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International law concerning the environmental protection in Arctic: what is left behind UNCLOS and the BBNJ Agreement?

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The Arctic region, with its unique and fragile ecosystem, faces significant challenges in environmental protection due to climate change, increasing human activities, and geopolitical tensions. This paper examines the international legal framework governing Arctic environmental protection, focusing on the roles and limitations of the United Nations Convention on the Law of the Sea (UNCLOS) and the Agreement on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction (BBNJ Agreement). While UNCLOS provides a foundational legal framework for ocean governance, its applicability in addressing Arctic environmental concerns should be acknowledged, as should the complementary role of the BBNJ Agreement. However, the lack of provisions specific to Arctic environmental issues creates a gap between the effectiveness of international law and the urgent need for a comprehensive legal regime tailored to the Arctic context. Furthermore, the supplementary role of the BBNJ Agreement to UNCLOS remains limited. By highlighting key challenges in the implementation of international law, including disputes over Article 234 of UNCLOS, this study underscores the urgent need for a more robust and cohesive international legal approach to ensure the sustainable future of the Arctic environment, and concludes with appropriate recommendations.

KEYWORDS

UNCLOS, BBNJ Agreement, Arctic marine environment, Article 234, Arctic thaw

1 Introduction

The Arctic Ocean, once known for being frozen and white, is vital to the global climate and ecological balance. However, due to climate change and increasing shipping activities, planetary crises such as biodiversity loss and pollution are affecting the Arctic, threatening its fragile environment and weakening its role as a global climate regulator. Moreover, the phenomenon of Arctic amplification—faster warming in the Arctic region compared to the

global average (Dai et al., 2019), is accelerating ice melt, which in turn further contributes to global warming. Over the past decades, the Arctic has experienced significant losses in sea ice thickness and multiyear ice coverage (Kwok, 2018; Stroeve and Notz, 2018). According to the Protection of the Arctic Marine Environment (PAME), Arctic sea ice declined from 6.1 million km² in 1999 to 4.3 million km² in 2019 (Arctic Council, 2024). It is also forecast that the first ice-free day in the Arctic may occur within the next 10 years (Heuzé and Jahn, 2024). Arctic thaw has led to substantial changes in habitats for Arctic species and the structure of the marine ecosystem, while pollution from shipping and resource exploitation further exacerbates its vulnerability.

It is reported that the number of unique ships entering the Arctic Polar Code area increased by 37% from 2013 to 2023, reaching 1,781 in 2024, this figure does not account for multiple trips made by individual vessels (Arctic Council, 2024). In addition, the total distance sailed by ships during this period rose by 108%, from 6.1 million to 12.7 million nautical miles (Arctic Council, 2024). Increasing shipping activity brings multifaceted environmental implications in the Arctic context, most notably the introduction of pollutants (McRae and Goundrey, 1982). Emissions from the combustion of fossil fuels, especially heavy fuel oil (HFO) used by vessels are major sources of sulfur dioxide (SO₂) and carbon oxides. Although MARPOL Annex 1 prohibits the use and carriage of HFO in Arctic waters (Regulation 43A), exemptions exist for certain ships, and vessels flying the flags of coastal states may temporarily waive these requirements while operating within the jurisdiction of their flag states. In addition, as per the specification given by MARPOL Annex I, several low-sulfur fuel oils (LSFOs) with acceptable densities and viscosities are still permitted. As a result, oil spills remain a significant environmental risk. LSFOs with high pour points or high viscosity are particularly difficult to manage in the low temperatures typical of the Arctic (Arctic Council, 2025; Solski, 2021). The three primary methods of oil spill response—mechanical recovery, dispersants, and *in-situ* burning—are either difficult to implement in this environment or may cause further harm to the marine environments thereof (Feron, 2018). Apart from making it possible for commercial navigation, the retreat of sea ice also brings opportunities for resource development in the region. The Arctic is rich in natural resources, but extensive sea ice has traditionally made their extraction challenging—something that may change under increasingly ice-free conditions. The expansion of commercial activities will have significant implications for global shipping and energy supply, while simultaneously posing serious threats to the Arctic's ecological integrity.

