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Re-evaluating particularly sensitive sea areas as an area-based management tool: advancing the implementation of the BBNJ agreement

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As a sectoral Area-Based Management Tool (ABMT) under the IMO regulatory framework, Particularly Sensitive Sea Areas (PSSAs) play a crucial role in preventing pollution from vessels. PSSAs allow coastal states to adopt Associated Protective Measures (APMs), including navigational restrictions and discharge controls, enabling more flexible and adaptive regulatory measures to prevent vessel-source marine pollution. The designation criteria and discharge control requirements for Special Areas under MARPOL73/78 are generally more stringent than those for PSSAs, particularly in Areas Beyond National Jurisdiction (ABNJ). This study analyzes the applicability and implementation of PSSAs as an ABMT within the framework of the BBNJ Agreement. It specifically addresses vessel-source marine pollution, a significant threat to marine ecosystems in ABNJ, and emphasizes the need for PSSAs as a legal tool to effectively prevent and mitigate this pollution. As a result, the study explores whether PSSAs can be adopted or applied as ABMTs under the BBNJ Agreement and presents improvement measures to enhance their effective implementation.

KEYWORDS

particularly sensitive sea area (PSSA), area-based management tools (ABMTs), BBNJ agreement, vessel-source pollution, international maritime organisation

1 Introduction

Covering 64% of the ocean's surface and 43% of the Earth's surface, the high seas—areas beyond national jurisdiction—are essential for sustaining marine biodiversity. However, these ecosystems face escalating threats due to inadequate international regulation. This has sparked global discussions and efforts to establish a new legal framework through the Agreement on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction (BBNJ Agreement) (Kachelriess, 2023). The high seas are defined as open ocean areas that are not under the national jurisdiction of any country and extend beyond the boundaries of Exclusive Economic

Zones (EEZs). Given that these areas encompass two-thirds of the world's oceans, there is an increasing need for regulations to govern activities such as fishing, shipping, and scientific research to ensure environmental protection (Warner, 2015).

In response, countries have committed to designating 30% of the high seas as protected areas by 2030, a goal being pursued under the Kunming-Montreal Global Biodiversity Framework (GBF) (Kachelriess, 2023). Implementing and managing marine conservation efforts in these vast oceanic areas presents significant challenges. First, while various legal frameworks already exist to protect the high seas, they are fragmented, hindering the establishment of a comprehensive conservation management system. Second, the “freedom of the seas” principle outlined in the United Nations Convention on the Law of the Sea (UNCLOS) complicates the establishment of marine protected areas (MPAs) under the BBNJ agreement.

Vessel-source pollution is a major threat to marine ecosystems and is particularly difficult to detect compared to land-based pollution sources. The impacts of this pollution often manifest only after prolonged accumulation, complicating the identification of direct causal relationships. Due to oceanic circulation patterns, remedial efforts such as water quality improvement or sediment dredging do not result in rapid recovery. Vessel-source pollution causes transboundary issues, inflicting both direct and indirect harm on marine environments. The International Maritime Organization (IMO), as the competent authority under UNCLOS, addresses marine pollution from ships by developing regulations to protect marine ecosystems and sustain ocean health.

Among the IMO regulatory, sectoral Area-Based Management Tools (ABMTs) include Special Areas and Particularly Sensitive Sea Areas (PSSAs) under the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78) (Krabbe, 2023). These designated areas span various ocean regions, with specific restrictions, such as navigation limitations and pollutant discharge controls, tailored to protect the marine environment. The MARPOL 73/78 defines Special Areas across six annexes, primarily targeting pollution from routine ship operations (Krabbe, 2023).

In contrast, PSSAs allow coastal states to adopt Associated Protective Measures (APMs), including navigational restrictions and discharge controls, enabling more flexible and adaptive regulatory measures to prevent ship-source marine pollution (Roberts, 2006). The designation criteria and discharge control requirements for Special Areas under MARPOL 73/78 are generally more stringent than those for PSSAs, particularly in ABNJ, where establishing Special Areas is particularly challenging. Therefore, PSSAs are anticipated to serve as effective and practical ABMTs under the BBNJ Agreement in the future.

Against this background, this study aims to analyze the potential applicability and implementation of PSSAs as sectoral ABMTs under the BBNJ Agreement within the IMO framework. First, it will provide a legal and procedural review of ABMTs outlined in the BBNJ Agreement. Based on these provisions, it will explore pathways for the adoption of PSSAs as ABMTs.

Furthermore, this study will examine the possibility of the IMO acting as the submitting entity for ABMT proposals under the BBNJ Agreement and consider the normative and procedural improvements needed to support PSSAs in this role. Additionally, it will offer specific recommendations for revising the PSSA resolution and enhancing the designation and decision-making process, outlining actionable steps that IMO can take to actively utilize PSSAs as ABMTs under the BBNJ Agreement. Ultimately, this study aims to contribute to the protection of marine ecosystems from ship-source marine pollution in ABNJ by establishing PSSAs.

2 General principle of ABMTs in the BBNJ agreement

2.1 Defining ABMT

Under BBNJ Agreement, the explicit definition of ABMT provides “a tool, including a marine protected area, for a geographically defined area through which one or several sectors or activities are managed with the aim of achieving particular conservation and sustainable use objectives”. The concept of ABMT has been proposed in two forms: sectoral ABMTs and cross-sectoral ABMTs (Gissi et al., 2022).

