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Establishing a coherent ABMTs network: how the BBNJ Agreement can foster cooperation with existing mechanisms from the perspective of institutional complementarity

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Establishing a coherent network of area-based management tools (ABMTs) in areas beyond national jurisdiction (ABNJ) is critical for the sustainable development of the ocean, which hinges on effective cooperation between the BBNJ Agreement and existing mechanisms. This paper introduces the concept of institutional complementarity as a novel perspective focused on synergistic potential, exploring pathways for such cooperation. It discusses significant gaps in complementarity between the BBNJ Agreement and existing mechanisms across three core dimensions: strategic objectives, operational rules and management practices, posing substantial challenges to effective cooperation. To address these challenges, this paper proposes stepwise pathways for strengthening institutional complementarity: coordinating objectives from dialogue to shared strategic plans, promoting rule compatibility from scientific guidelines to rule coordination, and enhancing management from collaborative capacity-building to joint actions.

KEYWORDS

ABMTs, ABNJ, BBNJ Agreement, marine biodiversity, sustainable development

1 Introduction

Global warming, marine pollution, overfishing, and other anthropogenic stressors have caused severe degradation of biodiversity of the ocean (Xue and Long, 2016; Halpern et al., 2019; O'Leary et al., 2020; IPCC, 2023).This degradation of biodiversity has already extended to areas beyond national jurisdiction (ABNJ) due to these transboundary stressors, posing a serious threat to the sustainable development of the global ocean (IUCN, 2022). Area-based management tools (ABMTs), including marine protected areas (MPAs), serving as important means to conserve and sustainably use marine biodiversity, are widely recognized as effective measures to mitigate the impacts of human activities and influences on the ocean (O'Leary et al., 2020). Research indicates that ABMTs, by maintaining ecosystems, can significantly enhance the ocean resilience and contribute to its sustainable development (Hopkins et al., 2016; Reimer et al., 2021; Gissi et al., 2022).Given that intact and healthy ecosystems generally exhibit greater resilience to anthropogenic stressors, it is particularly important to establish an inter-connected, coordinated, and well-protected network of ABMTs (Hopkins et al., 2016; Blasiak et al., 2020; O'Leary et al., 2020; Gissi et al., 2022).

The adoption of the Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (the BBNJ Agreement) provides a significant opportunity to establish such a coherent ABMTs network in ABNJ. This Agreement constructs a comprehensive global framework for ABMTs and explicitly incorporates strengthening ocean resilience into its objectives, marking a significant legal milestone.[1] Adopted on June 19, 2023, the BBNJ Agreement has met the conditions for entry into force and will officially take effect on January 17, 2026.[2].

However, it is important to note that the BBNJ Agreement will not operate in isolation. Instead, it will complement and integrate with the broader international legal framework that already governs marine biodiversity in ABNJ (ISA, 2024). The establishment of ABMTs is now scattered across various sectoral and regional mechanisms, each operating under its distinct mandates (Xu and Chen, 2025). Diverse forms of ABMTs under these mechanisms are tailored to specific goals and standards (Miao and Chen, 2025). Their efforts are constrained by industry objectives and geographical scope, resulting in a governance patchwork that fails to achieve the comprehensive, ecosystem-based management required to address the stressors. In this context, the BBNJ Agreement can leverage its global framework to collaborate with existing mechanisms and advance the development of a coherent ABMTs network in order to strengthen the ocean resilience. Effective cooperation between the BBNJ Agreement and these existing mechanisms is therefore a critical issue.

Recent studies have explored the cooperation between the BBNJ Agreement and specific mechanisms regarding ABMTs (Wang and Zhang, 2024; Lothian, 2025; Tian and Guo, 2025; Willaert and Soete, 2025; Xu and Chen, 2025; Currie and Müller, 2025). These studies primarily focus on the coordination and balance of mandates of the BBNJ Agreement and existing mechanisms. Essentially, they discuss the reactive cooperation to address jurisdictional overlaps and potential conflicts. While foundational, this mandate-focused perspective simplifies the complex and dynamic interactions required for a coherent ABMTs network to a static allocation of mandates. This paper introduces the concept of institutional complementarity - shifting the analytical focus from mere mandate coordination to synergistic potential - offering a more constructive perspective to explore the intricate interactions between the BBNJ Agreement and existing mechanisms. The concept of institutional complementarity suggests that when institutions are complementary, they can form a combined force and enhance institutional performance, thereby creating synergy effects (Amable, 2000; Aoki, 2001; Ahlering and Deakin, 2007). Drawing on this theoretical insight, this paper argues that the key to effective cooperation lies in constructing institutional complementarity between the BBNJ Agreement and existing mechanisms, thereby stimulating synergy effects and forming a collaborative governance force.

Following the introduction, Section 2 provides a comprehensive overview of the international legal landscape for ABMTs, clarifying the groundwork for cooperation. Section 3 elaborates on the concept of institutional complementarity and demonstrates its relevance to this study. Section 4 diagnoses complementarity gaps between the BBNJ Agreement and existing mechanisms, thereby revealing the challenges to effective cooperation. Section 5 proposes targeted pathways for constructing and enhancing institutional complementarity to overcome barriers and unlock synergistic potential. Finally, Section 6 concludes.

