (AUV; for examples, see NOC, 2022b), or use buoyancy engines, classed as gliders (for examples, see NOC, 2022c).

UUVs are a mix of in-house and commercially produced capabilities with sizes varying between man-portable to 10m. They are fitted with passive and active sensors covering measurements of oceanographic, biological, chemical, optical - including imagery - and acoustic parameters. UUVs have been deployed on experimental observations lasting from one day up to several months, from shallow waters > 50m down to full ocean depth.

UUVs have been launched and/or recovered from mother ships, researching States, coastal States, third-party States or a combination. The piloting has taken place on mother vessels and/or remote piloting centres located in researching States, coastal States and third-party States or a combination. On the surface, they are controlled using satellite communications with access to the data collected via the same capability and tracked by AIS. When submerged, they run on pre-programmed tracks and depths. Measured data is saved onboard.

UUVs are operated at autonomy level D4 when submerged and at level D3 when on the surface and when underwater acoustic telemetry is available.

2.3 Remotely Operated Vehicle (ROV)

ROVs (NOC, 2022d) are generally commercially purchased, but some marine research institutes build in-house vehicles. Their sizes vary from man-portable to those requiring specialised containers for transport and bespoke launch and recovery gantries. They are operated down to full ocean depth with an average of 6000m and are fitted with passive and active sensors covering measurements of oceanographic, biological, chemical, optical - including imagery - and acoustic parameters.

ROVs have been launched, recovered and operated from mother ships, although they can be launched and recovered from MASS (Ocean Infinity, 2020). The piloting is undertaken from remote centres in researching States, coastal States and third-party States or a combination. There are now commercially available ROVs that can be detached from their

umbilical and operate as full AUVs. It is this latter type of ROV that is the main reason for their inclusion in this paper.

ROVs usually are operated at autonomy level D3.

2.4 Profiling Floats (PF)

Most PFs (Argo, 2022) are commercial products. They are fitted with sensors covering oceanographic, biological and chemical measurements. Recent developments have seen floats capable of being operated down to 4000m. They are carried along by ocean currents and are not recovered.

PFs are launched from research vessels and ships of opportunity. There have been trials of both air-launched PF and from MASS. The piloting is remote and can be undertaken from centres in research, coastal and third-party States or a combination. On the surface, they are controlled using satellite communications with access to the data collected via the same capability and tracked using AIS. When submerged, they run at pre-programmed depths.

The level of autonomy for PF is D3.

2.5 Seabed Observatory (SO)

SOs (NOC, 2022e) come in many forms, from a buoyed system as with the Porcupine Abyssal Plain (PAP) example to fixed submerged seabed structures. They are generally produced in-house by research institutes with bespoke capabilities. SOs can be found both in shallow water and deep ocean and are operated down to full ocean depth, running pre-programmed depths. They are fitted with passive and active sensors covering the measurement of oceanographic, biological, chemical, optical and acoustic parameters.

SOs can be long-term installations that are serviced by research vessels. Observatories on the sea bed either store the data onboard, which is recovered when serviced, or give real-time access to it when cabled to a shore-based receiving station. SOs like the PAP are controlled using satellite communications with access to the data collected via the same capability from the surface part of the observatory.

They are primarily operated at autonomy level D4 but at times work the D3 level.

2.6 Remotely Piloted Aircraft (RPA)

RPA (the acronym is synonymous with Unmanned Air Vehicle) –or drone– can either be propeller powered fixed-wing or rotary-wing. Most RPAs are man-portable though large ones require special launch and recovery capabilities (Air-Sea Interaction Laboratory, n.d.). They are fitted with passive and active sensors covering the in-air measurement of optical in a broad-spectrum range, like temperature and meteorological parameters (Ridge and Johnson, 2020).

RPAs have been launched and/or recovered from mother ships, researching States, coastal States, third-party States or a combination. They use radio frequency communications for both piloting and data transfer. Backups of the data and operating parameters are stored onboard.

Shipborne and land-based RPAs are operated at autonomy level D3.

3. Legal Aspects of Using MAS in Ocean Observation






The LOSC provides a comprehensive framework governing MSR undertaken by States and/or competent IOs using vessels, installations, and equipment (Papanicolopulu, 2017b, 1733). The Convention's MSR regulation is mainly located in Part XIII, which seeks to strike a balance

between freedom to conduct MSR and the jurisdiction of States (Gorina-Ysern, 2003; Soons, 1982).

In areas under national jurisdiction (AUNJ) and international cooperation, the regulation also aims to strengthen developing States' marine sciences capacities (Coelho, 2022; Salpin, 2013; von Kries et al., 2015).

The non-monetary benefits target the capabilities explained in table 2:

Table 2 Modalities of benefits (considered for this study)

		Articles
Training and Capacity Building 	Consent regime	
	Participate on board of vessels, craft, or installations	249(1)(a)
	Receive support to assess and interpret data, samples, and information	249(1)(d)
	International cooperation	
	Promote training and capacity development	244(2)
	Create favourable conditions for MSR and integrate the efforts of scientists	243
	Strengthen MSR capabilities of developing States	244(2)
	Provide training and education for developing States	268(d)
Access to Data, Samples, Information and Knowledge 	Promote the exchange of scientists and experts	269(c)
	Consent regime	
	Access data, samples, information, and knowledge	249(1)(b)(c)
	Prior agreement for releasing information with economic significance	249(2)
	International cooperation	
	Promote the flow of data and information, including about health, the safety of persons and the marine environment	242(2)
Enable Research Infrastructure 	Disseminate proposed significant programs and their objectives	244(1)
	Facilitate the acquisition, evaluation and dissemination of marine technological knowledge, information and data	268(a)
	International cooperation	
Establish Legal and Policy Framework 	Develop marine technology and technological infrastructure	268(b)(c)
	Establish and strengthen national and regional marine scientific and technological research centres	275-276
	Consent regime	
	Establish guidelines to assist in ascertaining the nature and implications of MSR	251
	International cooperation	
Establish Legal and Policy Framework 	Create favourable conditions for MSR	243
	Conclude contracts and agreements for the acquisition of marine technology under equitable and reasonable conditions	269(b)
	Establish guidelines for the transfer of marine technology	271

Source: Prepared by the authors, based on (Coelho, 2022)

The rights and obligations related to such benefits differ in each maritime space and depending on the legal basis supporting them.

3.1 The Consent Regime

The consent regime is a degree of rights and obligations of coastal vis-à-vis researching States and competent IOs varying in each maritime AUNJ. Benefit-sharing obligations are tied to the coastal states' rights to withhold clearance for a project. In internal waters, territorial sea, and archipelagic waters, coastal States have the discretion to deny consent and request any benefit, including monetary (Huh/Nishimoto, 2017b, 1648; Salpin, 2013).

In the EEZ and on the continental shelf, coastal States must grant clearance in normal circumstances, whereas researching States and IOs must comply with post-cruise obligations under article 249 (Huh/Nishimoto, 2017b, 1681). These obligations have the twofold purpose of confirming the MSR project's bona fides and sharing benefits (Coelho, 2022). Only in a limited number of circumstances Coastal States have a wider margin of discretion to withhold consent and impose additional compliance measures.

The first one is when the MSR project involves the construction, operation, or use of artificial islands and installations (article 246(5)(c)). The second situation is when the project is of direct significance for the exploration and exploitation of marine resources. 'Direct significance' refers to research findings expected to enable locating, assessing, and monitoring the status and commercial availability of marine resources (DOALOS, 2010, 10).

Alternatively, the research permission might be granted, followed by a request to restrict the public availability of the results (article 249(2)). Thirdly, consent may be denied when the project involves drilling into the continental shelf or introducing harmful substances into the marine environment (article 246(5)(b)). The final circumstance relates to previous research that failed to comply with the duty to inform the nature and objectives of a given MSR project or the post-cruise obligations.