Given the importance of the Arctic to the international community, these current and potential environmental risks must be addressed appropriately. Governance of the Arctic is a global concern; however, international law has not clearly defined the legal status of the region, this is one of the primary reasons for ongoing disputes over Arctic issues. This paper aims to conduct a legal assessment of the applicability of international law in the context of Arctic environmental protection. In addressing marine environmental protection and preservation, it should be acknowledged that there is a comprehensive web of legal instruments available. Apart from the

overarching architecture provided by UNCLOS and its implementing agreements, Arctic environmental governance operates under other international instruments such as MARPOL, International Code for Ships Operating in Polar Waters (Polar Code), Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing. In addition, regional agreements including the 2008 Ilulissat Declaration and domestic regulations of Arctic states, for example, the Canada's Arctic Waters Pollution Prevention Act (AWPPA) also play important roles in Arctic marine environmental protection and preservation. With full cognizance of such a broader normative mosaic, this paper focuses on UNCLOS and the BBNJ Agreement considering their foundational reach and seeks to clarify their respective roles in safeguarding the Arctic marine environment, while also analyzing the limitations of existing provisions, with particular attention to the contentious Article 234 of UNCLOS. To this end, the analysis of this paper is carried out following three main steps. Firstly, it solidates the foundation of analysis by means of the fundamental role of UNCLOS in marine governance, other supportive instruments and practice of directly affected states, and provides an overview of relevant provisions throughout the convention based on its normative content. Secondly, it points out the inherent shortcomings of UNCLOS in addressing Arctic marine environmental protection, especially Article 234. It subjects the provisions of Article 234 to doctrinal reconstruction against the most contested aspects of its application. Thirdly, it evaluates the supplementary role of BBNJ Agreement through doctrinal legal analysis including comparison with provisions of UNCLOS, clarifying their relationship and assessing the remaining gaps in international environmental law for the Arctic context.

2 International environmental law in the Arctic context

2.1 Applicability of international law of the sea

Geographically, the Arctic refers to the area of land and sea north of the Arctic Circle. In the context of international law, it includes the Arctic Ocean which covers more than 12 million square kilometers, along with its islands and the northernmost landmasses adjacent to it. Regarding the application of international law in this region, it can be concluded that there is no comprehensive legal regime governing all Arctic affairs, nor has a definitive legal status been established for the region. However, this does not mean that the Arctic is excluded from the reach of international law. As an integral part of the global ocean system, the Arctic Ocean is subject to the foundational legal framework for ocean governance established by UNCLOS for ocean governance (Miao and Chen, 2025). And seawater, whether in liquid or frozen form—is considered part of the marine space (Lynch and Norchi, 2024). This interpretation undoubtedly applies to other high-latitude areas in the Northern Hemisphere as well. Within the jurisdiction of coastal states, ice-covered areas are treated the same as other maritime zones. The fact that some ice-covered areas in

the Arctic Ocean lie beyond national jurisdiction does not, in itself (*ipso facto*), alter their legal status (Joyner, 1991; Korkut and Fowler, 2019).

Moreover, the applicability of UNCLOS in the Arctic is affirmed by state practice. During the Third United Nations Conference on the Law of the Sea (UNCLOS III) from 1973 to 1982, Canada proposed Arctic-specific provisions and negotiated with the United States and the Soviet Union. These efforts resulted in the inclusion of Article 234 (Solski, 2021). Also, as contracting states, littoral states exercise jurisdiction over their maritime zones in accordance with the Convention. Even the United States, which is not a party to UNCLOS, accepts its substantive provisions as reflective of customary international law. Additionally, the Arctic Council's Rules of Procedure and the 2008 Ilulissat Declaration further underscore the applicability of UNCLOS to the Arctic (Lynch and Norchi, 2024). Annex 2 of the Rules of Procedure emphasizes the foundational role played by the Law of the Sea in the management of the Arctic Ocean. In the Ilulissat Declaration, the five Arctic coastal states agreed on the primacy of UNCLOS in resolving any potential claims or disputes (Carlson, 2021), and made it clear that they “see no need to develop a new comprehensive international legal regime to govern the Arctic Ocean”.

2.2 Protection of Arctic marine environments under UNCLOS

UNCLOS, with its wide-ranging provisions, serves as a constitutional foundation for the protection and preservation of the Arctic marine environment (Korkut and Fowler, 2019). It emphasizes this objective in its Preamble and outlines a comprehensive set of general obligations and principles in support of it. Article 192 imposes a fundamental duty on states to protect and preserve the marine environment, which is an obligation that applies across all maritime activities and zones. Article 193 links the sovereign rights of states to exploit their natural resources with their responsibilities in environmental protection and preservation, emphasizing that states must fulfill their environmental obligations when engaging in marine resources exploitation. Article 194 reinforces this point by requiring states to take all necessary measures to prevent, reduce, and control pollution from any source. This includes the adoption of domestic laws and regulations to address pollution originating from land-based sources, ships, seabed activities, and dumping. Furthermore, as indicated in Article 194(5), environmental protection measures must also aim to safeguard rare or fragile ecosystems, as well as the habitats of depleted, threatened, or endangered species and other forms of marine life.