Sectoral ABMTs include measures such as fishing prohibitions designated by Regional Fishery Management Organizations (RFMOs), PSSAs and Special Areas designated by the IMO, and Areas of Particular Environmental Interest (APEIs) established by the International Seabed Authority (ISA) (Druel et al., 2014). In contrast, cross-sectoral ABMTs encompass marine spatial planning, which allocates space to achieve specific goals, and MPAs (Johnson et al., 2018).

When considering the concept of ABMT, several concerns of the involved parties arise. First, a fundamental concern arises regarding how to balance the freedom of the high seas with the obligation to protect the marine environment. Second, questions emerge regarding the relationship between the various existing ABMTs used in current international ocean governance and the new ABMTs to be created under the BBNJ Agreement. Specifically, when establishing new MPAs on the high seas, who holds the authority—the BBNJ Agreement or the existing ocean governance frameworks? This question is critical to the ABMT discussion (Druel et al., 2014).

According to the definition clause in the Revised Draft Text from the third Intergovernmental Conference in November 2019, ABMTs were defined as follows:

“An area-based management tool means a tool, including MPA, for a geographically defined area through which one or several sectors or activities are managed with the aim of achieving particular conservation and sustainable use objectives [and affording higher protection than that provided in the surrounding areas] (UN General Assembly, 2019).”

In the same draft, the definition of MPA was provided as follows:

“Marine protected area means a geographically defined marine area that is designated and managed to achieve specific [long-term biodiversity] conservation and sustainable use objectives [and that affords higher protection than the surrounding areas] (UN General Assembly, 2019).”

An analysis of the national proposals submitted by parties in response to this draft reveals differences in their positions (Textual Proposals, 2019). Many developing countries advocate for explicitly retaining the phrase “higher protection than the surrounding areas” to ensure a high level of marine protection after the establishment of an ABMT. In contrast, most developed countries, including South Korea, have called for the removal of this phrase. Developed nations such as the EU and the U.S. have pointed out the logical inconsistencies in defining ABMTs based on relative comparisons with surrounding areas, particularly since there may already be other types of ABMTs established nearby, or adjacent coastal states may have their own region-based protection measures. The U.S. has proposed replacing the phrase ‘higher protection than the surrounding areas’ with wording that emphasizes the need for the area to have a higher level of protection than it did prior to its designation as an MPA (Textual Proposals, 2019).

Each country has highlighted different aspects regarding the definition of MPAs. The International Union for Conservation of Nature (IUCN) and most developing countries emphasize the importance of the long-term designation of MPAs to maximize conservation functions and facilitate genuine ecological recovery, which often requires considerable time. In contrast, the U.S. has proposed omitting the term “long-term,” instead suggesting that MPAs may evolve over time based on scientific evidence (Textual Proposals, 2019).

2.2 Analysis of ABMT in BBNJ agreement

2.2.1 Ecosystem approach

The provisions related to ABMTs are outlined in Part III of the BBNJ Agreement, which consists of 10 articles (Articles 17 to 26). In addition to Article 2, which addresses the general objectives of the entire agreement, Article 17 specifically enumerates the objectives applicable solely to Part III, which focuses on ABMT.

A significant aspect the objectives article is the explicit adoption of an ecosystem approach (Westholm and Argüello, 2023). This approach aims to establish a connected system of ecologically representative MPAs while also addressing biodiversity and ecosystem restoration. This emphasis clearly fills legal gaps regarding ecosystem considerations under UNCLOS. Beyond the general objectives for the conservation and sustainable use of marine biodiversity (BBNJ), the ecosystem approach is explicitly mentioned in Article 7(f), which pertains to general principles and approaches, as well as in Article 19(3) when formulating proposals the establishment ABMT. The central theme throughout the discussions on developing BBNJ documents is the protection of marine ecosystems and biodiversity in ABNJ. During discussions on the guiding principles and approaches of this international document, most countries, including South Korea, agreed to

incorporate the ecosystem-based approach as a key element, along with adherence to the best available science and the precautionary principle.

2.2.2 Cooperation and coordination as global and regional mechanisms

Article 17(b) of the agreement outlines specific provisions regarding International Cooperation and Coordination. This section imposes a general obligation on parties to strengthen cooperation and coordination in the use of ABMTs, including MPAs, to enhance consistency and complementarity in the conservation and sustainable use of BBNJ. This obligation encompasses both global and regional or sectoral mechanisms.

The global mechanism envisions the new BBNJ Agreement as an umbrella convention that would hold a higher status than existing regional and sectoral organizations, such as the IMO and Regional Fisheries Management Organizations (RFMOs). This approach seeks to address regulatory gaps in the current international legal framework governing activities in ABNJ by establishing a higher-level standard to protect high-seas biodiversity. Key activities—including decision-making on the establishment and implementation of ABMTs, providing scientific guidance, and monitoring and enforcing compliance—would be delegated to a single international body, with the goal of unifying and standardizing efforts for ABMTs in ABNJ (UN DOALOS, 2017).