2 The international legal landscape for ABMTs

The international legal framework governing ABMTs in ABNJ is a complex and fragmented patchwork, composed of diverse sectoral and regional mechanisms with established mandates and practices. The BBNJ Agreement provides a global framework of ABMTs and fills the gaps in existing mechanisms. This section analyzes the international legal landscape for ABMTs, understanding the groundwork for cooperation.

2.1 The existing mechanisms regulating ABMTs

As the core legal framework of the modern law of the sea, the United Nations Convention on the Law of the Sea (UNCLOS) lays the legal foundation for establishing ABMTs. Article 192 of UNCLOS stresses the general obligation of States to "protect and preserve the marine environment", which applies to all marine areas, including ABNJ (Scovazzi, 2004). Specifically, Article 194(5) requires States to take necessary measures 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". In *the Chagos Marine Protected Areas Arbitral Award*, the Arbitral Tribunal affirmed that MPAs are such measures in Article 194 (5).[3] However, UNCLOS

1 The BBNJ Agreement, Article 17.

2 See UNTC website of Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (New York, 19 June 2023). Available online at: https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXI-10&chapter=21&clang=_en (Accessed 21 November 2025).

3 Permanent Court of Arbitration, Award in the Arbitration regarding the Chagos Marine Protected Area between Mauritius and the United Kingdom of Great Britain and Northern Ireland, 18 March 2015, para. 538. "Article 194 is accordingly not limited to measures aimed strictly at controlling pollution and extends to measures focused primarily on conservation and the preservation of ecosystems. As repeatedly justified by the United Kingdom, the MPA is such a measure." Available online at: https://legal.un.org/riaa/cases/vol_XXXI/359-606.pdf (Accessed 21 November 2025).

contains no specific provisions for ABMTs and therefore cannot be directly applied to the implementation of ABMTs.

Based on this fundamental obligation of marine environmental protection, various mechanisms have established diverse types of ABMTs under their respective mandates (see Table 1), tailored to their specific objectives and standards. These mechanisms indicate a fragmented approach to implementing ABMTs (Tang et al., 2021), which can be broadly categorized into sectoral and regional.

The International Seabed Authority (ISA), established under UNCLOS, is the competent organization for managing "the Area" and its resources. Protecting the environment of "the Area" from potential harmful effects of mining activities is the core responsibility of ISA. In the particular region of the Clarion-Clipperton Zone, ISA has designated Areas of Particular Environmental Interest (APEIs) to mitigate the environmental impact of mining activities, thereby protecting the environment and promoting the sustainable development of deep seabed mining (ISA, 2011).

Other sectoral mechanisms also establish different types of ABMTs to manage and control certain activities in designated areas. The International Maritime Organization (IMO), a specialized agency under the United Nations, is responsible for ensuring the safety and security of maritime navigation, as well as prevention and control of marine pollution from ships.[4] On one hand, IMO establishes Special Areas to protect the enclosed and semi-closed seas by imposing stringent controls on operational discharges (Ünlü, 2004), such as, oil, noxious liquid substances, sewage and garbage from ships.[5] On the other hand, IMO designates marine areas as Particularly Sensitive Sea Areas (PSSAs) to provide special protection due to their ecological, socio-economic, or scientific significance and their potential vulnerability to damage from international maritime activities (Roberts, 2024). Shipping activities are not prohibited in PSSAs. Instead, specific measures, such as routing systems and the stringent application of discharge and equipment standards, can be employed to regulate maritime activities.[6] Likewise, International Whaling Commission (IWC), established under the International Convention for the Regulation of Whaling (ICRW), focuses on conservation of whale stocks and management of whaling activities. IWC oversees the global whaling activities and the protection of whales. It establishes whale sanctuaries to prohibit commercial whaling.[7]

TABLE 1 Existing mechanisms and established ABMTs.

Existing mechanisms	ABMTs	Description
ISA	APEIs	13 APEIs in Clarion-Clipperton Zone
IMO	Special Areas PSSAs	Mediterranean and Antarctic Special Areas cover ABNJ No PSSAs in ABNJ
IWC	Whale sanctuary	the Indian Ocean Sanctuary the Southern Ocean Sanctuary
RFMOs	Fisheries closures for protecting VMEs	8 RFMOs have established areas closed to bottom fishing to protect known or likely VMEs and other measures that will provide protection from fisheries impacts on VMEs
Barcelona Convention	MPAs	Pelagos Sanctuary
OSPAR Convention	MPAs	8 MPAs in ABNJ
CAMLR Convention	MPAs	The South Orkney Islands Southern Shelf Marine Protected Area The Ross Sea Region Marine Protected Area

In addition, Regional Fisheries Management Organizations (RFMOs) specialize in managing specific fishery resources. RFMOs operate within the context established by the UNCLOS, the United Nations Fish Stocks Agreement (UNFSA), and legal documents adopted under the Food and Agriculture Organization of the United Nations (FAO) (Ardron et al., 2014). Currently, eight RFMOs with authority over fishing activities in ABNJ have established fisheries closures in their respective management areas to protect known or potential Vulnerable Marine Ecosystems (VMEs) (Thompson and Reid, 2024). These RFMOs include the General Fisheries Commission for the Mediterranean (GFCM), the North East Atlantic Fisheries Commission (NEAFC), Northwest Atlantic Fisheries Organization (NAFO), the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), [8] the South East Atlantic Fisheries Organization (SEAFO), the North Pacific Fisheries Commission (NPFC), the Southern Indian Ocean Fisheries Agreement (SIOFA), the South Pacific Regional Fisheries Management Organization (SPRFMO).