According to its zonal approach, UNCLOS delineates different maritime zones and specifies the extent to which a coastal state may exercise legislative jurisdiction. Based on the principle that “the land dominates the sea”, coastal states are the primary actors in environmental protection within areas under national jurisdiction. They exercise full sovereignty over their internal waters and territorial seas and hold sovereign rights and relevant jurisdiction for the protection and preservation of the marine environment in their

exclusive economic zones (EEZs). In fact, the Convention entitles coastal states to exercise sovereign rights for the exploration, exploitation, conservation, and management of natural resources within their EEZs—activities that encompass much of the work required for marine environmental protection. In areas beyond national jurisdiction, no state may claim sovereignty over any part of the high seas or the Area (the seabed and ocean floor beyond national jurisdiction). As a result, peace and order in the high seas and the Area of the Arctic are maintained through the jurisdiction of flag states, to which the general principles and obligations of Part XII of UNCLOS apply. Article 209 requires states to enact laws and regulations to prevent, reduce, and control pollution arising from activities in the Area, when conducted by vessels, installations, structures, and other devices flying their flag, registered under them, or operating under their authority. Similarly, Article 211 imposes obligations on states to regulate pollution of the marine environment caused by vessels flying their flag or registered under their jurisdiction.

However, the challenges posed should not be overlooked. During UNCLOS III, limited attention was given to Arctic-specific concerns, including the region's legal status. Traditionally, the need for a dedicated legal regime for the Arctic was not a priority in global discussions due to the historically low level of human activity in the area (Solski, 2021; Lynch and Norchi, 2024). As a result, UNCLOS does not provide a distinct regime for ice-covered areas such as the Arctic (Joyner, 1991). Although Article 234 is often regarded as Arctic-specific, its provisions were not extensively negotiated and are insufficient to form the basis of a comprehensive legal framework for the region. In recent years, however, human activity in the Arctic has increased significantly with the opening of new seaways, highlighting the need for regulatory mechanisms to balance the interests of all parties involved. Yet in addressing Arctic issues, the general obligations under UNCLOS fall short of adequately considering the unique characteristics of the Arctic environment, including its fragile ecosystem and rich biodiversity. This creates a gap between the applicability and effectiveness of international law and the urgent need for a more robust and tailored legal regime in the Arctic context. Furthermore, the general obligations and principles related to environmental protection and preservation under UNCLOS are structured around a zonal approach. This means that the implementation of relevant provisions depends heavily on clear maritime delimitation. However, maritime delimitation remains one of the most sensitive and contested issues in the Arctic.

3 Article 234 and its application in the Arctic

3.1 Background and objectives of the Arctic Article

Article 234 of UNCLOS, often referred to as the “Arctic Article”, originates from Canada's Arctic Waters Pollution Prevention Act (AWPPA). In 1969, the passage of the U.S.-flagged oil tanker

Manhattan through the Northwest Passage prompted Canada to assert greater control over the ice-laden waters along its northern coastline (Bartenstein, 2011). In response, Canada enacted the AWPPA in 1970, extending its jurisdiction over foreign vessels to 100 nautical miles from land—an extension that exceeded the limits permitted by the law of the sea at that time (Solski, 2021). This move marked Canada's first significant attempt to assert control over the Northwest Passage (NWP), especially at a time when its claim of sovereignty over the Arctic Archipelago received little acknowledgement from other states.

Later, during the UNCLOS III negotiations, Canada actively advocated for the inclusion of provisions aimed at strengthening such control. Proponents of Article 234 argued that Article 211(6) was insufficient for protecting the unique environment of Arctic waters. The limitations of Article 211(6) stemmed from its procedural requirements: the adoption of special environmental regulations under that article required the submission of scientific and technical evidence to justify the necessity of such measures, as well as approval from a competent international organization. Furthermore, the special regulations permitted under Article 211(6) were constrained by generally accepted international rules and standards concerning the design, construction, manning, and equipment of foreign vessels. By contrast, the AWPPA regime was intended to impose special requirements on vessel design, structure, and manning standards, without such constraints. Consequently, Article 234 was included in UNCLOS to empower coastal states to take enhanced measures in ice-covered areas without needing reference to international standards or a competent organization (Solski, 2021). It reflects broad recognition of the necessity for special regimes to address the unique environmental challenges present in Arctic waters.