The regional and sectoral mechanisms, conversely, aim to address existing gaps in high-seas regulation by promoting cooperation and coordination among relevant international organizations (UN DOALOS, 2017). This approach seeks to empower these organizations with the necessary authority to conserve high-seas biodiversity through effective collaboration, forming a cooperative international system. While the global mechanism would operate in a more hierarchical manner under overarching international law (the ‘umbrella’ approach), the regional mechanism would function horizontally, relying on cooperation, coordination, and continuous dialogue among stakeholders (UN DOALOS, 2017). Countries that support the regional mechanism base their argument on the principle of high-seas freedom as established by UNCLOS, advocating for maximizing the use of existing frameworks rather than creating new norms for the high seas.

Article 17(b) outlines the general duty of cooperation and the methods of coordination depending on the presence of relevant international organizations. It allows for the adoption of BBNJ measures in cases where regulatory gaps exist, even when a relevant international organization is already in place. In other words, if no ABMT-related measures are provided under an existing international body, the BBNJ Agreement may step in to supplement these gaps and exercise its authority to implement such measures.

2.2.3 The ‘do not undermine’ principle

Fragmented and overlapping marine governance at regional and sectoral levels complicates the effective and efficient

coordination of ABMTs established by various international organizations with differing goals and interests (De Santo, 2018). Within the BBNJ negotiations, two key principles were discussed to address potential jurisdictional conflicts and regulatory overlaps (De Santo, 2018). First, all discussions should adhere to the framework established by UNCLOS. Second, the BBNJ Agreement must not undermine existing international documents, systems, and global, sectoral, and regional organizations. This principle calls for coherence within the high seas governance regime and has been a point of intense debate. The term ‘do not undermine’ appears frequently in the BBNJ Agreement, reflecting the underlying tensions among existing international organizations. The significance of this principle in ABMT discussions centers on the challenging question of whether establishing a systematic ABMT regime, as the BBNJ Agreement envisions, can coexist with UNCLOS’s principle of freedom of the high seas (Howard, 2021). This principle is explicitly addressed in Articles 5, 22(2), and 25 of the BBNJ Agreement.

2.3 Procedure for establishing ABMTs in the BBNJ agreement

2.3.1 Proposal and decision process

Article 19(3) specifies that proposals for ABMT, including the establishment of protected areas, must be based on the best available science, relevant scientific information, and, where possible, the traditional knowledge of Indigenous Peoples and local communities, while considering the precautionary and ecosystem approaches. According to this provision, proposals related to MPA establishment may be submitted to the Secretariat individually or jointly by the parties. Parties are expected to collaborate and consult, as appropriate, with relevant stakeholders—including States, global, regional, subregional, and sectoral bodies, as well as civil society, the scientific community, the private sector, Indigenous Peoples, and local communities—when developing proposals, as outlined in this section.

The BBNJ Agreement does not directly confer legal status on ABMTs; instead, it establishes a procedural and institutional framework for Parties to develop these measures. This process follows three key steps: first, Article 19 of the BBNJ Agreement allows Parties, individually or collectively, to submit proposals for ABMTs, including MPAs, to the Secretariat established under the BBNJ. Next, the Scientific and Technical Body (STB) conducts an initial review of these proposals to verify that they meet the necessary criteria and facilitates consultations on them. Finally, according to Article 22, the Conference of the Parties (COP) makes the ultimate decision on establishing ABMTs, including MPAs, along with any associated measures. Article 22(2) mandates that the COP respect and uphold the authority of relevant frameworks, instruments, and bodies, ensuring that its actions do not undermine their competencies. Additionally, Article 22(5) ensures that COP decisions and recommendations do not interfere with measures within national jurisdictions and are made with full consideration of

the rights and responsibilities of all States, in accordance with UNCLOS.

Although the IMO does not hold a formal priority in submitting proposals or participating in decision-making under the BBNJ, its roles and measures are considered throughout the process. Proposals for ABMTs must include details such as the area’s boundaries, proposed measures, consultations with relevant global, regional, and sectoral bodies, and information on any existing ABMTs. Under Article 19(a), Sectoral bodies such as the IMO may also submit proposals for ABMT views, scientific input, and information on existing measures to the Secretariat (Wang and Zhang, 2024).

2.3.2 Decision-making, implementation, and monitoring and review

Article 23 outlines the decision-making authority of the BBNJ COP. While there is general agreement among states that the COP has the authority to establish ABMTs, including MPAs, opinions differ on whether the COP can make additional decisions in areas where other organizations have jurisdiction and the extent of its authority in the absence of relevant bodies (UNGA, 2019). According to Article 23 of the BBNJ Agreement, COP decisions must be reached by consensus. If consensus cannot be achieved, a three-quarters majority of the Parties is required. Decisions made in this manner take effect 120 days after being adopted by the COP and are binding on all Parties. Any Party may object to a decision within this period by providing written notice, rendering the decision non-binding for the objecting Party.

Article 25 of the BBNJ Agreement requires Parties to ensure that activities under their jurisdiction or control in ABNJ comply with COP decisions. Additionally, the Agreement specifies that Parties may adopt more stringent measures regarding their nationals, vessels, or activities under their control, provided these measures align with international law and support the Agreement’s objectives. Furthermore, measures implemented under this part of the Agreement should not disproportionately burden small island developing States or least developed countries. Parties are encouraged to adopt appropriate measures that support COP decisions and recommendations, especially in coordination with relevant legal frameworks and global, regional, subregional, and sectoral bodies. A Party that is not a participant in a specific legal instrument, framework, or organization—nor a member of a relevant global, regional, subregional, or sectoral body— and does not otherwise agree to apply the measures established by such instruments and bodies, is nonetheless obligated to cooperate, in accordance with the Convention and this Agreement, in the conservation and sustainable use of marine biological diversity in ABNJ.