3.2 International Cooperation

The duty to cooperate with the objective of increasing knowledge of the marine environment is applicable in all maritime zones. States and competent IOs can freely negotiate how to facilitate the clearance process as far as the research project has peaceful aims, respects the sovereignty, sovereign rights, and jurisdiction of States and mutually benefits all participants (article 242).

IOs have been vital in creating favourable conditions for MSR and enhancing capacities. However, developing countries' participation in international collaborations is still asymmetrical (IOC-UNESCO, 2020; Tolochko and Vadrot, 2021). The use of MAS could improve their participation, as such systems are usually cheaper to purchase and maintain. However, this is not without questioning the shortcomings of the LOSC in regulating the employment of MAS.

4. Using MAS and Maintaining the Balance Envisioned by the Framework on MSR

The LOSC is a product of its time (Buga, 2015). Nevertheless, it is considered a 'living instrument' with the flexibility to accommodate changing circumstances either through interpretation (Heidar, 2020; McLaughlin, 2020) or subsequent practice (Buga, 2015). This section analyses if and how the MSR's framework might regulate the use of MAS preserving the balance between States and sharing benefits with coastal States. It examines potential incompatibilities between aspects of MAS and the legal framework proposing interpretative guidance. After, it assesses the informal contribution of non-binding instruments to advance interpretation and implementation. Lastly, it explores two cases in which MAS were employed in ocean observation and benefits were shared.

4.1 Evolutionary Interpretation of Part XIII

In AUNJ, using MAS in MSR and ocean observation potentially causes loopholes related to the three main aspects explored in the following.

4.1.1 When Coastal State Consent is needed

The status of a given MAS is relevant to determining the need for coastal States' consent. MAS are generally classified as a vessel, installation, structure, platform, device, equipment, or craft, which are terms not defined in the LOSC (Veal et al., 2019). It behoves national laws to establish which MAS are considered vessels (Veal et al., 2019; Wegelein, 2005). Installations are larger mobile or fixed devices employed to stay in place for longer periods (Hofmann and Proelss, 2015; Wegelein, 2005, 138–235). They usually serve to carry equipment, and some have the capability of manning. This terminology includes structure and platforms (Ibid.). Equipment, which includes crafts and devices, are smaller instruments employed for a specific purpose and a short period (Hofmann and Proelss, 2015; Veal et al., 2019; Wegelein, 2005, 137). "Device" is also used when no other classification is applicable (Veal et al., 2019).

In cases when the MAS is not considered a vessel, if deployed from a mother vessel, the clearance process is connected to the latter (Ibid., 32). Conversely, the system has an autonomous status when deployed from shore or a platform without the status of a vessel, like a "ship in its own right" (Ibid., 32), which could trigger the need for consent to each MAS. Communication through official channels or between scientists from the States concerned could help clarify the procedure to obtain consent and expedite it (article 250). Article 247 also provides a viable solution, facilitating authorisation when the MSR project is under the auspices of competent IOs in the EEZ or on the continental shelf of a State member.

The project's geographical location and the MAS expected date of first appearance and departure, i.e. launch and recovery, play a role in assessing when consent must be requested and has consequential effects on the allocation of liability. It is indisputable that it is needed when the State in which the device transits coincides with that overseeing the location of data gathering. A diverse situation takes place when they are different.

In the territorial sea, archipelagic waters, or straits used for navigation of a third State, if considered vessels by national laws, a MAS would be entitled to the right of innocent or transit passage (articles 17, 52, and 38). The latter is also applicable to RPAs (article 38). In this case, the MAS would have to comply with national laws and regulations (article 21), refrain from carrying out research during the passage (articles 19(j), 40 and 54), navigate on the surface and show the identification of the State of registry when an underwater vehicle (article 20). If not qualifying as a vessel, the MAS unlikely is entitled to innocent passage, potentially necessitating permission from third States when transiting (Veal et al., 2019, 33; Wegelein, 2005, 135).

In the EEZ and on the continental shelf, the principle of freedom of navigation prevails. However, it is uncertain whether the project's geographical location and the date of first appearance and departure, which must be informed in the pre-cruise phase, include just the site of data collection or also areas of transiting (article 248(c)(d)). Again, national laws must clarify this issue (article 246(1)), which can create a troublesome situation in projects involving multiple States. As a default, researching States should notify third States of MAS passing through their EEZs and continental shelves or with the potential to drift in areas under national jurisdiction. This information is particularly relevant if the MAS collects data when transiting with no capability of determining when and where the collection will start.

4.1.2 When the Consent can be Withhold

The status of MAS and the types of measurements supported by each technology are significant to recognise as likely circumstances under which coastal States have the discretion

to withhold consent and request compliance with obligations other than those prescribed by article 249.

In the territorial sea, coastal States have the exclusive right to grant consent for MSR and the discretion to impose requirements, including monetary benefits (Huh/Nishimoto, 2017b, 1648; Salpin, 2013). Conversely, in the EEZ and on the continental shelf, coastal States have limited discretion to deny clearance to MSR projects. One example is when the activity involves the deployment of installations and structures. Interestingly, such discretion is not extensive to projects using equipment (Papanicolopulu, 2017b, 1735).

Notwithstanding the guidance provided in the previous subsection, the assessment criteria to classify a system as installation or equipment are insufficient because there is no threshold for the system's size and time of employment. For instance, the extended range of time in which MASS and UUV can stay at sea could cast doubts on their classification as equipment. More clarity on the legal criteria to determine the status of each MAS would be helpful. In the meantime, communication between official channels or scientists would be valuable to fill this gap.

Coastal States' discretion to withhold consent is also applicable if the MSR has economic significance. At first glance, this would not be the case for ocean observation; however, many parameters measured by the systems discussed can have commercial applications. Therefore, pre-cruise information should certify, beyond doubt, the nature of the research.

4.1.3 How to comply with the Benefit Sharing Obligations

Obligations from whichever source of international law usually require an action or omission, and sometimes the achievement of a result (ILC, 2001, 55, para. 3). Since the distinction between obligations of conduct and result is not exclusive (Ibid., 56, para. 11), an assessment of articles 242-244 and 249 in light of the Vienna Convention on the Law of Treaties and the doctrine of obligations provides a nuanced perspective.

Articles 242-244 establish goal-oriented obligations, which necessitate a permanent evolution leading to a particular 'defined or definable' outcome, even if no specific deadline exists (Wolfrum, 2011, 376). Consequently, cooperation concerning MSR should be continued, addressing shared challenges and unequal capacities to conduct MSR and utilise scientific knowledge. Furthermore, the format to accomplish such obligations' goals is less relevant, allowing to accommodate MAS features.

In article 249, researching States and/or IOs sponsoring research bear responsibility for pre-cruise information and complying with post-cruise obligations, even if the activity is actually undertaken by a research institute. When such an institute is not a governmental entity, one could refer to parallel responsibilities for States and private persons (Wolfrum, 2011). In this case, while the formers must ensure that the latter behave in a certain way (Ibid., 379), research centres are responsible through State Parties for adopting specific actions (DOALOS, 2010), some of which constitute benefits.

To meet their duties, researching States and IOs should adopt the necessary steps, like enacting internal laws and procedures compelling compliance with post-cruise obligations and monitoring enforcement. But, they are not legally required to ensure the obtainment of a result (Wolfrum, 2011). This conclusion is confirmed by the language used in article 249, which limits compliance to 'when practicable,' 'as soon as practicable,' and when requested by coastal States; or uses the vague obligation of 'undertake to provide' (article 249(1)(c)). However, since

consent can be withheld due to outstanding obligations from a previous project, it is on researching States' interests to compel research institutes to fulfil their obligations.