3.2 Interpretation of Article 234

As mentioned earlier, the objective of Article 234 is to empower coastal states to enact and enforce special regulations for navigational safety and environmental protection. However, this authority is subject to strict limitations, including a geographical limitation within the limits of the exclusive economic zone and an environmental limitation—“particularly severe climatic conditions and the presence of ice covering such areas for most of the year.” During UNCLOS III, negotiations over Article 234 were conducted among directly affected states, including Canada, the United States, and the Soviet Union, and the provision did not generate significant controversy at the time (Solski, 2021). However, as melting sea ice has opened new seaways and the discovery of natural resource reserves has enhanced the region's strategic importance, the language of Article 234 has become the subject of varied and often conflicting interpretations.

3.2.1 Within the limits of the exclusive economic zone

Regarding the geographical scope of its application, there are both strict and broad interpretations of Article 234. The strict

interpretation holds that the competence of a coastal state under Article 234 applies only within a specific maritime zone—namely, the exclusive economic zone (EEZ)—that lies between the territorial sea and the high seas (Tuerk, 2013). It interprets the phrase “within the limits of the exclusive economic zone” as referring solely to the exclusive economic zone (EEZ). In contrast, the broader interpretation holds that this article applies from the baseline of a coastal state to the outer limits of its EEZ, which implies that the provision may also apply to territorial seas, as territorial seas undoubtedly lie within the limits of the exclusive economic zone in a geographical sense (Pharand, 2007). With reference to the wording of UNCLOS in Chinese, the expression can be interpreted either way. However, in English, the phrase “within the limits of the exclusive economic zone” does not exclude the possibility of including the territorial sea. In this context, some scholars further interpret this article considering its object and purpose, arguing that the intention of the drafters was to establish a special legal regime applicable only to the EEZ waters of the Arctic Ocean (Gavrilov et al., 2019). Nevertheless, this interpretation fails to explain why the Convention does not use the more precise phrase “within the exclusive economic zone”, which would have been clearer and more direct.

Given the disputes regarding the textual interpretation of its geographical scope, a neutral viewpoint has also emerged. It accepts the broader interpretation of the text while maintaining that the exercise of additional competence is only practical within the exclusive economic zone (Roach, 1990). Apart from the fact that it fits the interpretation compliant with the original meaning of the phrase “within the limits of the exclusive economic zone”, it could also be regarded as the appropriate interpretation considering the nature of the competence granted by Article 234. As clarified earlier, the purpose of Article 234 is to grant coastal states competence to enact and enforce laws and regulations that override general rules. Accordingly, if applied to the EEZ, the article would grant coastal states greater competence for marine environmental protection than that available under Part V, and if applied to the territorial sea, greater than that under Part II. However, based on the design of UNCLOS, the authority of coastal states weakens as it extends further seaward: coastal states have sovereignty in their territorial seas, while in the EEZ they have sovereign rights. It would contradict the basic idea of UNCLOS to provide coastal states with greater power in the EEZ than the sovereignty they have in their territorial seas (Bartenstein, 2011; McRae and Goundrey, 1982). Instead, it is logical to believe that due to the peculiarities of the Arctic marine environment, the authority under Part V for the EEZ is not sufficient, and it is necessary to grant coastal states extra jurisdiction through Article 234. Thus, the competence under Article 234 is superior to that normally granted for EEZ environmental protection but subordinate to that for territorial seas.

3.2.2 The ice-covered condition

Article 234 specifies the applicable geographical scope and limits its applicability to ice-covered areas within that scope. Following the general interpretation of its wording, the conditions for invoking this article can be deduced as follows: “particularly

severe climatic conditions and the presence of ice covering such areas for most of the year create obstructions or exceptional hazards to navigation, and pollution of the marine environment could cause major harm to or irreversible disturbance of the ecological balance.” This consequently imposes two distinct restrictions. On one hand, the applicable areas should be ice-covered with the presence of ice for most of the year and characterized by particularly severe climatic conditions. On the other hand, the conditions of such areas may create undesirable consequences for navigation, the marine environment, and ecological balance. Accordingly, this article is not for any ice-covered areas, but only for those meeting such descriptions.