According to Article 26, the COP may conduct a post-implementation review of ABMTs, including MPAs, and make the findings public. Based on these reviews, the COP may also make decisions or recommendations for modifying, extending, or withdrawing ABMTs and related measures, guided by precautionary and ecosystem-based approaches.

3 Analysis of implementing PSSAs as ABMTs

3.1 PSSAs as a unique ABMT in the IMO regulatory instruments

3.1.1 Contribution of PSSAs to marine ecosystem protection

Shipping is essential to global trade, with over 80% of goods worldwide transported by sea (Choi et al., 2024). Recognizing the critical need to prevent marine pollution from ships, the international community has prioritized regulatory measures. As the number of vessels and volume of maritime trade continue to grow, the risk of environmental degradation rises, underscoring the importance of global regulations and pollution control efforts. The IMO plays a central role in these efforts, serving as the “competent international organization” responsible for developing effective, universally applied regulations for the shipping industry (Basaran, 2016). Over the years, the IMO has established various global regulatory frameworks worked to enhance ship safety and prevent marine pollution (Yi and Lee, 2023). Its regulatory instruments set the ‘international rules and standards’ under Part XII of UNCLOS, aiming to safeguard the marine environment from pollution caused by vessels (Budislav, 2004; Beckman and Sun, 2017).

A PSSA is defined as “an area requiring special protection through IMO action due to its recognized ecological, socio-economic, or scientific significance, where such attributes are at risk from international shipping activities” (IMO Resolution A.982(24), 2005). Since the Great Barrier Reef was designated as the first PSSA by the IMO’s Marine Environment Protection Committee (MEPC) in 1990, a total of 18 PSSAs have been approved (IMO Resolution MEPC.44(30), 1990). Apart from the Special Areas under MARPOL 73/78, PSSAs derive their legal status from IMO Resolution A.982(24), titled ‘Revised Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas’. This resolution provides normative flexibility, allowing a coastal state to adopt and enforce APMs approved by the IMO for ships navigating within designated PSSAs (IMO Resolution A.982(24), 2005).

APMs are defined as ‘practical regulatory measures’ aimed at protecting coastal states from risks posed by international shipping activities (Choi, 2022). APMs are typically divided into two categories: navigational measures and discharge restrictions (Kachel, 2008). Coastal states can implement stricter discharge standards by designating specific areas as special under MARPOL 73/78 (Kachel, 2008). They can also adopt navigational measures under the International Convention for the Safety of Life at Sea (SOLAS) and generally accepted navigation standards, as well as protective measures under Article 211(6) of UNCLOS (Roberts, 2006).

APMs are crucial for PSSAs to effectively address pollution from shipping activities. Without APMs, PSSAs cannot fulfill their intended protective function (Roberts, 2024). Currently designated PSSAs are areas where the marine ecosystem needs protection from shipping impacts. These PSSAs have implemented various

navigational measures as APMs, such as areas to be avoided, no-anchoring zones, and ship reporting systems, to mitigate the adverse effects of shipping activities on sensitive marine environments (see Table 1).

3.1.2 Ecological criteria for PSSA designation and its impact

To designate a sea area as a PSSA, the proposing state must fulfill at least one requirement outlined in paragraph 4 of Resolution A.982(24). These criteria are grouped into three categories: ecological, socio-economic, and scientific/educational (IMO Resolution A.982(24), 2005).

Among these, the ecological criteria consist of 11 elements: ‘1) uniqueness or rarity, 2) critical habitat, 3) dependency, 4) representativeness, 5) diversity, 6) productivity, 7) spawning or breeding grounds, 8) naturalness, 9) integrity, 10) fragility, and 11) bio-geographic importance’ (IMO Resolution A.982(24), 2005). The socio-economic criteria include three elements: ‘1) social or economic dependency, 2) human dependency, and 3) cultural heritage’ (IMO Resolution A.982(24), 2005). The scientific and educational criteria comprise three elements: ‘1) high scientific interest, 2) a baseline for monitoring studies, and 3) an exceptional opportunity to demonstrate specific natural phenomena’ (IMO Resolution A.982(24), 2005). Notably, the criteria for special areas under MARPOL 73/78 are not mutually exclusive with PSSA criteria; therefore, a sea area designated as a PSSA may also be designated as a special area under MARPOL 73/78 (IMO Resolution A.982(24), 2005).

In addition to these criteria, the sea area must be exposed to risks from international shipping activities (Sakib et al., 2021), a term that encompasses both the characteristics of vessel traffic and natural factors. When proposing a PSSA to the IMO, the state must provide adequate information about the environmental risks posed by international shipping, including documented evidence of potential threats to the marine environment, a history of accidental discharges from ships, stress from other environmental sources, and existing measures along with their actual or expected benefits (IMO Resolution A.982(24), 2005). This information is crucial for the IMO’s final decision regarding PSSA designation and the implementation of APMs.