Valuable training and capacity-building opportunities come from the right to participate in the MSR project onboard research vessels, installations or equipment, mainly because not all States have access to research vessels and state-of-the-art technology (IOC-UNESCO, 2020). In the absence of capacity to carry crew in many MAS, participation can occur in piloting centres, developing human capabilities to build in-house systems or training in assessing and analysing data.

The use of MAS might not affect the duty to provide access to data, samples, information, and knowledge because data collected from MAS is usually stored onboard and can be processed and shared soon after its collection. In the case of SO, data can be accessed in real-time. When article 249(2) applies, researching States should be prompt to filter any data bearing economic significance for coastal States.

4.2 Informal Law-making Instruments

This subsection explores soft law and self-regulatory instruments alike adopted by IOs and private entities, which, despite lacking binding force, generally "announce and reflect eras of change and are often harbingers of legal progression" (Friedrich, 2010).

4.2.1 International Organisations

Seeking to induce the implementation of Part XIII, the United Nations Division for Ocean Affairs & Law of the Sea (DOALOS) published a guide in 1991, revised in 2010. Both editions draw attention to the clearance procedure and consultation between scientists from involved States as appropriate steps to build trust, expedite consent and share benefits (DOALOS, 2010, p. 28).

In the consent form, researching States must demonstrate the peaceful purpose of the project and its contribution to a body of knowledge, thus, differentiating it from prospection, exploration, and exploitation and attesting to its harmlessness to national security. Also, the adoption of measures to minimise impacts on the marine environment like risk assessment should be informed (Ibid., 40). Of relevance, the form template includes space to describe the systems used (Ibid., 33). Conversely, Coastal States must inform the expected level of participation, the format in which the data should be provided, and the existence of ecological or culturally sensitive areas and areas-based management tools (ABMT) (Ibid., 31, 42 and 45).

Local scientists' involvement in the project's early stages can promote meaningful participation for developing States and garner consensus on how to align the technicalities of MAS with Part XIII's obligations (Ibid., 29–32). It may also open opportunities for adding local and regional areas of interest to the project proposal, incorporating traditional and local knowledge, promoting the optimal utilisation of the information provided, and realise the transfer of technology (Bax et al., 2018). A similar approach has been adopted to discuss aspects of intellectual property rights (DOALOS, 2010, 32; Gorina-Ysern, 2003).

The Intergovernmental Oceanographic Commission of UNESCO is pivotal in triggering cooperation and accommodating the MSR's framework to changing circumstances. It had an active role in drafting the DOALOS guide and, in 2007, published a guideline on the procedure for MSR carried out by itself, acting as a competent IO, according to article 247. Although never used, such an instrument sets a precedent for other IOs (GOOS 246, 2021, 23).

4.2.2 Private Sector

In compliance with the parallel obligations upon States and private entities, the scientific community adopted self-regulatory instruments seeking to minimise the environmental impact of MSR and assure safety standards (ISOM, 2007; InterRidge, 2009). The industry established codes of conduct reporting best practices for deploying MAS (UK, 2018). States published guidelines informing scientific institutions on how to conform to the LOSC requirements (UNLOS, 2015; NOC, 2019; SUT, 2007). The latter exemplifies how States can improve the implementation of Part XIII by what McLaughlin (2020) calls conduciveness. However, the instruments consulted only superficially discuss the post-cruise obligations. The private sector should be more active in filling this gap.

4.3 Case Studies

The following cases exemplify MSR and ocean observation projects promoted by IO and States using MAS in which LOSC provisions on MSR were applied, and benefits were shared.

4.3.1 Argo OceanOPS and ARGO Floats

The outputs of the ARGO array inform our long-term understanding of climate change and provide critical inputs into ocean-atmosphere forecast models used for weather forecasting. Furthermore, access to the observations in near real-time is open to all States, even if they are not net providers of ARGO floats to the array.

The floats launched on the high seas are free to drift into coastal States' waters eventually. Coastal States have seen these unscheduled excursions into States' EEZs as unpermitted MSR. IOC addressed such anomaly in 2008 via the adoption of a Guideline regulating the deployment of profiling floats in the High Seas within the framework of the Argo Programme (IOC Executive Council, 2008).

Member States of IOC agreed that coastal States concerned should be notified in advance of the deployment of floats with the potential entrance into their waters (Mateos and Gorina-Ysern, 2010). Besides, IOC and the World Meteorological Organisation act as clearing house mechanisms, receiving and releasing data collected in the public domain. IOC compromised to verify ways to maximise the number of States participating in the project and benefiting from it (IOC Assembly, n.d.). Coastal States have the right to retain the publication of data collected in their EEZs with economic significance (IOC Executive Council, 2008, Annex).

The data generated by the Argo Float Programme has been applied to education and capacity development by the Pacific Islands Applied Geoscience Commission (SOPAC) and by a partnership with the US in South America and Africa (Roemmich et al., 2009). Hence, through a soft-law instrument that resembles Part XIII's provisions, IOC member States adapted the rights and obligations to the respective features of floats, sharing benefits.

4.3.2 Commonwealth Marine Economies Programme (CMEP) Containerised Autonomous Marine Environmental Laboratory (CAMEL)

The CMEP and CAMEL serve as an example in which a State - the UK - undertakes MSR through MAS and meets its duty to promote access to and share the benefits of such activity with the respective coastal State.

The CMEP was launched in 2015 to support Commonwealth SIDS' sustainable growth by strengthening scientific and technological capacities, developing plans for environmental protection and designating ABMTs (UK, 2016; Ziegwied, 2019). CAMEL was designed and

deployed as a project of CMEP aiming to expand the use of state-of-the-art technology, which is cheaper and easier to maintain than a traditional research vessel (Ziegwied, 2019). The facilities generally involve an operations container, a workshop, a C-Worker-4 Unmanned Surface Vehicle, an UUV ecoSUB, and three exchangeable sensors (Ibid.). The capability covers oceanography, hydrography, marine meteorology, and marine environmental security measurements (Ibid). It also involves capacity development since representatives of SIDS receive training on using the CAMEL system.

Between 2018 and 2019, CAMEL has already been successfully deployed for scientific data collection in Belize, contributing to investigating ocean acidification in shallow waters, including the Belizean Barrier Reef, with reduced costs compared with traditional methods of in situ investigation (Cryer et al., 2020). In 2019, it was used in Dominica, where CAMEL enabled producing marine habitat maps in support of two marine protected areas (NOC, n.d.).

In this case, bilateral agreements were capable of implementing the obligations of conduct concerning international cooperation achieving the required access to and benefits from MSR using MAS as laid out in Part XIII, as well as transferring marine technology.

5. Conclusion

By the time we celebrate the LOSC's 40th anniversary, this study evidenced its contemporarily by demonstrating the framework's governing MSR suitability to serve as a benchmark regulating the use of MAS in ocean observation. The chapter examined situations in which the use of MAS challenges identifying when coastal States' consent is needed, when it can be withheld, and how to comply with benefit-sharing obligations, suggesting States and competent international organisations pathways. Furthermore, it assessed informal law-making processes advancing the Convention's flexibility to changing circumstances, with particular emphasis on the DOALO's guide and work of IOC-UNESCO. The latter was a protagonist in establishing a regulatory instrument concerning the use of profiling floats based on Part XIII, garnering consensus between divergent positions. A second case evidenced how Part XIII can trigger collaborations advancing the use of MAS in ocean observation and sharing benefits.