However, disputes have arisen over whether the melting Arctic still qualifies as, or will remain, such an area. The focus of these disputes is the interpretation of the word “where” in Article 234. It has been argued that the description following “where” may not be used definitively to define the ice-covered area or to describe specific conditions of the ice-covered areas under this article, but rather refers to a specific location — the Arctic (McRae and Goundrey, 1982). Apparently, the above discussion would hold only if “where” is taken as describing the conditions; otherwise, the actual presence of ice would not be a prerequisite for the application of Article 234 to the Arctic (Gavrilov et al., 2019). To this end, some have proposed that the original intention behind negotiating the ice-covered area clause was to establish a special legal regime for Arctic waters, and the participants did not object to this purpose (Gavrilov et al., 2019). Therefore, these descriptions should not be construed as conditions for invoking this article; instead, they were used to identify the characteristics of Arctic waters in the late 20th century, when a perennial ice sheet overlaid the surface of the Arctic Ocean, and no one foresaw the possibility of Arctic thaw. In this case, the key issue is not the physical ice itself but the idea that special arrangements are necessary for Arctic waters (Lynch and Norchi, 2024). The complex language used is to distinguish Arctic waters from other vulnerable zones or special areas under UNCLOS (Dremluga, 2017).

Yet, this viewpoint is also questionable because the conditions listed in Article 234 seem redundant if they were only meant to differentiate Arctic waters from others (McRae and Goundrey, 1982). Compared to Article 211(6), which mentions conditions such as “recognized technical reasons in relation to its oceanographical and ecological conditions, as well as its utilization or the protection of its resources and the particular character of its traffic,” the conditions in Article 234 are more explicit and even consider the time factor, requiring ice coverage for most of the year. In this regard, it seems more logical to take the ice-covered condition as one of the reasons why the Arctic is especially fragile and requires extra jurisdiction by coastal states.

3.2.3 Limits on coastal states’ jurisdiction

Article 234 requires that the laws and regulations adopted accordingly “shall have due regard to navigation and the protection and preservation of the marine environment based on the best available scientific evidence”. Although UNCLOS employs the principle of due regard many times, it provides no precise legal

definition for this term. Literally, “due” implies what is reasonable, proper, and just in law (McRae and Goundrey, 1982). Therefore, it requires the laws and regulations enacted by coastal states under Article 234 to be deemed proper and reasonable from the perspectives of navigation and environmental protection, respectively. Also, as a fundamental principle in UNCLOS, due regard is usually linked to specific authorizations for coastal states and serves as an effective tool for balancing the interests of coastal states and other states. Accordingly, in Article 234, it mandates that coastal states must balance environmental protection and preservation with the interests of navigation. In other words, the competence of coastal states to enact and enforce laws and regulations is restrained (McRae and Goundrey, 1982). When taking actions for environmental protection and preservation, coastal states must reasonably consider their impact on navigation.

However, coastal states still have discretion in interpreting “reasonable” in this context, and there is no definitive criterion for assessing the reasonableness and the sufficiency of consideration coastal states give to the impact on navigation (Gavrilov et al., 2019). Furthermore, the ambiguity concerning the geographical scope of applicability discussed above adds to the uncertainty. If Article 234 applies to territorial seas, then the right of innocent passage available to foreign ships may be overridden. If not, then the right of innocent passage under Part II surpasses the competence of coastal states under Article 234, and the principle of due regard would safeguard the navigational rights of foreign ships.

Similarly, the requirement to base actions taken by coastal states on “the best available scientific evidence” introduces another layer of ambiguity. There is no explicit clarification about “available” here; it may either mean internationally available or available merely to the coastal state in question. Inconsistencies may arise as different coastal states may have different judgments about what constitutes sufficient evidence. They may have access to different scientific data, not to mention that “the best available scientific evidence” may change with the evolution of scientific research. If implementation of this article in special ice-covered areas needs scientific justification, then it may be necessary to update the evidence periodically, or at least, when the melting ice largely changes the Arctic environment, the scientific evidence needs to be reviewed thoroughly.

4 BBNJ Agreement and its supplementary role

From a historical perspective, the freedom-of-the-seas doctrine has long affected the oceans, and the vast oceans were declared free for all. It is since the mid-twentieth century that prosperous shipping activities made it urgent for international law to avoid conflicts and settle disputes over offshore resources. The adoption of UNCLOS marked a watershed by extending national jurisdiction seaward significantly, leaving roughly two-thirds of the ocean as areas beyond national jurisdiction (the ABNJ), which consist of the high seas and the international seabed area (the Area). Yet, notwithstanding such areal disparity, UNCLOS devotes extensive

provisions to defining the rights and obligations of states within areas under national jurisdiction, including those concerning environmental protection and preservation. Whereas for the high seas and the Area, it affirms the principle of freedom-of-the-seas, and the common heritage of mankind principle applies respectively; therefore, states are subject to the general principles and obligations stipulated under the convention, particularly the responsibility for the conservation and management of marine living resources (MLR) on the high seas.