These sectoral mechanisms function independently, each focusing on specific activities. The ABMTs established and managed under these mechanisms also concentrate on particular tasks, with less consideration given to other critical factors. For example, the fisheries closures implemented by RFMOs concentrate exclusively on commercial fish stocks, specifically targeted fish populations within their jurisdictions, [9] without addressing the growing concerns on marine ecosystems (Tang et al., 2021). Within the CCAMLR area, for instance, fisheries currently target Patagonian toothfish, Antarctic toothfish, mackerel icefish, and Antarctic krill. This narrow focus leads to RFMOs protecting only

4 See Brief History of IMO. Available online at: https://www.imo.org/en/About/HistoryOfIMO/Pages/Default.aspx (Accessed 21 November 2025).

5 See Special Areas under MARPOL. Available online at: https://www.imo.org/en/OurWork/Environment/Pages/Special-Areas-Marpol.aspx (Accessed 21 November 2025).

6 PSSAs are applicable in ABNJ, but currently designated PSSAs are all within national jurisdictions. See the adopted PSSAs. Available online at: https://www.imo.org/en/ourwork/environment/pages/pssas.aspx (Accessed 21 November 2025).

7 See the Whale Sanctuaries. Available online at: https://iwc.int/management-and-conservation/sanctuaries (Accessed 21 November 2025).

8 CCAMLR's mandate extends beyond fisheries management, suggesting that it is more than a general RFMO.

9 According to the UNCLOS and the UN Fish Stocks Agreement, RFMOs manage "straddling fish stocks and highly migratory fish stocks". Non-commercial fish stocks such as discrete high seas stocks fall outside their management scope.

5% of fishery resources beyond national jurisdiction, leaving 95% of fish biodiversity inadequately protected.[10] Another example is the ISA's APEIs, which are primarily designed to mitigate the environmental impacts of deep-sea mining activities, aiming to protect the environment while promoting seabed mineral resource development (ISA, 2011). This demonstrates that existing sectoral mechanisms fail to address cross-sectoral and systemic impacts on the ocean.

Unlike managing specific activities, the regional mechanisms prioritize the conservation of marine ecosystems, establishing cross-sectoral MPAs. In the Mediterranean sea, a legal system for MPAs is formed under the Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention) and its Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol). Under this system, France, Italy, and Morocco established the first MPA encompassing high seas, the Pelagos Sanctuary, to protect marine mammals in the region (Notarbartolo di Sciara and Agardy, 2016; Tani, 2023). Additionally, OSPAR Commission and CCAMLR have established MPAs within their respective geographic areas (Smith and Jabour, 2018), based on the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention)[11] and the Convention for the Conservation of Antarctic Marine Living Resources (CAMLR Convention), as well as their respective normative frameworks. The regional characteristics of these mechanisms confine them to specific geographic areas and bind only their parties (Tang et al., 2021). Their scope is limited to avoid overlaps with other treaties. For example, OSPAR Commission leaves fisheries management to the NEAFC and shipping management to IMO. CCAMLR specifically excludes the management of whales and seals, which are the subject of the ICRW and the Convention for the Conservation of Antarctic Seals (Rochette et al., 2014).

While specialized efforts have their merits, such a fragmented approach of existing mechanisms can hardly adopt a global perspective and focus on the integrity of marine ecosystems to address cross-sectoral and transboundary threats.

2.2 The global framework for ABMTs of the BBNJ Agreement

In response to the inadequacy of existing mechanisms, the BBNJ Agreement provides a global framework for the implementation of ABMTs, committing to "a comprehensive system of area-based management tools, with ecologically representative and well-connected networks of marine protected areas".[12] The comprehensive framework of the BBNJ Agreement can become the key pivot for establishing a coherent ABMTs network in ABNJ.

The BBNJ Agreement defines ABMTs as cross-sectoral conservation tools, stating that an ABMT is "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".[13] This term of ABMTs in the BBNJ Agreement serves as a broad category encompassing all relevant measures, enabling the establishment of ABMTs across all sectors of human activities in ABNJ (Lucia, 2024).

Furthermore, the BBNJ Agreement provides a comprehensive procedure for implementing globally recognized ABMTs across the vast ABNJ. The procedure comprises multiple stages, covering proposal submission (Article 19), publicity and preliminary review (Article 20), consultations and assessments (Article 21), establishment of ABMTs (Article 22), decision-making (Article 23), implementation (Article 25), monitoring and review (Article 26), and emergency measures (Article 24) in exceptional cases. Internal bodies such as the Conference of the Parties (COP), the Scientific and Technical Body (STB), and the Secretariat are established to facilitate these processes (Miao and Chen, 2025).