Thinking about the LOSC at 50 and aligned with the Decade of Ocean Science for Sustainable Development objectives, an updated DOALOS Guide and a platform assembling IOC's best practices have been proposed (GOOS 246, 2021, 39). These exercises could advance the implementation of Part XIII, in light of new technologies and improve developing countries' participation in marine sciences. The Argo Guidelines could inform discussions, particularly its notification system and the use of IOs as clearing house mechanisms. The guide's new edition should emphasise the relevance of the consent form and official/direct communications between States involved to build trust and to identify: when consent is needed, how to avoid withholding it and ways of complying with the benefit-sharing obligations in light of new technologies. An expanded discussion on data sharing and property rights would also be beneficial. Besides, DOALOS and IOC could increase dialogue with sub-regional and regional organisations. The latter would be more equipped to assist States in adjusting legal, policy and administrative procedures to process the consent request within the permitted time frame and enjoy the benefits accrued from MSR.

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Paper V





Ocean Science Diplomacy can Be a Game Changer to Promote the Access to Marine Technology in Latin America and the Caribbean

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Ocean science is central in providing evidence for the implementation of the United Nations Law of the Sea Convention. The Convention's provisions on transfer of marine technology to developing countries aim at strengthening scientific capabilities to promote equitable opportunities for these countries to exercise rights and obligations in managing the marine environment. Decades after the adoption of the Convention, these provisions are under implemented, despite the efforts of international organizations, such as IOC-UNESCO. Latin America and the Caribbean struggle to conduct marine scientific research and seize the opportunities of blue economy due to the limited access to state-of-the-art technology. Ocean science communities in these countries are subject to constraints not foreseeing in international treaties, such as unstable exchange rates, taxation, fees for transportation, costs of maintenance and calibration of technology, challenges to comply with technical standards, and intellectual property rights. Action is needed to overcome these challenges by promoting a closer tie between science and diplomacy. We discuss that this interplay between science and international relations, as we frame science diplomacy, can inform on how to progress in allowing countries in this region to develop relevant research and implement the Convention. We provide concrete examples of this transfer of marine technology and ways forward, in particular in the context of the UN Decade of Ocean Science for Sustainable Development (2021–2030).

Keywords: science diplomacy, access to technology, Latin America, caribbean, UN decade of ocean science

INTRODUCTION

For the past decades, as the same time as scientific discoveries allowed us to acknowledge the critical importance of the ocean to our livelihood, it was also significant to demonstrate the serious consequences of anthropogenic impacts on the marine environment threatening this life-supporting system (Rockström et al., 2009). It is a humanitarian solicitude to preserve and sustainably use the ocean, conserving its essential ecosystem services for generations to come (Griggs et al., 2013). However, science and technology have not served all countries equally (Harden-Davies and Snelgrove, 2020; Ocampo and Vos, 2008, pp. 34–36). As the UN Decade of Ocean Science for Sustainable Development makes its debut, this paper seeks to assist it by discussing current limitations hampering countries in Latin America and the Caribbean from

accessing and using marine technologies to develop the science needed to inform decisions and international negotiation processes in an equitable basis.

Science has been responsible for both acknowledging the critical importance of the ocean as well as identifying its multiple stressors and delicate ecological limits (Nash et al., 2017). With the increasing significance of environmental and ocean related discussions in international fora, scientists are called to provide evidence on life-threatening issues, such as natural and human induced hazards or food security and pollution. More recently, science has been pushed in the ocean international arena to assume a more relevant social role rather than just unveiling the unknowns (Wisz et al., 2020). Scientists are requested to provide empirical inputs to global decision-making processes, with the potential to build international partnerships to overcome these collective humanitarian challenges (Fedoroff, 2009). Ocean scientists are also being urged to deliver social goods and foster capacity development and transfer of marine technology (IOC-UNESCO, 2020b)¹. Nevertheless, ocean knowledge production depends upon the access and application of available marine technologies. These include not just research vessels, underwater vehicles and oceanic instruments, but all sort of expertise and knowledge-based materials, including databases and information, as formatted by the Intergovernmental Oceanographic Commission (IOC) of UNESCO (IOC-UNESCO, 2005). Therefore, accessing marine technologies is critical to develop ocean research that can ultimately provide evidence to decision-making.

Developing countries struggle to develop or access marine technologies in spite of some attempts to address this issue (Alexander et al., 2020). Vast ocean areas are still unmapped and unknown to humanity, in particular the Southern parts of the Atlantic and of the Pacific, mostly due to the lack of access to marine technologies and incipient human capacities of countries in these regions (Inniss et al., 2017; IOC-UNESCO, 2017). The asymmetrical distribution of scientific knowledge and technologies not only impinge discoveries, but also reduce possibilities of developing countries to table their needs in international negotiations on ocean affairs based in sound evidence. As one of the major historical battlefields between developing and developed countries, the United Nations Convention on the Law of the Sea (LOSC) enshrines provisions to promote international cooperation on marine scientific research (MSR) and the transfer of marine technology (TMT)² (Anand, 1982; Soons, 1982; Nordquist et al., 1990; Gorina-Ysern, 2004). However, these provisions are among the less implemented in the LOSC (Long, 2007; Long and Chaves, 2015; Salpin et al., 2018).

Enforcing the LOSC rules on MSR and TMT in an equitable manner has been in the forefront of the international agenda for developing countries, as for instance in the current negotiations of a legally binding implementing agreement to regulate the conservation and sustainable use of marine biodiversity beyond national jurisdiction (BBNJ agreement) (Long and Chaves, 2015; Harden-Davies, 2018). The UN Decade of Ocean Science also lies within this background, focused on balancing countries' capabilities to promote sound science for social and environmental benefit. Nonetheless, it is uncertain how the geopolitical interactions between the actors negotiating these processes will occur, as well as which roles will be played by scientific evidence.

The Decade is a diplomatic movement to foster marine research in search of fulfilling the targets established under the Sustainable Development Goal 14, Life below Water (SDG14), in which ocean science is pivotal (Visbeck, 2018). As a coordination effort to this end, the Decade will need to deal with the transfer of marine technology to the Global South, without which ocean science cannot progress globally as requested. The Decade's ambition to involve other ways of knowing in science making, plus improving this knowledge uptake in society's decision making, will need to involve social scientists further (Ryabinin et al., 2019). Social sciences are called to the front to ask the correct questions and bridge all ways of knowing (Claudet et al., 2019). In this context, science diplomacy will be pivotal for the Decade's success.

International Relations scholarship has overseen the role of science and technology in theorizing the relations of power and influence between countries (Mayer et al., 2014). Globalization, for instance, has been mostly researched in economical contexts, whereas science has been described as an influential soft form of power, attracting partner countries to one's interests and values, rather than using force and coercion (Nye, 2017). Science diplomacy is a recent field of academic research that investigates exactly the relationship between science and international relations, opening a new horizon for scholarship in International Relations (The Royal Society, 2010; Gluckman et al., 2018; Rungius et al., 2018). Although its definition is still disputed [a good debate can be found in Flink (2020) and in Ruffini (2020b)], for the purpose of this piece, science diplomacy is framed as a practice by which international relations support and are supported by scientific research, evidencing sometimes conflicting national, regional, and global interests. The current debate around the topic has provided insightful perspectives to think about fostering the access to marine technology for developing countries (Griset, 2020).

This paper assesses how science diplomacy can be a significant tool for Latin America and Caribbean States to overcome challenges in negotiations related to accessing marine technologies and capacity building at the international level, ultimately enhancing the regions scientific capacities. Profiting from the opportunity presented by the implementation of the UN Decade of Ocean Science for Sustainable Development (2021–2030), we propose recommendations that could leverage the implementation of the legal rights and obligations on transfer of marine technologies reducing global inequalities in the access and use of marine technologies.