However, evidence of threats from international shipping is not strictly mandatory for a PSSA proposal. According to paragraph 5 of Resolution A.982(24), the area ‘should’ be at risk from international shipping activities, which includes consideration of relevant factors’ (IMO Resolution A.982(24), 2005). If a sea area meets at least one criterion under paragraph 4, there is no strict obligation to demonstrate vulnerability to international shipping threats. Nevertheless, such evidence often plays a significant role in the IMO’s assessment of the need for PSSA designation. By submitting information on the risks posed by international shipping activities, a state may signal its intent to have a specific sea area designated as a PSSA (Kachel, 2008).

The criteria for designating a PSSA are also simpler and more flexible than those required for establishing special areas under MARPOL 73/78 (Choi, 2022). To gain special status under

TABLE 1 Examples of PSSAs with ecological significance and their associated protective measures (APMs).

Designated PSSAs	Year	APMs
Great Barrier Reef (Australia)	1990	- Compulsory pilotage (inner) - Recommended pilotage - Mandatory ship reporting system
Sabana-Camagüey Archipelago (Cuba)	1997	- MARPOL 73/78 Annex V special area - Area to be avoided - Traffic-separation schemes (TSSs)
Malpelo Island (Colombia)	2002	Area to be avoided
Florida Keys (United States)	2002	- Four areas to be avoided - Three mandatory no-anchoring areas
Paracas National Reserve (Peru)	2003	- Four recommended TSSs - Area to be avoided
Torres Strait (Australia and Papua New Guinea)	2005	- Recommended pilotage - Recommended two-way route - Mandatory ship reporting system
Canary Islands (Spain)	2005	- Five areas to be avoided - Three recommended TSSs - Mandatory ship reporting system
Galapagos Archipelago (Ecuador)	2005	- Mandatory ship reporting system - Mandatory TSSs - Area to be avoided
Papahānaumokuākea Marine National Monument (United States)	2007	- Mandatory ship reporting system - Area to be avoided
Saba Bank (Netherlands)	2012	- Mandatory no-anchoring areas - Area to be avoided
Coral Sea Extension	2015	- Ships' routing systems (SOLAS V) - Recommended two-way route
Jomard Entrance (Papua New Guinea)	2016	Recommended two-way route
Tubbataha Reefs Natural Park (Philippines)	2017	- Recommended pilotage - Area to be avoided

MARPOL 73/78, states must satisfy specific oceanographic and ecological criteria, and the area must exhibit unique vessel traffic characteristics (IMO Resolution A.927(22), 2001). In contrast, to designate an area as a PSSA, the IMO requires that a state meet at least one of the ecological, socio-economic, or scientific criteria. For special area designation under MARPOL 73/78, however, all criteria must be met. The streamlined approach to PSSA designation encourages states to take advantage of the PSSA regime.

3.1.3 Designation of PSSAs in ABNJ

There is uncertainty regarding the designation of PSSAs in ABNJ to mitigate vessel-source pollution. While Resolution A.982 (24) permits the designation of a state's territory as a PSSA beyond its territorial waters for implementing APMs against various vessel-source pollutant (IMO Resolution A.982(24), 2005), it does not explicitly clarify whether a state can propose a PSSA in ABNJ or the high seas to protect the marine environment and ecosystems. This leaves some ambiguity regarding the geographical scope of such designations.

Furthermore, the resolution states that a proposal for PSSA designation and the adoption of APMs can be submitted to the IMO

if states share a common interest in a specific sea area. Given that flag states have a common interest in the high seas, this could provide a basis for designating a PSSA in ABNJ that applies to vessels flying their flag, but not to foreign vessels. According to Articles 92(1) and 94 of UNCLOS, flag states have exclusive jurisdiction over ships flying their flag on the high seas. However, all states are generally obligated to protect and preserve the marine environment under Article 194 of UNCLOS (Beckman, 2015). While it may be theoretically possible for a state to propose a PSSA on the high seas, enforcing jurisdiction over foreign vessels could be challenging.

A representative example is the SARGADOM Project, which commenced on 1 September 2021. This project aims to contribute to the protection of biodiversity and ecosystem services while promoting a regional and international hybrid marine governance approach in two specific areas (SARGADOM, 2024). The Sargasso Sea, named after its golden Sargassum seaweed, is a two-million-square-mile marine ecosystem defined by the circulation currents of the North Atlantic Gyre. It serves as a migratory route for various species of sharks, rays, and whales but faces threats from shipping, fishing, plastic pollution, and climate change (SARGADOM, 2024).

The Thermal Dome, which spans the EEZs of several Central American countries and beyond, is characterized by trade winds and currents that cause deep, cool, nutrient-rich waters to rise to about 15 meters from the surface, forming a dome shape. Both the Sargasso Sea and the Thermal Dome illustrate the significance of high seas ecosystems and the challenges associated with their conservation due to the lack of jurisdictional authority. Through the SARGADOM Project, the Commission aims to implement the BBNJ initiative by utilizing ABMTs, including MPAs, and is considering the designation of a PSSA to prevent marine pollution from vessels (Roe et al., 2022).

As regions that highlight the diversity and importance of high seas ecosystems, the Sargasso Sea and the Thermal Dome face significant challenges from fishing, pollution, and climate change. However, because these areas lie beyond national jurisdiction, international cooperation is essential for their protection. If the Sargasso Sea and the Thermal Dome were designated as PSSAs by the IMO, they could become the first PSSAs established in ABNJ.