The procedure commences with a proposal submitted by the Parties to the BBNJ Agreement, individually or collectively, to the Secretariat.[14] The Secretariat then shall make the proposal publicly available and transmit it to the STB for a preliminary review to ascertain that the proposal contains all the required information.[15] Following the preliminary review, the Secretariat shall notify the Parties and make that preliminary-reviewed proposal publicly available and facilitate consultations. These public consultations are open to all relevant stakeholders, including States, legal instruments and frameworks and relevant global, regional, subregional and sectoral bodies (IFBs), civil society, the scientific community, Indigenous Peoples and local communities (IPLCs). The proponent shall consider the contributions received during the consultations, and views of and information from the STB to revise the proposal. Then, the revised proposal shall be submitted to the STB, which shall assess the proposal and make recommendations to the COP.[16] The COP shall consider the final proposal and contributions received during consultations and scientific inputs from the STB to make a decision on establishment of ABMTs.[17] Apart from this general procedure for establishing ABMTs, the BBNJ Agreement includes a simplified procedure for temporary measures on an emergency basis, "when a natural phenomenon or

10 See the Pew Trust website, High Seas Treaty Must Reflect Critical Role of Fish in Marine Ecosystems. Available online at: https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2022/03/high-seas-treaty-must-reflect-critical-role-of-fish-in-marine-ecosystems (Accessed 21 November 2025).

11 There are 8 OSPAR MPAs established in ABNJ. See Report and Assessment of the Status of the OSPAR Network of Marine Protected Areas in 2023. Available online at: https://oap-cloudfront.ospar.org/media/filer_public/e9/33/e933f456-6dce-456e-8e61-6daee3a95e94/p01052_mpa_report_2023.pdf (Accessed 21 November 2025).

12 BBNJ Agreement, Article 17(a).

13 BBNJ Agreement, Article 1(1).

14 BBNJ Agreement, Article 19.

15 BBNJ Agreement, Article 20.

16 BBNJ Agreement, Article 21.

17 BBNJ Agreement, Article 22.

human-caused disaster has caused, or is likely to cause, serious or irreversible harm".[18] Upon the COP's decision to establish ABMTs, the Parties assume the responsibility to comply with the adopted ABMTs and related measures by governing activities under their jurisdiction or control. Furthermore, the Parties shall, individually or collectively, report to the COP on the implementation of the adopted ABMTs and related measures. The STB assumes the responsibility to monitor and review the adopted ABMTs and related measures periodically, in order to provide advice and recommendations to the COP. The STB's advice assists the COP in deciding or recommending on the amendment, extension or revocation of ABMTs.

The characteristic of this set of procedure is the potential for a centralized forum to facilitate extensive participation and collaboration among diverse stakeholders in establishing ABMTs, thereby filling gaps in existing mechanisms and enhancing the coherence of ABMTs governance.

More importantly, the BBNJ Agreement emphasizes addressing the biodiversity degradation caused by transboundary stressors, such as climate change impacts, ocean acidification and marine pollution. [19] The Agreement explicitly lists strengthening resilience to these stressors as an objective of ABMTs.[20] When identifying areas for protection, the indicative criteria place particular emphasis on the "vulnerability" of ecosystems, including their susceptibility to climate change and ocean acidification.[21] Moreover, it outlines the approach aimed at building ecosystem resilience to adverse effects of climate change and ocean acidification, while also maintaining and restoring ecosystem integrity, including the carbon cycling services that underpin the role of the ocean in climate.[22] This highlights a strong commitment to strengthening ocean resilience.

2.3 Demand for cooperation with existing mechanisms on ABMTs

The BBNJ Agreement introduces a new holistic approach for implementing ABMTs. Once the BBNJ Agreement comes into effect, it will coexist with existing mechanisms without a hierarchical relationship. The BBNJ Agreement highlights a critical demand for cooperation and coordination to prevent normative conflict and operational duplication.

As the cornerstone for cooperation, the BBNJ Agreement proposes the principle of "not undermining" for integrating with existing mechanisms. Article 5(2) of the Agreement establishes this principle and emphasizes the importance of international cooperation. It stipulates that "this Agreement shall be interpreted and applied in a manner that does not undermine relevant legal instruments and frameworks and relevant global, regional, subregional and sectoral bodies and that promotes coherence and coordination with those instruments, frameworks and bodies."

Meanwhile, the mandate of the COP indicates that the BBNJ Agreement is designed as a supplement to existing mechanisms, which is categorized into three distinct scenarios when establishing ABMTs.[23] Article 22(1)(a) stipulates that the COP "shall take decisions on the establishment of area-based management tools, including marine protected areas, and related measures", affirming that the COP possesses the mandate to establish ABMTs and implement related measures. Article 22(1)(b) stipulates that the COP "may take decisions on measures compatible with those adopted by relevant legal instruments and frameworks and relevant global, regional, subregional and sectoral bodies, in cooperation and coordination with those instruments, frameworks and bodies". The prerequisite for the application of this sub-paragraph is that the IFBs have established ABMTs and adopted relevant measures. Under this circumstance, the COP has the mandate to decide on measures that are compatible with such ABMTs and related measures. Article 22(1)(c) stipulates that the COP "may, where proposed measures are within the competences of other global, regional, subregional or sectoral bodies, make recommendations to Parties to this Agreement and to global, regional, subregional and sectoral bodies to promote the adoption of relevant measures through such instruments, frameworks and bodies, in accordance with their respective mandates". This applies when the proposed ABMTs and related measures fall within the mandate of the IFBs, and the COP can only provide non-binding recommendations, but does not possess the authority to take decisions. Such a design of mandates further requires the BBNJ Agreement to collaborate with IFBs.