¹For the purpose of this paper, marine technology encompasses the "instruments, equipment, vessels, processes and methodologies required to produce and use knowledge to improve the study and understanding of the nature and resources of the ocean and coastal areas" (IOC-UNESCO, 2005, p. 9)

²In the absence of a clear-cut definition of marine scientific research in the United Nations Law of the Sea Convention (LOSC), we understand this activity as "any study or related experimental work designed to increase [hu]man's knowledge of the marine environment" (Soons, 1982)

METHODS

We conducted a legal analysis of the provisions adopted in the LOSC regarding the promotion of MSR and TMT, focusing on the rules with especial provisions for developing countries. Additionally, official documents aiming at implementing such provisions were analyzed, in particular those from the Intergovernmental Oceanographic Commission from UNESCO (Gonçalves, 1984; Harden-Davies and Snelgrove, 2020). Some of the perspectives and examples provided were drawn from the authors' experience in managing scientific programs in the region and through the collection of views from researchers in the field over time. We acknowledge the importance of analyzing how social, cultural and political relations can add layers of complexity in the discussion of implementing the transfer of marine technology obligations, however, this has not been the focus of this paper.

Reasons Why Marine Technology Transfer Is Critical in Latin America and the Caribbean

Globalization is usually themed after economic relations but became a facilitator movement of international scientific cooperation, in particular in issues of global concern, such as ocean health (Held et al., 1999; Carter, 2008). With a more engaged global scientific community, the knowledge produced could reflect a form of scientific consensus that could inform diplomacy. However, the uneven participation of researchers from Latin America and the Caribbean in global ocean assessments show that this consensus might be reflecting views from a narrow group of scientists, lacking inclusivity (IOC-UNESCO, 2020a; Tessnow-von Wysocki and Vadrot, 2020). Thus, globalization has provided good opportunities for the evolution of Science but has still much to progress in terms of accommodating knowledge from other communities, in particular researchers from the Global South (Biermann and Möller, 2019; Kraemer-Mbula et al., 2020).

Researchers from developed countries often access funding and infrastructure to conduct research in Latin America and the Caribbean waters. As principal investigators of such research projects, these researchers usually apply only a small portion of the funding in the foreign field, leaving local contributors with limited access to research equipment. This has been evident in the current Covid-19 pandemic, with Northern scientists regretting having lost their field work access due to travel bans, thus jeopardizing entire research projects (de Vos, 2020). What should be regretted is that those research projects did not provide a well-equipped and trained personnel on the ground. If done so, research would have been preserved, so as capacity development and access to technology provided, a win-win situation.

Ocean scientists in Latin America and the Caribbean struggle in many ways to develop world-class marine research. First, research budget is limited and allocated in local currency, subject to high fluctuating exchange rates. This conversion is necessary to import equipment and other research inputs from foreign companies, usually from developed countries. Research

proposals' budget are challenged in predicting this currency fluctuation as well as adding the high costs related to taxation and transportation. As a result, research inputs and equipment can become prohibitive. Managing these discrepancies becomes a fundamental part of doing ocean science in the Global South.

Second, once an equipment is imported, it needs to be calibrated and maintained by certified services so results can be compared, and data defined as accurate. In general, these certified services are only provided by the same companies that manufacture the devices. The contracting party is usually hold accountable to cover the costs of the technician's travel and accommodation, plus the service itself. Establishing local or regional offices in the region would provide not only a solution, but also foster jobs and boost small enterprises and start-ups. Ocean technology companies claim that the market share in Latin America and the Caribbean is insufficient for opening branches in the region. Indeed, limited funding results in less acquisition of equipment, making the market share low for those companies. Countries could develop certified laboratories to provide maintenance and calibration. Brazil, for example, has this capacity established in universities. Those laboratories are however unable to be certified due to the high international standards for accreditation, costly to comply with. Without this certification, one can just lose the equipment's warranty or have the data being trashed out for the lack of quality assurance.

Lastly, the global ocean scientific community moves steadily in determining essential ocean variables, i.e., a minimum requirement of observations to monitor the state of the ocean environment and predict trends which are useful to inform society and policy makers (Lindstrom et al., 2012). It has been acknowledged that complying with such standards will be challenging to the developing world, in particular because of the fragmented ocean international governance framework and the lack of coordination and security in funding schemes (Bax et al., 2018). Capacity development and transfer of marine technology are critical to instrumentalize a coordinated set of data that will allow better forecast and modeling of the marine environment (Miloslavich et al., 2018). Despite some endeavors in the Pacific and Southern Asia (Bax et al., 2018), the overall scenario in ocean observations is still detrimental (Tanhua et al., 2019).

All in all, ocean scientists in the South have limited research budget in local currency with highly fluctuating exchange rates. Much of this budget is then spent in keeping up with international standards, that determine data accuracy, thus allowing replicability and comparison. To make things slightly challenging, the competition for shiptime is intense since there are not many research vessels available. Thus, international cooperation is essential to access and deploy ocean technologies. Governments need to support researchers in negotiating equitable and fair platforms for sharing research infrastructure and co-developing marine technologies.

The Legal Framework That Supports the Transfer of Marine Technology

There is a compelling international legal framework that aims at fostering the transfer of marine technologies, in particular in the context of the United Nations Law of the Sea Convention (LOSC).

The LOSC provides a comprehensive framework regulating the jurisdiction of States Parties and activities taking place at sea, interacting with other instruments, actors and regimes (Trevisanut et al., 2020). Even though scientific evidence is interwoven in many provisions of the Convention, the transfer of marine science and technology is enshrined in part XIII (Marine scientific research), part XIV (Development and transfer of marine technology), and articles 143, and 144. Whereas the link between the framework on marine scientific research, transfer of technology and capacity development has been analyzed elsewhere (Harden-Davies and Snelgrove, 2020), the literature lacks a closer look into the special rules directed to developing countries.

The obligation of transferring marine technology generally covers 1) access to data, information and knowledge; 2) training human resources on science and technology; 3) promoting access to equipment and infrastructure; and 4) promoting international, regional and national scientific and technical cooperation (Harden-Davies and Snelgrove, 2020). In more details, within the framework of scientific cooperation, there is a special obligation for States, alone or in collaboration, to promote the flow of scientific data and information, as well as the transfer of knowledge resulting from MSR and transfer of marine science and technology to developing countries. Additionally, international efforts must focus on increasing the autonomous scientific capability and infrastructure of these countries through capacity development actions as well as the establishment of national and regional research centers aiming at not only increasing skills in pure science, but also to improve the social and economic development of these countries (art. 244 (2), art. 266 (1)(2), art. 268 (d), art. 275, art. 276 LOSC). Aligned with States, International Organizations must endeavor to conclude focused programmes of technical cooperation for transferring all kinds of marine technologies and technical assistance to States that have not been able to establish or promote their own technological capacities in pure or applied marine sciences (art. 269 (a)). Even when not intermediated by international organizations, the TMT between States must consider the needs and interests of developing countries (art. 272, LOSC). Article 267 provides means of interaction with other legal regimes by counterbalancing the obligation to transfer marine technology with the obligation of due regard the rights and duties of holders, suppliers and recipients of marine technology. **Table 1** summarizes the provisions in parts XIII and XIV with rights and obligations for developing countries.

Understanding that technological and scientific developments would require normative adaptation over time, article 271 calls for collaboration through international organizations for enacting criteria and guidelines to facilitate the TMT taking into account the interests and needs of developing countries, including skills and technology regarding activities in the Area, i.e., the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction. Even though no specific organization is mentioned in LOSC, IOC-UNESCO has acted as the focal point for implementing parts XIII and XIV. Other organizations with competences related to ocean sciences are the Food and Agriculture Organization (FAO), the International Seabed Authority (ISA) and the International Maritime Organization (IMO), among others with a more regional focus (Nordquist et al., 1985, pp. 558–560; United

Nations, 2010). The conduct of MSR has increasingly been undertaken by cooperative arrangements, what is fostered by articles 424 and 244 of the Convention. Besides, IOC has been leading initiatives of capacity building in marine scientific research and has assumed a pivotal role in discussions in the BBNJ negotiations, which has transfer of technology and capacity building in the core of the negotiations (Harden-Davies, 2016).