Due to the continuous evolution of environmental thinking, the mere idea of pollution control is not sufficient, especially in areas as fragile as the Arctic Ocean. The conservation of marine biodiversity is now seen as integral to marine environmental protection (Southern Bluefin Tuna, 2000). Given that ABNJ are home to rich biodiversity yet increasingly suffer from anthropogenic pressures (United Nations, 2025), UN delegates further agreed to conserve the marine biological diversity of areas beyond national jurisdiction and adopted the BBNJ Agreement on 19 June 2023 (United Nations, 2023). As an implementing agreement of UNCLOS, the BBNJ Agreement upholds the marine environmental protection principles and concepts established by the convention and incorporates provisions addressing this issue.

Although the Convention addresses biodiversity, as Article 194 (5) requires that necessary measures be taken to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened, or endangered species and other forms of marine life, the BBNJ Agreement embeds biodiversity conservation into the framework set up by the Convention, providing more detailed and operational provisions including area-based management tools and environmental impact assessments. Part III of the BBNJ Agreement introduces detailed rules on area-based management tools (ABMTs) including marine protected areas and clarifies relevant procedural requirements such as their establishment, implementation, monitoring, and review procedures. Besides, it pays special attention to the establishment of emergency measures (Article 24). Similarly, Part IV focuses on environmental impact assessments (EIAs), under which states are obligated to conduct environmental impact assessments for planned activities under their jurisdiction or control in ABNJ, and subject to the processes set forth therein. Further requirements are put forth for activities that may have more than a minor or transitory effect on the marine environment, or whose effects are unknown or poorly understood (Article 30). Moreover, the impact of all activities in ABNJ shall be under continuous surveillance by permitting and engaging parties, and periodic reports are required by Article 36.

In addition, the BBNJ Agreement enriches the notion of living resources. Marine living resources form an element of the marine environment (Rafaly, 2021). In its Preamble, UNCLOS addresses the desirability of establishing a legal order to promote the conservation of living resources. Apart from the Preamble, the term “living resources” appears in seventeen of its articles. However, UNCLOS provides no legal definition of marine living resources. Literally, living resources refer to living organisms (Matz-Luck and Fuchs, 2015). According to its usage in the law of the sea, “living resources” is usually linked to commercial purposes and the idea of

conservation and sustainable management of such resources (Rafaly, 2021). As the adoption of the BBNJ Agreement reveals that marine genetic resources might be harvestable (Article 1) and following the idea that living resources are those that can be explored and exploited for economic value, it is likely that marine genetic resources under the BBNJ Agreement fit into the notion of marine living resources under UNCLOS (Rafaly, 2021). Consequently, the exploitation of genetic resources in the Arctic Ocean would be regulated by the above-mentioned articles of UNCLOS and, meanwhile, the BBNJ Agreement. This may give rise to issues concerning the interface between these two instruments.

Accordingly, in Arctic environmental protection, ABMTs such as marine protected areas (MPAs) can be implemented to regulate activities in Arctic high seas, particularly sensitive sea areas. These tools target management of specific geographic zones and allow special precautionary measures to be taken, safeguarding them from influences including those introduced by fishing, shipping or mining activities. Under Part IV, states are required to conduct EIAs for any planned activity under their jurisdiction or control in Arctic high seas whose effects may be more than “minor or transitory”. EIAs are requisite for authorization of such activities and once authorized, activities are subject to continuous monitoring and reviewing process through periodical reporting. This means that future exploration and exploitation activities in Arctic ABNJs will be subject to a uniform, science-based assessment cycle, creating procedural parity with the special measures coastal States may take under Article 234 within their EEZs.