Furthermore, the BBNJ Agreement outlines the way forward for cooperation with IFBs. Article 22(3) authorizes the COP to make arrangements for regular consultations to enhance cooperation and coordination with and among IFBs with regard to ABMTs. This provision requires the COP to function as an "organizer" or "initiator", providing a regular platform for cooperation at three levels: first, cooperation between the COP to the BBNJ Agreement and the IFBs; second, cooperation between the IFBs; and third, coordination of relevant measures adopted by the IFBs (Tang and Wang, 2023). Additionally, Article 22(4) addresses coordination with established ABMTs, stipulating that the COP may consider and decide, as appropriate, to develop a mechanism regarding existing ABMTs adopted by IFBs, which may improve the connectivity of ABMTs (Duan, 2024).

However, these clauses remain controversial and subject to uncertain enforcement, making it difficult to find directly actionable cooperation paths within current legal frameworks.

The most critical controversy centers on the interpretation of "not undermine". Although delegates during the BBNJ negotiations accepted the phrase, they failed to reach a consensus on its meaning (Lucia, 2024). This remained an open question even after the

18 According to Article 24 (5), "Procedures and guidance for the establishment of emergency measures, including consultation procedures, shall be elaborated by the Scientific and Technical Body, as necessary, for consideration and adoption by the Conference of the Parties at its earliest opportunity."

19 BBNJ Agreement, preamble.

20 BBNJ Agreement, Article 17.

21 BBNJ Agreement, Annex I.

22 BBNJ Agreement, Article 7.

23 BBNJ Agreement, Article 22(1).

adoption of the BBNJ Agreement (Tiller et al., 2023). There is no disagreement on the literal definition of "undermine", namely, "to make someone less confident, less powerful, or less likely to succeed, or to make something weaker, often gradually."[24] The primary divergence lies in the different interpretations of the object of "not undermine". Some scholars suggest that the "not undermine" in the BBNJ Agreement should draw from the "not undermine" in Article 7 of the UNFSA, meaning it should not weaken or diminish the effectiveness of IFBs (Gjerde et al., 2019; Klerk, 2023). However, others argue that referencing the interpretation of "not undermine" from UNFSA might affect the authority of IFBs and should instead be interpreted as not weakening the mandate of IFBs (Scanlon, 2018; Kim, 2024). Meanwhile, some scholars point out that there is no necessity for a binary choice between the interpretations of "not undermine" with respect to ABMTs (Duan, 2024; Xu and Chen, 2025). Article 22(2) is a reiteration of the "not undermine" provision in Part III, stating that "in taking decisions under this article, the Conference of the Parties shall respect the competences of, and not undermine, relevant legal instruments and frameworks and relevant global, regional, subregional and sectoral bodies." The terms "respect the competences of" and "not undermine" appear simultaneously in this provision. The combination phrasing suggests that the BBNJ Agreement does not prejudice or affect the competence of the IFBs (Duan, 2024). Varying interpretations of "not undermine" would consequently not result in differences in the ultimate understanding of Article 22(2) (Xu and Chen, 2025).

However, the debate concerning the meaning and implications of "not undermine" is directly linked to broader disagreements regarding regional versus global governance and the utility and desirability of international law (Mendenhall et al., 2019). States hold varying perspectives on the authorities and relationship of the BBNJ Agreement to other mechanisms (Clark, 2020). Those supporting a strong global-level BBNJ Agreement may adopt "not undermine" effectiveness of IFBs, while those favoring existing mechanisms may choose "not undermine" mandates. This creates a misalignment of intentions from the outset for cooperation.

Additionally, the design of the BBNJ COP's mandates poses a risk of impeding cooperation. Those provisions implicitly suggest that the COP of the BBNJ Agreement holds the authority to define the mandates of IFBs, as well as to assess whether the ABMTs of IFBs meet the needs for marine conservation. It could, in practice, enable the Agreement to exert either direct or indirect influence on existing mechanisms (Tang, 2024). However, the existing mechanisms view the BBNJ Agreement as a supportive framework, rather than an overriding authority. They support collaboration on the basis of fully respecting their mandates and autonomy. For example, IMO pointed out that it has established a comprehensive regime for international shipping, ensuring safety of navigation and protecting the marine environment, including several options for ABMTs, and thus opposed the designation of ABMTs within its mandate by another decision-making body.[25] Similarly, the ISA expressed a positive willingness to establish "a stable and productive relationship" with the COP of the BBNJ Agreement, and offers full cooperation, technical expertise and experience to implement the Agreement with full respect for the rights and obligations of States as outlined in Part XI of UNCLOS and the 1994 Agreement, particularly concerning the Area and its resources (UNGA, 2023). Such an arrangement contradicts the cooperation condition promoted by existing mechanisms.

More importantly, developing mechanisms for cooperation is another difficult task. Article 22 (3) of the Agreement only provides "what to do" and "who will do it, " leaving a gap in the question of "how to do it." Article 22(4) presents only a vague directional goal and does not specify the precise content and form of the mechanism that "may" be considered to establish. The challenges in designing such mechanisms should not be underestimated. Regular consultation arrangements would involve a series of complex issues, including participation scale, practical arrangements, efficiency, funding, and more. The sheer number of existing mechanisms is staggering—for instance, there are already eight RFMOs concerning ABMTs in ABNJ. How can the COP schedule consultations with the numerous IFBs? How should consultation timing be determined? What topics and issues should the consultations cover? What legal effect would the outcomes of these consultations have? What form should the consultations take? These and many other critical questions remain unanswered. When diving into these details, it is inevitable that many divergences will arise. Therefore, the practical steps for effective cooperation are still up for debate (ISA, 2024).