In 1994, a new Implementing Agreement under LOSC was negotiated to implement Part XI regarding activities in the Area (United Nations, 1994). Developed countries were dissatisfied with the regime negotiated in LOSC for the Area, including the obligation of mandatory technology transfer. As part of the compromise to acquire the necessary number of ratifications for the LOSC to come into force, the 1994 Agreement modified article 144 introducing new principles in disfavor of developing countries (Galindo, 2006). First, it has linked the conditions to facilitate the access of technology to the terms of the open market or through joint-ventures, reducing favorable prices to developing countries. Second, it has submitted technology acquisition to the effective protection of property rights, one important limitation for TMT in current times, as we shall discuss below (United Nations, 1994). Despite the setbacks introduced by the 1994 Agreement, the ISA has established an Endowment Fund in 2006 to support the participation of scientists from developing countries in research projects (United Nations, 2010), which, in turn, has been subject to some criticism (Jaeckel et al., 2016).

In spite of the comprehensive legal framework favoring scientific cooperation and marine technology transfer with particular provisions focusing on increasing capacities in developing countries, part XIII and part XIV of the LOSC are under-implemented (Long, 2007) As a result, there is currently a lack of balance between developed and developing countries in producing ocean science (IOC-UNESCO, 2017). These concerns are vivid in many international stages, such as in the BBNJ negotiations, where countries of the Global South are requesting more legal opportunities for accessing marine technologies. As the scope of the Decade is broader than the BBNJ, we claim that it could act more ambitiously as a springboard to foster the implementation of the special rules on marine scientific research and transfer of technology for developing countries, particularly considering the rules on international scientific cooperation aforementioned and the positive outcomes to promote transfer of technology of informal arrangements.

Challenges and Opportunities in Implementing the Transfer of Marine Technology

Implementing the LOSC Rules on Transfer of Marine Technology

Technology transfer can mean a diversity of processes. For example, it can be applied to a dual use of a certain technology being transferred from one field of application to another. It can also represent the factual physical movement of an asset (or even immaterial elements, such as know-how or technical information) or people or a set of capacities between places. Here, we will address technology transfer as the transfer of systematic knowledge for the manufacture of a product, for the

TABLE 1 | Law of the Sea Convention provisions in part XIII and part XIV (Development and transfer of marine technology) specifically dealing with developing countries.

Special rules for developing States in part XIII	Art 244.2	States and IO shall transfer scientific data, information and knowledge States and IO shall strengthen the autonomous MSR capabilities of developing countries States and IO shall strengthen human resources of developing countries through education and training
	Art 266	States shall promote the development of MS and technological capacity of States with regards to exploration, conservation and management
Special rules for developing States in part XIV	Art 268	States, IO, ISA shall promote the development of HR through training and education
	Art 269	States, IO, ISA shall endeavour: establish programmes of technical cooperation - own technological capacity
	Art 272	IO shall coordinate Global or regional programmes taking into account interests and needs
	Art 273	States, OI and ISA shall facilitate the transfer of Skills and marine technology with regards to activities in the Area
	Art 275.1	States, IO, ISA shall establish national marine scientific and technologic research centres
	Art 276	States, IO and ISA shall promote the Establishment of regional marine scientific and technological research centres to stimulate and advance the conduct of MSR and foster the TMT

HR, Human Resources; IO, Intergovernmental Organizations; ISA, International Seabed Authority; TMT, Transfer of Marine Technology; MSR, Marine Scientific Research; MS, Marine Science.

application of a process or for the rendering of a service and does not extend to the mere sale or lease of goods (United Nations Conference on Trade and Development, 2014).

Special rules for developing States in part XIII	<p>Art 244.2</p> <ul style="list-style-type: none"> • Autonomous MSR capabilities • Education and training
Special rules for developing States in part XIV	<p>Art 266: MS and technological capacity of States with regards to exploration, conservation and management</p> <p>Art 268: States + IO + ISA shall promote the development of HR through training and education</p> <p>Art 269: States + IO + ISA shall endeavour: establish programmes of technical cooperation - own technological capacity</p> <p>Art. 272: Global or regional programmes taking into account interests and needs</p> <p>Art. 273: Skills and marine technology with regards to activities in the Area</p> <p>Art. 275.1 States + IO + ISA shall establish national marine scientific and technologic research centres</p> <p>Art. 276 Establishment of regional marine scientific and technological research centres to stimulate and advance the conduct of MSR and foster the TMT</p>

Marine technology transfer is generally referred to in the context of the IOC Criteria and Guidelines on the Transfer of Marine Technology, or GTMT, as illustrated in Box 1 (IOC-UNESCO, 2005). GTMT details the need for a clearing-house mechanism, by which interested stakeholders could identify technology-holders and technology needs among the global ocean community. This clearing-house mechanism is not yet established, although IOC has created a Group of Experts on Capacity Development that have produced recommendations on ways to move forward, based in other organizations' models (IOC-UNESCO, 2019). IOC has, however, established a proof-of-concept trial clearing house mechanism in its regional body for the Latin America and the Caribbean through a dedicated website.³ This trial version makes available information on

³<http://portete.invemmar.org/chm>, accessed on January 27, 2021.

some of the region's institutions, experts and research vessels, but a match making feature for those seeking available marine technologies from the North is inexistent. Therefore, after 15 years of the establishment of those criteria and guidelines, the world has yet to see transformational technology transfers that result in a balance between countries in the access and use of marine technologies (IOC-UNESCO, 2017; Salpin et al., 2018).

Diplomacy cannot afford to postpone the debate on the effective transfer of marine technologies. As the world's population grows, there will be a race to explore the ocean natural resources further. Thus, ocean sustainable development based on the best available scientific knowledge is of utmost importance for future generations, in particular for developing countries (Hassanali, 2020). Bearing this in mind, the United Nations proclaimed the next decade as the UN Decade of Ocean Science for Sustainable Development (2021–2030).

The Decade of Ocean Science shall be a good opportunity to foster the debate around effective manners to progress in granting opportunities for developing countries to access marine technology and capacity development (Claudet et al., 2019), by implementing the regimes enshrined in part XIII and XIV of the LOSC. For this to happen, the implementation of the Decade should be centered in searching for equality in the access and use of marine technologies for sustainable development and human and environmental wellbeing. Terms such as co-development of technology instead of transfer, with a more equitable and linear participation of stakeholders, should also be promoted. In this sense, science diplomacy can inform on practices applicable to fostering this balance.

Scientists Leading the Transfer of Marine Technology

In practice, marine technology transfer has relied less in formal intergovernmental diplomatic routes and more in peer-to-peer exchange. Peer-to-peer cooperation is a basic mechanism of the scientific endeavor. It has produced advancements in our common knowledge of the marine realm allowing society to make better informed decisions (Fischhoff and Scheufele, 2013). Research centers, universities and individual researchers have fostered technology transfer for problem-solving, aiming at progressing in scientific



discovery. Agreements signed between research institutions and universities often include the exchange of human capacities and technology transfer at some level (Dolan, 2012). Drivers of such agreements are opportunities presented by the growing internationalization mechanisms adopted by those institutions (Qiang, 2003). Such mechanisms aim at projecting national capacities and competencies abroad to attract human and financial capital for further institutional developments, as a form of investment. In the context of Latin America and the Caribbean, internationalization has also provided the means to access foreign research funding and assets, placing an important opportunity to foster partnerships, but also to overcome national budget constraints.

This practice is more common in the context of technologies developed by publicly funded research, mainly targeting scientific discovery. Privately funded research assets, in particular those aimed at exploring the marine resources such as oil, fisheries and minerals, are less common on those agreements because these technologies raise industry's competitiveness and profit (Ruffini, 2020a). There are, however, a few privately funded organizations that use advanced technologies to promote open access information to society [e.g., Global Fishing Watch (Nugent, 2019)].