Although the PSSA resolution contains ambiguous provisions regarding the possibility of designation in ABNJ, the IMO has officially recognized PSSAs as ABMTs. However, no country has yet submitted a proposal specifically aimed at pollution control through PSSA designation. Furthermore, political support from IMO member states would be necessary to establish PSSAs in ABNJ. The proposal remains contentious, as the current PSSA resolution does not explicitly address the possibility of designating PSSAs. To resolve this issue, the IMO should clarify the geographical scope of PSSAs and specify the types of APMs that can be implemented to address pollution concerns.

3.2 Application of PSSA as an ABMT under the BBNJ agreement

3.2.1 Compatibility of the PSSA resolution with ABMTs under the BBNJ agreement

Article 5(2) of the BBNJ Agreement aims to bridge management gaps by fostering cooperation with existing legal frameworks, documents, and relevant bodies, without undermining their authority. This provision implies that the BBNJ Agreement acts as a comprehensive umbrella convention, guiding cooperation among existing bodies in a cohesive, top-down manner while respecting their roles. Effectively, it functions as a global mechanism that incorporates both global and regional approaches, allowing measures under the BBNJ framework to address gaps in actions established by other instruments, frameworks, and bodies. Furthermore, in areas where no relevant legal frameworks or bodies exist, the BBNJ Agreement grants authority to establish ABMTs and adopt related measures, thus extending its scope and authority.

3.2.2 The impact of PSSA designation in ABNJ on marine ecosystem as an ABMT

The PSSA designation offers the advantage of allowing tailored protective measures suited to the specific characteristics of a given

region. Given that most Special Areas are enclosed or semi-enclosed seas, PSSAs can allow for broader designation of marine areas as protected zones based on ecological or oceanographic factors. PSSA measures, approved by the IMO, are enforceable for vessels navigating these areas and often encompass a wider range of protective actions than those required for Special Areas, thereby enhancing their significance.

Ships are a primary source of marine pollution in ABNJ due to the extensive areas they operate across, unlike land-based sources of marine pollution (Kindt, 1984). Consequently, accidental or operational discharges on the high seas pose a significant threat to marine ecosystems, highlighting the need for robust regulatory standards and management frameworks (Prior et al., 2010). Establishing PSSAs in ABNJ can therefore play a crucial role in safeguarding marine ecosystems from ship-based pollution. In particular, implementing effective APMs within ABNJ-designated PSSAs could significantly enhance their impact. Potential APMs suitable for ABNJ include navigational measures that adopt a precautionary approach to preventing marine pollution. Measures such as speed reduction, Long-Range Identification and Tracking (LRIT), area avoidance, stricter discharge standards for pollutants, and regulations on underwater noise could significantly contribute to the protection of marine ecosystems in ABNJ.

3.3 Current challenges of PSSA Implementation as an ABMT under the BBNJ agreement

The question arises whether a PSSA qualifies as an ABMT under the BBNJ Agreement. Article 19(1) of the BBNJ Agreement stipulates that proposals must be submitted by parties, either individually or jointly, to the Secretariat. Furthermore, Article 19 (2) emphasizes the importance of cooperation and consultation with national, global, regional, subregional, and sectoral bodies during proposal development. This raises two key questions: Can only individual states submit ABMT applications, or can the IMO, as a recognized party, also initiate an application? It is posited that the IMO could indeed submit an ABMT application for a PSSA established in ABNJ under the BBNJ Agreement. As an active participant in the drafting of the BBNJ Agreement, the IMO explicitly affirmed the relevance of PSSAs as ABMTs in maritime contexts. Additionally, if needed, individual states could submit proposals following IMO approval.

A notable example illustrating jurisdictional challenges is the Sargasso Sea conservation project, which highlights conflicts with standards set by RFMOs and sheds light on the BBNJ-RFMO relationship (Freestone and Gjerde, 2016). The Sargasso Sea Project, aimed at protecting eels, was initiated in collaboration with relevant entities, including neighboring countries, the ISA, the IMO, and the International Commission for the Conservation of Atlantic Tunas (ICCAT). However, due to the lack of organizations experienced in protecting non-tuna species, collaboration with global and regional bodies faced delays (Freestone and Gjerde, 2016). ICCAT, in particular, hindered progress by not endorsing

fundamental standards for protected areas, such as precautionary measures and ecosystem-based approaches. According to an IUCN analysis, ICCAT lacks the necessary competence for eel conservation (Freestone and Gjerde, 2016). As no organization had assumed a leadership role initially, this situation cannot be fully described as competitive. RFMOs that are passive or opposed to establishing MPAs are unlikely to assert jurisdictional authority in cases of conflict with the BBNJ regarding MPA establishment.

For an RFMO to assert authority over MPA establishment, it must first develop clear regulations within its framework regarding the authority, responsibilities, and procedures for MPA establishment and must actively enforce these regulations. By contrast, the IMO is committed to minimizing and preventing pollution from ships—both accidental and intentional—as well as mitigating physical harm to marine habitats and species. Through detailed resolutions, the IMO addresses the procedural regulations for PSSAs. Accordingly, as a competent international organization under UNCLOS in matters of ship-source marine pollution, the IMO can be considered a leading sectoral body within the BBNJ framework (Freestone and Gjerde, 2016).