3 Institutional complementarity and its applicability

The concept of institutional complementarity originated in economics, and has since been adopted and further developed in a range of disciplines, including management, sociology, political science, and law (Gagliardi, 2021). Institutional complementarity refers to the interdependence among institutions, often employed to explain the observed degree of institutional diversity and its impact on certain outcomes (Landini and Pagano, 2023). Scholars have offered diverse interpretations of the concept from different theoretical perspectives. Hall and Soskice hold that institutional complementarity arises when the presence or effectiveness of one institution enhances the efficiency of another (Hall and Soskice, 2001). Milgrom and Roberts understand complementarity as the mutual reinforcement of institutional arrangements that are functionally aligned, enabling synergistic effects and coordinated development (Milgrom and Roberts, 1995). Tarabar and Pantuosco see it as the capacity of non-exclusive institutional arrangements to

24 See Cambridge Dictionary. Available online at: https://dictionary.cambridge.org/dictionary/english/undermine (Accessed 21 November 2025).

25 See the website of IMO, "IMO will play an important role in the implementation of the BBNJ Agreement and that the new instrument will not negatively impact IMO's existing mandate and framework." Available online at: https://www.imo.org/en/ourwork/legal/pages/unitednationsconventiononthelawofthesea.aspx (Accessed 21 November 2025).

mutually create enabling conditions and advance shared objectives (Tarabar and Pantuosco, 2023). In sum, institutional complementarity reflects a reciprocal and systemic form of institutional interdependence—where institutions not only coexist but also reinforce one another in a mutually beneficial manner.

The BBNJ Agreement and existing mechanisms constitute a typical institutional complex—a system composed of multiple interconnected institutions. The concept of institutional complementarity is well-suited for analyzing such multi-institutional interactions. Current research on the cooperation between the BBNJ Agreement and existing mechanisms has predominantly focused on institutional overlap, emphasizing how to delineate mandates and avoid potential conflicts. By contrast, the introduction of institutional complementarity shifts the analytical lens from "coordination and balance" to "mutual reinforcement." It emphasizes the construction of synergistic relationships, directly addressing the core practical question of "how to achieve effective cooperation." This paper applies the concept of institutional complementarity to diagnose the challenges in cooperation between the BBNJ Agreement and existing mechanisms, while also offering a directional guide for designing effective solutions.

4 Cooperation challenges: an institutional complementarity perspective

This section applies institutional complementarity as an analytical lens to diagnose the interaction between the BBNJ Agreement and existing mechanisms in establishing ABMTs. It finds that the BBNJ Agreement and existing mechanisms have significant gaps in complementarity across three major dimensions—strategic objectives, operational rules, and management—preventing them from achieving synergy, and thereby posing substantial challenges to effective cooperation.

4.1 Conflicts over strategic objectives

The alignment of objectives is the key foundation for cooperation between the BBNJ Agreement and existing mechanisms. However, significant differences exist in their strategic objectives for establishing ABMTs. The objective of the BBNJ Agreement is to protect and sustain the biological diversity and ecosystems of ABNJ as a whole, emphasizing ecosystem resilience. In contrast, existing mechanisms focus on sectoral-specific or regionally targeted objectives, rather than broader marine ecosystem conservation.

The differences in strategic objectives between the BBNJ Agreement and sectoral mechanisms reflects the deep-seated divergences in value prioritization. Such divergences weaken or even disrupt their potential complementarity, potentially escalating into substantive conflicts in practice. For example, the primary goal of fisheries closures established by RFMOs is to maintain the productivity of target species, ensure the long-term sustainable use of fishery resources (Tian and Guo, 2025). In the case of Antarctic MPAs, their design and management primarily aim to regulate fishing activities to preserve the sustainability of Southern Ocean fisheries (Haward, 2021). ISA, on the other hand, carries a dual mission of resource exploitation and environmental protection. Its designation of APEIs, which are closed to any mining activities, fundamentally aims to mitigate the adverse environmental impacts of deep-sea mining and promote long-term exploitation of seabed mineral resource (Friedman, 2024). This reflects a logic centered on managing environmental risks during exploitation, rather than prioritizing ecosystem protection. Similarly, IMO designates Special Areas and PSSA to regulate rather than prohibit shipping activities. By implementing special navigation rules or discharge restrictions, it seeks to minimize the environmental impact of shipping on specific sensitive areas (Saiful Karim, 2015). Its core objective is to balance navigation safety, efficiency, and environmental protection, with the priority of supporting shipping activities.

Given the BBNJ Agreement's comprehensive objectives and broad applicability, the ABMTs established under its framework—aimed at strictly maintaining ecological resilience—are likely to overlap spatially with areas under the jurisdiction of the ISA, IMO, or RFMOs, creating direct conflicts in the regulation of human activities. These value-driven divergences will make it difficult for the BBNJ Agreement and existing mechanisms to reach strategic consensus, instead easily trapping them in a zero-sum narrative of protection versus utilization, fundamentally eroding the foundation for achieving synergies.