It is therefore fundamental that scientific cooperation in informal pathways is continued and promoted so science can profit from the free thinking and foster technology transfer. In fact, diplomacy should acknowledge and promote these informal channels where applicable, supporting actions that have been successful over time, such as cooperation agreements between research institutions. This informality is addressed as a form of Track 2 diplomacy in International Relations scholarship. The term can be understood as a parastatal informal diplomacy in which stakeholders are not necessarily bound to Governments (Jones, 2015). Track 2 diplomacy can use the science international cooperation to progress on

addressing community and common interests in a more flexible way than the official, Government-led track 1 diplomacy. At the end of the day, both forms of negotiations should be interlinked and supportive of one another if we are to see change in the transfer of marine technologies during the Decade of Ocean Science, for example.

Intellectual Property Rights (IPR)

The overarching difficulty for an intergovernmental body such as the IOC to pragmatically propose the transfer of marine technologies lays partially on issues of Intellectual Property Rights (IPR) (Zhou, 2019). Unlike the provisions on TMT, MSR and capacity development, under the scope of the LOSC and the mandate of institutions connected with this regime, IPR in under the mandate of the World Intellectual Property Organization (WIPO) and the World Trade Organization (WTO), through the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). Indeed, as the LOSC is not a stand-alone treaty, it interacts with other regimes of international law, and has mechanisms to do so (Trevisanut et al., 2020), as for instance the above-mentioned article 267. Nonetheless, the conversation between these regimes has so far only favored private companies detaining patents.

In light of global environmental conundrums, WIPO was challenged to balance “the free transfer of technologies and sustainable innovation”, but without much success (Zhou, 2019). Similar process is undergoing in the WTO, and negotiations on technology transfer under the scope of TRIPS have not been evolving (Zhou, 2019). Therefore, traditional diplomacy has been unable to reach consensus on how to balance IPRs and public interests to advance sustainability (Latif et al., 2011).

Private Sector Involvement

Companies take risks and make investments to profit from technological assets. The private sector alone should not be accountable to make change by opening patents and handling technology blueprints. In addition, countries in Latin America and the Caribbean will benefit little from blueprints if they do not possess the necessary human capacities and physical facilities to develop marine technologies. Therefore, an intergovernmental coordinated effort needs to be developed by finally operationalizing the clearing-house mechanism of IOC to then match technology holders and needs (Harden-Davies, 2016). Second, public diplomacy needs to foster a discussion on the possible trade-offs for the private sector to join in this effort. Companies can profit from opening new markets and investing in capacitating new labor in the region. Third, local governments need to invest in innovation policies and start-up programs to absorb the technology being transferred. Local business might then flourish, and local realities will adapt technologies to their needs, feedbacking the innovation process at a larger scale. At the end of this complex process, countries can begin to negotiate the co-development of technologies, beyond the scope of transferring technology as a passive-active relationship (Chesbrough and Schwartz, 2007). Although there are conflicting views addressing market competition and sustainability, there are also opportunities to leverage this relationship, such as private

research programs on marine ecosystem restoration or pollution (Virdin et al., 2021).

Private companies' interests are considered by diplomacy when defending national positions in international negotiations. Same applies to public interest, as the societal benefit of a healthy and safe ocean environment. Thus, diplomacy needs to balance community/public interest with those interests coming from specific groups or countries. This complex relationship between national interests and global public goods involving science and technology is taken under the scrutiny of science diplomacy research (Ruffini, 2020b). Moreover, a better coordination between international regimes such as LOSC, WIPO, and TRIPS is highly desired. The Decade of Ocean Science should open this dialogue by confronting diplomatic negotiations in both regimes and searching for opportunities. A simple recommendation in this issue would be to align country's representations in both process with the aim of finding common grounds for opening this frank debate on Intellectual Property Rights.

DISCUSSION

The United Nations Law of the Sea Convention and related implementing instruments have set rights and obligations able to reduce worldwide asymmetries in the access to scientific knowledge and marine technology. Nevertheless, in spite of some increase in the participation of Asian countries in scientific publications, mentioned in the latest Global Ocean Science Report, the scientific and technological capabilities remain inequality distributed. Developed countries still concentrate the majority of ocean science human capacity and more incentives for researchers, like the access to international forums and networking (IOC-UNESCO, 2020a). Equally, only five countries in the world, all located in the global north, have full wide range access of technological infrastructure, with only a few others with capacity to conduct open waters and deep-sea research (IOC-UNESCO, 2020a). For instance, none of the Small Island Developing States (SIDS), which includes the Caribbean States, have deep-research vessels.

The origins of many of these difficulties in promoting the right of access to scientific knowledge and technology to developing countries lie in historical processes of colonization (Headrick, 1981). Additionally, from an epistemological perspective, science is a western invention, as so, from the starting point developing countries need to follow theories and methods founded in an alien mindset, still being under dispute how to integrate traditional and indigenous knowledge in the science-making (Weiss, 2005; Mulalap et al., 2020). This topic assesses whether science diplomacy is an appropriate tool to reduce scientific and technological asymmetries without disregarding the compelling reasons for a deeper discussion.

Science Diplomacy Facilitating the Transfer of Marine Technologies in Latin America and the Caribbean

Latin America has experienced a raise in social sciences' research in understanding the role of Science in advising policy, with a

prominent focus on "center-periphery" relations in scientific research and the globalization of the social sciences, or the ownership of knowledge, particularly indigenous knowledge, when compared to the United States and Europe (Echeverria et al., 2020). Historically the theoretical field of International Relations (IR) has dealt with technology in both an optimistic and a skeptical conflict, in particular scholarship around the role of technology in the Cold War. Science and Technology was placed exogenously in theoretical IR and the dynamics and global impacts of Science needed further empirical evidence. Today, IR is seeking ways to incorporate the global politics of science and technology as a distinct subfield, which is by default an interdisciplinary approach that needs to include other fields of social sciences therein (Koh and Jayakumar, 1977). Therefore, science diplomacy can offer a new interdisciplinary approach to study how science and technology, its multiple facets and understandings, can influence international relations (Lidskog, 2014). We frame this discussion around the taxonomy provided by (The Royal Society, 2010) so the organization reflects the general science diplomacy literature.

First, "Diplomacy for science", which stands for diplomacy facilitating international scientific cooperation by leveraging investment and prioritizing research to address uncertainties in decision-making. Here, diplomacy can set official frameworks by which countries can access marine technologies, such as through the IOC. By doing so, diplomatic negotiations can foster the establishment of international cooperation on fair and equitable grounds, in accordance with the Law of the Sea Convention. Moreover, diplomacy needs to integrate debates going on in different fora, in particular among WTO and WIPO, on how to deal with intellectual property rights. In addition, diplomacy can foster an arrangement between the public and private sector regarding the access and application of relevant technology to research global public goods, such as the ocean. Ocean science can only progress in an equitable manner if access to marine technologies is granted on an equitable basis through the diplomatic decision making. Thus, diplomacy for science in this scenario means intergovernmental negotiations to grant access to marine technologies and capacity development.

Second, "science in diplomacy", that deals with the provision of scientific evidence to support international decision-making. Research will be responsible to inform diplomacy on the above mentioned negotiations. Knowledge gaps and trending themes of concern need to be communicated in such a way that diplomacy can discuss institutional and legal arrangements to overcome current obstacles for an effective transfer of marine technologies. Scientists have a pivotal role in clarifying what should be the results in effective marine technology transfer, highlighting the current pathways to acquire technologies and barriers, such as Intellectual Property, maintenance and operating costs. Non-governmental organizations and intergovernmental organizations shall play an important role in this regard (Lidskog, 2014). For example, the organization of public debates among scientists using the networks under NGOs are theme-oriented and independent from States and formal diplomacy, resulting in a flexible approach to discussing the

state-of-the-art research and potential future actions. In ocean affairs, NGOs have provided scientific expertise since the early negotiations of the LOSC (Koh and Jayakumar, 1977). Therefore, science in diplomacy will allow provision of knowledge gaps and current technology needs to properly advance in ocean sustainability to comply with global community interests.