5 Suggestions towards a sustainable and cooperative Arctic

5.1 BBNJ Agreement highlights the gaps in international law

Fundamentally, UNCLOS provides an overarching international legal framework for the conservation and sustainable use of marine living resources, yet its generality leaves gaps to be filled (Feron, 2018). For example, Article 61 addresses the conservation of living resources in EEZs, and Article 119 addresses the conservation of living resources on the high seas. Although no restrictions are imposed, it seems that living resources in these articles mainly refer to fisheries resources. This can be construed based on textual evidence. Article 61 imposes obligations in living resources conservation to coastal states with reference to “allowable catch” and “maximum sustainable yield”, which are concepts historically tied to capture fisheries. What’s more, Article 61(3) repeatedly links it to “needs of coastal fishing community”, “fishing patterns” and “stocks”. Similarly, Article 118 directly links the cooperation of states in the conservation and management of living resources with the establishment of regional fisheries organizations. Genetic resources, which were neither commercially harvested nor patent-protected in the 1970s, were never considered during the negotiation

of UNCLOS. Therefore, when it comes to nowadays biologically “living” genetic material, the normative focus of the Convention on fisheries leaves a regulatory void that the BBNJ Agreement subsequently seeks to fill by expanding the scope of MLR. However, genetic resources and fisheries resources have different characteristics; expanding the legal scope of living resources requires comprehensive consideration regarding the possibility of incorporation. Furthermore, the current regime may also be insufficient in dealing with the challenges arising from Arctic thaw as it opens the way for exploitation activities of Arctic living resources. These new species may not fall within the categories already considered. Existing regional fisheries management organizations (RFMOs) extend only to commercially targeted stocks and may not encompass the full spectrum of Arctic marine living resources.

Apart from the limited coverage of marine environmental components, the spatial coverage of the current regime is also incomplete. While the BBNJ Agreement addresses the gap in UNCLOS regarding the prevention of overexploitation of new resources, its focus is exclusively on the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction. Biodiversity within 200 nautical miles is not covered by the BBNJ Agreement. As mentioned above, issues concerning areas beyond national jurisdiction are less addressed compared to those concerning areas within national jurisdiction. This is the regulatory weakness that BBNJ Agreement seeks to fill. Again, this will in the end lead to disparity in conservation of living resources in ABNJ and other maritime zones. Furthermore, the delimitation dilemma in the Arctic remains unresolved, which significantly undermines the goals of the BBNJ Agreement for marine biodiversity conservation. Unless these gaps are filled through regional instruments or implementation mechanisms, the marine environment in the Arctic, particularly its unique biodiversity, will remain under pressure despite the overarching UNCLOS-BBNJ framework. In this regard, a proper interpretation and application of the Arctic article may be the most direct and effective approach.

5.2 A possible path to unravel the entangled interpretation of Article 234

Given the divergent interpretations of Article 234 of UNCLOS, its application in the Arctic region, especially in the context of climate change, has been highly controversial. As coastal states of Arctic shipping routes, Canada and Russia have enacted domestic laws and regulations to regulate Arctic shipping activities within their jurisdictions (Molenaar, 2014). Canada designates safety control zones covering the Northwest Passage (Bartenstein, 2019), imposing strict navigation rules such as vessel information reporting before entry and compulsory pilotage. In practice, Canada treats ice-covered areas as equivalent to Arctic waters, applying AWPPA to all Arctic waters regardless of ice presence. Russia also incorporates the language of Article 234 into its domestic laws, imposing control over vessels navigating through

the Northern Sea Route, including requirements on ice-class, advance reporting, and implementing a compulsory pilotage system. However, these practices have been contested by other states. Critics argue that the requirements imposed by these two states lack a direct link to environmental considerations (Fahey, 2018), and their domestic laws and regulations exceed the permissible scope under international law (Pedrozo, 2013).

Considering the interpretive disputes discussed in Section 3, the limitations of the normative content of Article 234 leave significant regulatory gaps of international law of the sea in governing Arctic marine environment to be filled through further clarification. In general, provisions of Article 234 shall be interpreted in compliance with the rules under the Vienna Convention on the Law of Treaties. Article 31(1) of the Vienna Convention on the Law of Treaties makes it clear that “a treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of their object and purpose”. As discussed above, a literal interpretation of the terms cannot clarify the internal meaning of the provisions. Considering the object and purpose of the Arctic Article, its inclusion in UNCLOS results from the need to protect the fragile Arctic environment. The truth is, during its negotiation, no one ever foresaw the possibility of Arctic thaw; therefore, despite the terminology, what really matters is the reason for this article. Interpretation of the terminology and the practice of coastal states in applying this article should focus on its purpose. Undoubtedly, the environment of a frozen Arctic is different from one with no ice coverage. Yet, the missing ice coverage does not necessarily lead to a lack of support for applying Article 234 to this region, as melting ice would bring more shipping activities and greater threats. To this point, supporting and even encouraging coastal states to take reasonable measures to protect the Arctic marine environment during the development and utilization of Arctic shipping routes aligns with the principles of green and sustainable development. Therefore, despite the actual ice-covered condition of the Arctic Ocean, as long as the necessity for a higher level of safety and environmental protection remains convincing considering either the remoteness of the region or the sensitivity of its marine environment (Bartenstein, 2019), the application of Article 234 should be recognized by the international community. Of course, this will no longer stand when it becomes difficult to distinguish the Arctic Ocean from other waters (Flake, 2013).