If regulatory content affecting the shipping sector is included in the UN BBNJ international document, the relationship with designation and identification procedures outlined in IMO conventions and resolutions must be carefully considered. Specifically, although information for PSSA designation is primarily provided by member states, the IMO retains final authority over the decision and designation. Consequently, the IMO appears eligible to serve as a proponent for ABMT designation applications under the BBNJ Agreement.

Second, procedural clarity is essential to determine whether a single party can obtain approval for an ABMT application in the form of a PSSA, or if only PSSAs approved by the IMO qualify for such applications. In this regard, prior IMO approval of a PSSA designation would be necessary for a party to have it recognized as an ABMT. As mentioned earlier, PSSA designation is a prerequisite for a party to apply APMs and enforce laws regarding flag-state vessels in ABNJ. This jurisdictional authority is grounded in the PSSA resolution and IMO norms. Although the processes for PSSA and ABMT designations under the BBNJ Agreement are procedurally distinct, improvements in aligning IMO PSSA procedures with the BBNJ ABMT framework could allow PSSAs to be granted ABMT status under the BBNJ Agreement.

4 The way forward: future recommendations

4.1 Need for revising the PSSA resolution

PSSAs operate within the framework of IMO regulations, relying on a resolution as their legal basis. The MEPC, which has final approval authority, can adopt and approve resolutions in the form of MEPC recommendations based on guidelines set forth in resolution (George, 2020). However, questions have persisted regarding the legally binding status of documents adopted by the

IMO MEPC resolutions under international law (George, 2020). The IMO Convention does not specify the legal standing of resolutions adopted by the IMO, and the PSSA resolution lacks explicit articulation of its legal foundation (Beckman, 2007). Without a strong link to UNCLOS, it remains uncertain if it constitutes a binding norm. Although debated as a guideline from the Assembly, the PSSA guidelines are internationally recognized standards approved by authoritative international bodies. Until the legal status of PSSAs as mandatory documents is clarified, their effectiveness will depend on the commitment of coastal states, leading to inherent limitations.

Additionally, there is a need to revise procedural aspects of the PSSA resolution. Specifically, the resolution defines PSSA scope as ‘within and beyond the limits of the territorial sea’ (Choi, 2022). For PSSAs to be considered ABMTs under the BBNJ Agreement, clear procedural criteria for establishing PSSAs in ABNJ are essential (George, 2020), as is a detailed outline of APMs applicable in ABNJ. Consequently, the current PSSA resolution should be amended to clarify its legal status and establish procedures for PSSA designation in ABNJ.

4.2 Need for independent IMO regulatory instruments

For the IMO’s PSSA to function effectively as an ABMT under the BBNJ Agreement, it is necessary to adopt a separate resolution to ensure compatibility with ABMT requirements under the BBNJ agreement. This resolution should build on revisions to the existing PSSA resolution. While assembly resolutions may not carry binding force, they hold significant persuasive value (Nam, 2021), influencing state practices by creating or expanding legal possibilities and proving effective during negotiation processes. Additionally, resolutions can establish legislative criteria, guide the interpretation and application of treaties, and clarify principles of international law.

Examples of such resolutions include IMO LEG/MISC.8, ‘Implications of the United Nations Convention on the Law of the Sea for the International Maritime Organization’ (2014), and IMO A.911(22), ‘Uniform Wording for Referencing IMO Instruments’ (2002).

Generally, IMO resolutions are non-binding and are primarily of a recommendatory nature (Nam, 2021). They do not create new international legal norms and cannot function as sources of international law. However, the lack of binding force does not diminish their legal significance. IMO resolutions are essential legal acts that member states are expected to respect. While typically advisory, some resolutions can acquire binding force equivalent to treaties if incorporated into legally binding agreements or explicitly designated as enforceable within treaty texts. Even resolutions not enforced by treaties are recognized as international minimum standards unless a member state’s domestic laws establish stricter standards.

Therefore, it is recommended that a new resolution be adopted to supplement the existing PSSA resolution, establishing procedural

criteria for implementing IMO PSSAs as ABMTs under the BBNJ Agreement. This new resolution should align authority, obligations, functions, and procedural requirements for PSSA designation with those of the ABMT framework under the BBNJ Agreement. Proposed guidelines titled ‘Guidelines for the Procedure of Establishing ABMTs for PSSAs under the BBNJ Agreement’, would designate the IMO as the leading authority for application processes, preliminary reviews, and information exchange in the international shipping sector for ABMT designation.

4.3 Strengthening enforcement jurisdiction in ABNJ

The effectiveness of PSSAs designated in ABNJ is compromised if effective and substantial APMs are not enforced. Additionally, if flag or port states do not actively exercise enforcement jurisdiction over APMs for their vessels or foreign vessels on the high seas, the value of PSSAs as regional protective measures is significantly reduced. Under UNCLOS, flag states traditionally maintain jurisdiction over vessel-source pollution on the high seas, suggesting that they have the authority to establish and enforce laws to prevent pollution from vessels registered under their flag (Qi and Zhang, 2021). Therefore, for PSSAs in ABNJ, flag states can apply APMs to their own vessels.