Lastly, “science for diplomacy”, in which international collaboration advances to bridge countries and build a constructive dialogue through joint research projects. The utmost example of such is the adoption of the UN Decade of Ocean Science. The Decade is hoped to be the long-awaited opportunity for research to bridge countries and people around a common goal. Different stakeholders with diverse values and needs shall inform the Decade’s process on achieving societal goals of ocean sustainability (Claudet et al., 2019). The Decade’s *raison d’être* is to put ocean science in service of society, including policy making, despite any possible tension between countries in other international debates. Thus, science for diplomacy will act to allow this dialogue between countries and stakeholders to take place through joint regional/global research efforts, that can be fostered initially by informal pathways, attained to the Track 2 diplomacy practices.

Ultimately, the balance between national political interests and global community interests in transferring marine technologies to foster ocean sustainability is a matter of balancing competition versus cooperation (Ruffini 2020b). There must be an optimal point in which trade-offs are made and commitments are adopted. This point must be achieved by addressing both the issues of national priorities, such as industry development and labor enhancement, with those of global concern, such as marine environmental protection and ecosystem service restoration. In this regard, scientists become yet another social group with intrinsic values and interests (Jasanoff, 1987; McCain, 2016, pp. 253-257). Therefore, progressing in understanding the social dynamics within the group of scientists and between scientists and diplomatic relations becomes essential to better inform global processes based on scientific evidence, such as the UN Decade of Ocean Science (Rose, 2018). Science diplomacy research in this regard, and in particular in the context of Latin America and the Caribbean, the region’s gaps and priorities, will enhance the global discussion to implement the Decade.

Examples of Science Diplomacy Processes Leading the Transfer of Marine Technology

Peer-to-peer cooperation agreements between research institutions and universities generally include the exchange of human capacities and technology transfer at some level (Dolan, 2012). Drivers of such agreements are opportunities presented by the growing internationalization mechanisms adopted by those institutions (Qiang, 2003). Internationalization of universities and research centers is one of the outcomes of the globalization of science.

A good example of such is the cooperation between research institutions from Germany and Cape Verde to create and operate an ocean research center in Cape Verde (Kaehlert et al., 2017). The Ocean Science Center Mindelo results from a formal agreement

between the GEOMAR Helmholtz Center for Ocean Research and Cape Verde’s Instituto do Mar—IMar. The Tropical portion of the Atlantic has a determinant role in the heat exchange between the ocean and the atmosphere, a feature that is central to understand global climate and ocean dynamics (Seidel et al., 2008). German scientists wish to access an island in the middle of the Atlantic to further enlighten how the Tropical Atlantic influences the North. Germany benefits from relevant information and Cape Verde with the access to technologies and capacities to deal with their own waters. Moreover, the center is devoted on building capacities in Cape Verde so their ocean science community can be empowered. Ultimately, the German interest in Cape Verde contributed to the European Commission signing a diplomatic bilateral science and technology agreement on ocean research as a part of a broader ocean science diplomacy arrangement for the whole Atlantic basin (Polejack et al., 2021). This ocean science diplomacy practice has balanced the capacity needs of Cape Verde with the German interests in the region advancing knowledge production that will be fit for the global ocean assessment purpose, fully implementing articles 244, 266 and 275, LOSC.

Another good example of science diplomacy aiding countries to implement their international obligations in the transfer of marine technologies is the global ocean observation network. Ocean observations are highly dependent on technology and, under the auspices of IOC’s Global Ocean Observing System (GOOS) cooperation has been key to deploy equipment worldwide, such as buoys, drifters and other ocean monitoring instruments (Tanhua et al., 2019). In general, this cooperation involves the exchange, maintenance and calibration of equipment from one country to another. The handling of equipment’s blueprints for local development and manufacture is much rarer. Among the practical examples of our knowledge is the development of the Atlas-B buoy in Brazil (Campos et al., 2014). The U.S. National Oceanic and Atmospheric Administration (NOAA) freely handed the blueprints of their Atlas buoy technology for development in Brazil. As a result, Academia and industry partnered to develop an adaptation of this equipment, which was deployed in face of Brazil for testing. In spite of formal Government agreements in this matter, both NOAA and the University of São Paulo together with two Brazilian companies were able to successfully transfer a key technology nonexistent in the country before. Capacities were developed and today Brazil is able to progress in the manufacture of this buoy.

From the above mentioned, science diplomacy as a practice provides different perspectives of implementing the international obligations of transferring marine scientific knowledge and technology, reducing inequalities and empowering developing countries. Practical examples support this perspective, although the Decade will be a more ambitious stage for the science diplomacy interplay.

CONCLUSION

Marine researchers in Latin America and the Caribbean struggle to conduct state-of-the-art research mostly due to the lack of

permanent funding, appropriate scientific capacities and access to marine technologies. Consequently, these countries are challenged to contribute with scientific evidence in current ocean affairs, such as the BBNJ negotiations (Harden-Davies and Snelgrove, 2020). Although the global ocean governance framework provides the legal and institutional support for the transfer of marine technology from developed to developing countries aiming at strengthening local and regional capabilities, after decades of the entry into force of LOSC, part XIII and part XIV are considered among the least implemented of the LOSC (Long, 2007; Long and Chaves, 2015).

The globalized research community has provided informal venues for the transfer of marine technology. However, these peer-to-peer relationships will not be sufficient to achieve the equity that several States have called for to strength national capacity permanently to meet national needs and international standards. Therefore, this paper presents some concrete recommendations on how countries in Latin America and the Caribbean can enhance their national scientific capacities by using science diplomacy as a tool to foster beneficial international deals.

First, according to the requirements of the LOSC and the Resolution on the development of national marine science, technology and ocean service infrastructure (A/CONF.62/120*), developing countries must produce science and technology needs assessments, by which gaps and priorities shall be apparent. Such an effort could be supported by international organizations, the scientific community and research organizations, including from the private sector, together with governments.

Second, efforts must be taken to effectively implement the clearing house mechanism as per the IOC guidelines (IOC-UNESCO, 2005). Major technology holders from the developed world and representatives from organizations with mandate related to intellectual property, such as WTO and WIPO, should be included in discussions on the of such a clearing house mechanism, providing inputs and other perspectives. Issues related to exchange rate, taxation, fees for transportation, and limits to comply with standards for ocean observation should be considered in the clearing house mechanism. Additionally, it is relevant to discuss about incentives to create regional certified laboratories in developing countries to provide maintenance and calibration for equipment, as well as reviewing the standards for accreditation. Latin America and the Caribbean can profit from the trial version of this mechanisms that IOC has initialized in the region.

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Third, a shift in vocabulary may represent a positive change on how developed countries understand their role in promoting scientific and technological equity. Using terminologies such as co-development of technology instead of transfer are able to build more linear relations between stakeholders and reduce perspectives of subservience (center-periphery).

The Decade of Ocean Science shall be a good opportunity to foster the debate around effective manners to progress in granting opportunities for developing countries to access marine technology and capacity development, by implementing the regimes enshrined in part XIII and XIV of the LOSC. Countries in Latin America and the Caribbean have the opportunity during this Decade to push for improvements in the access of marine technologies. The provisions in the LOSC and related instruments give the legal basis for this discussion. Moreover, ocean science diplomacy can provide the necessary insights on possible negotiations based on evidence and favoring fair and just transition pathways.

AUTHOR CONTRIBUTIONS

AP conceived and drafted the first version. Both authors contributed to the writing of the manuscript, co-developed the recommendations and approved the paper's final version.

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