In addition, the BBNJ Agreement and regional mechanisms face coordination challenges in their strategic objectives as well. The practice of the OSPAR Commission offers a cautionary lesson. Although the OSPAR Commission and the NEAFC successfully concluded a "Collective Arrangement between competent international organizations on cooperation and coordination regarding selected areas in areas beyond national jurisdiction in the North-East Atlantic" (Collective Arrangement) in 2014—aimed at fostering multilateral dialogue and cooperation in the North-East Atlantic—other key organizations such as ISA, IMO, and ICCAT have not joined.[26] This contrast highlights the fundamental differences in strategic demands between regional and global mechanisms. The OSPAR Commission and the NEAFC were able to smoothly sign this collective agreement because both are regional mechanisms focused on the Northeast Atlantic, with highly overlapping member States, long-term sharing of scientific advice from the International Council for the Exploration of the Sea, and clear functional boundaries (Hey, 2022). However, for global mechanisms like ISA and IMO, they may see limited incentive to join a regional arrangement that does not align with their worldwide mandates and could impose additional operational constraints (Tang et al., 2021). Therefore, even though regional mechanisms, such as the OSPAR Commission, and the BBNJ Agreement both focus on marine ecosystems, they may still clash

26 OSPAR/NEAFC Collective Arrangement, Available online at https://www.neafc.org/collective-arrangement, (Accessed 21 November 2025).

over specific geographical priorities, resource allocation, and political focus.

4.2 Incompatibility of rules regulating ABMTs

Complementarity among rules can effectively reduce compliance costs and promote cooperation. However, each existing mechanism follows its corresponding legal frameworks to establish ABMTs, operating independently and in parallel with the BBNJ Agreement. More importantly, it shows significant differences in rule formulation across the BBNJ Agreement and the rules regulating ABMTs under existing mechanisms. They lack an inherent connection of mutual reinforcement in key content, reflecting a profound absence of rule compatibility.

The existing mechanisms have established diverse and self-contained regulatory frameworks for ABMTs. The sectoral mechanisms operate under by a wide range of regulatory systems. For example, ISA is empowered to adopt appropriate rules, regulations and procedures for necessary measures.[27] These normative documents serve as the rules for establishing ABMTs by ISA. ISA establishes ABMTs through adopting Regional Environmental Management Plans (REMPs) (Christiansen et al., 2022). REMPs provide the comprehensive guidelines for regulating mining activities and managing environmental risks within a specific region, including the formulation of objectives, principles, and management measures (ISA, 2011). IMO follows International Convention for the Prevention of Pollution from Ships (MARPOL Convention) to establish Special Areas where ship discharges are controlled. While the PSSAs are designated under IMO's resolution, in specific, the "Revised Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas" (Wang and Zhang, 2024).[28] The IWC follows the ICRW to designate "open and closed waters, including the designation of sanctuary areas" to protect whale populations.[29] The FAO has developed "The FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas" as globally non-binding guidelines, providing standards, assessments, and measures for RFMOs to protect Vulnerable Marine Ecosystems (VMEs) from the impacts of fishing. [30].

Regional mechanisms base on regional conventions. The CAMLR Convention requires science-based conservation measures for the conservation of Antarctic marine living resources, including "the designation of the opening and closing of areas, regions or sub-regions for purposes of scientific study or conservation, including special areas for protection and scientific study."[31] The OSPAR Convention provides Annex V—"On the protection and conservation of the ecosystems and biological diversity of the maritime area" to authorize "means, consistent with international law, for instituting protective, conservation, restorative or precautionary measures related to specific areas or sites or related to particular species or habitats". [32] Notably, a comprehensive set of rules has developed under the OSPAR Convention. There are binding "decisions, " and non-binding "recommendations" and "agreements, " forming an internal rule system for MPAs' establishment and management. Specifically, the OSPAR Commission uses "recommendations" as a direct basis for establishing MPAs in ABNJ and "agreements" as guiding documents to support contracting parties in establishing and managing the OSPAR MPA network.[33] For example, the OSPAR Commission adopted OSPAR Recommendation 2010/2 as the regulatory framework to provide fundamental elements for establishing MPAs in ABNJ, [34] and "the General consultation procedures for establishing Marine Protected Areas in Areas Beyond National Jurisdiction of the OSPAR Maritime Area (OSPAR Agreement 2019-09)", [35] which outlines consultation issues and procedures for proposals to establish MPAs in ABNJ. When establishing MPAs, the OSPAR Commission uses "decisions" to establish specific MPAs and "recommendations" as management plans for these MPAs. Take the first OSPAR MPA in ABNJ as an example: OSPAR Decision 2010/1 establishes the Milne Seamount Complex Marine Protected Area, [36] while OSPAR Recommendation 2010/12 serves as its management plan.[37].

A key issue lies in the fact that the establishment criteria, scientific basis, management measures, and objectives of existing mechanisms for ABMTs were shaped under the framework of their respective treaty mandates and sectoral interests.

This parallelism in regulatory frameworks reflects the diversity of governance, but the absence of complementarity increases the risk of regulatory conflicts and coordination failures. Taking ISA's

27 UNCLOS, Article 145.

28 IMO. Revised Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas (A 24/Res.982). Available online at: https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/A24-Res.982.pdf (Accessed 21 November 2025).