As previously mentioned, effective APMs to protect marine ecosystems in ABNJ include measures such as speed reductions, LRIT, route adjustments to avoid protected areas, enhanced discharge standards for pollutants, and underwater noise regulations. Flag states are responsible for ensuring that their vessels comply with these navigational measures (Qi and Zhang, 2021). However, the effectiveness of flag-state jurisdiction as a regulatory tool for preventing marine pollution is debatable. If a flag state fails to take action against pollution caused by its vessels, the enforcement of pollution prevention measures is compromised. UNCLOS assumes that flag states will enforce international rules on their flagged vessels, but despite numerous obligations, flag states may be reluctant to actively regulate violations by their own vessels.

To address enforcement jurisdiction for PSSAs in ABNJ, Article 218 of UNCLOS allows port states to exercise post-facto enforcement jurisdiction over vessels that cause marine pollution incidents outside the territorial sea and then voluntarily enter their ports (Bang, 2009). This provision enables port states to take legal action against foreign vessels responsible for pollution on the high seas, enhancing their authority in marine environmental protection. However, a challenge arises because the port state’s legal jurisdiction depends on the polluting vessel voluntarily enter its port. The port state cannot compel a vessel to enter from the high seas or exclusive economic zone, nor can it enforce legal proceedings until the vessel voluntarily ports (Bang, 2009).

Despite this limitation, port states can still exercise jurisdiction over pollution activities in ABNJ. For instance, LRIT can be an effective tool for monitoring ships in real-time that are involved in

illegal discharges on the high seas (Prior et al., 2010). When such vessels voluntarily enter port, LRIT data can serve as crucial evidence of marine pollution violations, enabling the port state to exercise enforcement jurisdiction. In this way, LRIT can support port states in enforcing regulations related to marine pollution in ABNJ.

5 Conclusion

Since the adoption of UNCLOS, discussions surrounding a new international maritime order that could redefine the long-standing principle of ‘freedom of the high seas’ have gained momentum. The increasing diversity of human activities and the intensity of usage in the high seas and deep seabed have led to critical issues such as marine pollution, overfishing, and the degradation of marine biodiversity, which are central to ongoing UN discussions on BBNJ agreement. In response, a third implementing agreement of UNCLOS focused on the conservation and sustainable use of marine biodiversity in the high seas has been developed.

Challenges arise from the fragmented and overlapping nature of marine governance, as various international organizations with different objectives and areas of focus contribute to complex regulatory landscapes. This fragmentation makes it challenging to coordinate ABMTs effectively and efficiently. As a result, the ongoing discourse on fragmented and overlapping international norms remains a significant topic in international environmental law.

This study analyzes the applicability and implementation of PSSAs as an ABMT within the BBNJ Agreement. It specifically addresses vessel-source pollution, a significant threat to marine ecosystems in ABNJ, and emphasizes the need for PSSAs as a legal tool to effectively prevent and mitigate this pollution. Therefore, the study explores whether PSSAs can be adopted or applied as ABMTs under the BBNJ Agreement and presents improvement measures to enhance their effective implementation.

First, this study confirms that the IMO can apply for the designation of ABMTs under the BBNJ Agreement. As the competent international organization under UNCLOS concerning ship-source marine pollution, the IMO is recognized as a sectoral authority with a leading role in the BBNJ Agreement. Specifically, the designation of PSSAs involves a process led by the IMO, where relevant information is provided, and the final authority for designation rests with the organization. However, procedural clarity is needed to determine whether a single party can apply for an ABMT in the form of a PSSA or if only PSSAs approved by the IMO are eligible for such applications. For a PSSA-based ABMT designation, prior recognition of the PSSA by the IMO is essential to enable the enforcement of APMs and related jurisdiction over flag state vessels in ABNJ. The designation processes for PSSAs and ABMTs under the BBNJ Agreement are procedurally distinct.

Second, a new resolution is needed to supplement the existing PSSA concept, establishing procedural criteria for implementing the IMO’s PSSA as ABMTs under the BBNJ Agreement. This resolution

should harmonize the powers, obligations, functions, and processes associated with PSSA designation to align effectively with ABMT implementation under the BBNJ Agreement. A proposed guideline, tentatively titled ‘Guidelines for the Procedure of Establishing ABMTs for PSSAs under the BBNJ Agreement’, should be developed. The IMO would lead the designation of ABMTs in the international shipping sector, including tasks such as proposal submission, preliminary review, and information exchange. The resolution should also address ambiguities in the current PSSA designation, which applies ‘within and beyond the limits of the territorial sea’. To grant PSSAs the status of ABMTs under the BBNJ Agreement, clear procedural standards for PSSA designation in ABNJ are essential.

Finally, even if a PSSA is designated in ABNJ, effective and robust APMs are critical. For PSSAs in ABNJ, flag states must enforce the adopted APMs for their vessels. Effective APMs to protect marine ecosystems in ABNJ may include speed reductions, LRIT, rerouting around protected areas, stricter pollution discharge standards, and regulating underwater noise. These APMs should be explicitly addressed in the revised PSSA resolution.

Overall, this study demonstrates the effectiveness of PSSAs as ABMTs to prevent ship-source marine pollution on the high seas, which constitute approximately two-thirds of the ocean’s surface, within the framework of the BBNJ Agreement—the first global multilateral treaty focused on protecting the marine environment and biodiversity. Furthermore, it contributes to establishing normative and procedural guidelines for the IMO to implement the BBNJ Agreement effectively, based on PSSAs.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material. Further inquiries can be directed to the corresponding authors.

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