From the perspective of interest balance, coastal states shall not abuse the power conferred by the Convention. In terms of the geographical scope of its application, the ice-covered area clause applies only to waters within the exclusive economic zone, which directly excludes its application to the high seas. In turn, the outer limit of its application depends on the resolution of delimitation disputes in this region. As for its controversial inner limit, the dispute concerning whether it applies to territorial seas can be reconciled through a systematic interpretation. From the structure of UNCLOS, Article 234 belongs to Part XII, parallel to Part II for territorial seas and Part V for EEZs. Both parts contain the requirement of “due regard to navigation”. As discussed above, it is reasonable to believe that the legislative and enforcement powers

granted to coastal states under the ice-covered area clause do not surpass those originating from their sovereignty over territorial waters (Roach, 1990). Accordingly, if ice-covered areas are within a state's territorial waters, coastal states may enact laws and regulations aimed at preventing, reducing, and controlling marine pollution, but such laws must not impede the innocent passage of foreign vessels. Similarly, when exercising special legislative and enforcement powers in ice-covered areas within their EEZ, coastal states must also "have due regard to navigation". The rights of freedom of navigation in EEZs should only be affected by laws and regulations based on Article 234 when such navigation endangers the marine environment of the Arctic (Fields, 2017).

To clarify the extent to which coastal states may apply Article 234 to restrain Arctic shipping in the context of lower ice coverage in the Arctic Ocean, other relevant provisions of UNCLOS may also be referred to. Article 234 lies within Part XII which provides a broad framework of marine environmental protection and preservation. As *lex specialis*, Article 234 does not operate in isolation, its interpretation should align with the general idea of the broader matrix of Part XII, especially Article 211(6). Article 234 and Article 211(6) were conceived similarly (Bartenstein, 2011), both targeting "special areas" and conferring coastal states the power to enact "additional laws and regulations". According to Article 211(6), if a coastal state has reasonable grounds to believe that a clearly defined special area within its EEZ requires special regulations exceeding international rules and standards, it should consult appropriately with relevant countries through competent international organization before implementing special laws and regulations. For the Arctic, extensive consultation should likewise guide the application of Article 234. Through consultation, all stakeholders may jointly define the boundaries of waters requiring special attention and shape the rules. In this way, the international community can transform unilateral claims by coastal states into cooperative safeguards for the Arctic marine environment. Besides, considering the geographical adjacency of their applicable geographical scopes, it may also be suggestable for the coastal states to refer to the ABMT and EIA standards under BBNJ Agreement while taking special measures in compliance with Article 234 in EEZs. Which would to certain extent avoid the dilemma where the same living resources or ecosystem being subject to different regimes on either side of the 200-nautical-mile line.

6 Conclusion

Due to the lack of a comprehensive legal regime for Arctic affairs, the Arctic region is often labeled as a "new frontier" in international law. In this regard, the Arctic Ocean is part of the global ocean; it is by no means a legal vacuum and will witness developments in global ocean governance. In protecting and preserving the Arctic marine environment, the international law of the sea, including instruments that fall within its framework, such as the BBNJ Agreement, should always be referenced. However, in practice, the applicability of UNCLOS in the Arctic, especially with

respect to Article 234, remains controversial. The gaps in UNCLOS itself, as well as those revealed with the adoption of the BBNJ Agreement, need to be addressed through further instruments or implementation mechanisms. This may refer to mechanisms at different levels. For example, guidance may be developed by international organizations, for example, guidance of IMO concerning environmental performance of Arctic shipping in light of diminishing ice coverage. Competent international organizations and regional organizations may also provide fora for extensive consultation guiding the application of Article 234. Besides, Arctic Council could establish guidelines for coastal states to harmonize their regulations under Article 234 with Polar Code and BBNJ Agreement, ensuring coherence and enforceability of international law of the sea in Arctic context. As coastal states and other states share the obligation under international law to take measures, the applicability of Article 234 should be internationally acknowledged under specific circumstances until the Arctic Ocean is no longer considered special and fragile. By virtue of their geographic proximity, coastal states are best positioned to oversee and regulate external interference—provided that the additional jurisdiction conferred by Article 234 does not exceed the permissible scope.

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