29 ICRW, Article V 1(c).

30 FAO. International Guidelines for the Management of Deep-sea Fisheries in the High Seas (2008). Available online at: https://openknowledge.fao.org/server/api/core/bitstreams/224f4e53-0c34-4680-ad61-18e497763954/content (Accessed 21 November 2025).

31 CAMLR Convention, Article 9.

32 OSPAR Convention, Annex V, Article 3(1)(b)(ii).

33 See the website of OSPAR Commission. Available online at: https://www.ospar.org/work-areas/bdc/marine-protected-areas/guidance-for-the-development-and-management-of-the-ospar-network (Accessed 21 November 2025).

34 OSPAR Recommendation 2003/3 adopted by OSPAR 2003 (OSPAR 03/17/1, Annex 9), amended by OSPAR Recommendation 2010/2 (OSPAR 10/23/1, Annex 7).

35 General consultation procedures for establishing Marine Protected Areas in Areas Beyond National Jurisdiction of the OSPAR Maritime Area (OSPAR Agreement 2019-09). Available online at: https://www.ospar.org/documents?v=40965 (Accessed 21 November 2025).

36 OSPAR Decision 2010/1 on the Establishment of the Milne Seamount Complex Marine Protected Area (OSPAR 10/23/1-E, Annex 34).

37 OSPAR Recommendation 2010/12 on the Management of the Milne Seamount Complex Marine Protected Area (OSPAR 10/23/1-E, Annex 35).

REMPs and OSPAR Commission's MPA management plans as examples, although both involve the protection of seabed areas, their rules for ABMTs are not coordinated and may even have potential conflicts. For instance, in identifying areas for protection, the two frameworks reflect different approaches—"risk management" and "ecosystem protection"—that are difficult to reconcile directly.

ISA's REMPs do not explicitly list unified standards for identifying areas. Instead, they rely on surveys of representative ecosystems in seabed areas and assessment of potential risks of mining activities (Lodge et al., 2014). In contrast, OSPAR Commission has developed the "Guidelines for the identification and selection of Marine Protected Areas in the OSPAR Maritime Area" (Agreement 2003-17), which outlines criteria for identifying marine protected areas, including ecological criteria/considerations and practical criteria/considerations. The former includes threatened or declining species and habitats/biotopes, important species and habitats/biotopes, ecological significance, high natural biological diversity, representativity, sensitivity, and naturalness, while the latter covers size, potential for restoration, degree of acceptance, potential for success of management measures, potential damage to the area by human activities, and scientific value. [38] In terms of management measures, ISA focuses on regulating contractors' mining activities within REMP areas, while OSPAR's MPAs, though leaving specific management measures to the discretion of contracting parties, may include prohibitions on certain activities (Klerk, 2020). The significant difference between the rules lies in the fact that mining activities within a REMP may fully comply with ISA rules but could violate the rules and objectives of an adjacent OSPAR MPA. However, both ISA and OSPAR Commission encourage marine scientific research to obtain marine environmental data, demonstrating some complementarity (Ardito et al., 2023).

The rules of the BBNJ Agreement and existing legal frameworks also lack consistency in objectives, standards, and management measures, failing to reinforce each other and even potentially conflicting. For example, the vast majority of the existing regulatory systems do not incorporate "strengthening ocean resilience" or systematically addressing transboundary stressors, such as the impacts of climate change into their statutory objectives or scientific evaluation criteria. The diverse regulatory frameworks imposes compliance burden and significant uncertainty on contracting States. Moreover, the incompatibility of rules will create various frictional obstacles for future cooperation. Aligning the BBNJ Agreement with the diverse rules under existing mechanisms to promote coherence and consistency is a significant technical challenge.

4.3 Gaps in managing ABMTs

Complementarity in managing ABMTs is also a key manifestation of achieving synergy. However, there are significant management gaps within the BBNJ Agreement and existing mechanisms that hinder collaborative efforts.

The existing mechanisms generally exhibit weak management of ABMTs and lack coordination among themselves (ISA, 2024). Taking the Antarctic MPAs as an example, effective management of these areas is hindered by the vast Antarctic waters, harsh climate, sparse human activity, and CCAMLR's own limited monitoring and enforcement capabilities. The SOISS MPA, which has been operational for over a decade, faces numerous issues, including ineffective reporting systems, simplistic conservation measures (primarily fishing bans), unverified effectiveness, and limited enforcement authority within the protected areas (Fu, 2019).

RFMOs are more representative of institutional isolation and fragmented capabilities. RFMOs primarily rely on self-regulation by sovereign States and generally lack specific implementation provisions and independent administrative bodies (Matley, 2018). They operate within their respective jurisdictional areas. Due to different management objectives, regional priorities, and resource capacities, they lack both the willingness and mechanisms for coordination, often considering actions outside their target areas as beyond their mandate or not a priority (Haas et al., 2020). This not only results in poor coordination among RFMOs but also hinders their collaboration with other international mechanisms. Additionally, the development and capability of RFMOs are uneven. Identifying VMEs and establishing no-fishing zones impose additional workloads and costs on newer RFMOs and those with many developing country members, making the management of ABMTs and coordination with other mechanisms an extra burden (Thompson et al., 2016).

The BBNJ Agreement is unlikely to establish a large-scale, direct monitoring or enforcement force. The management of its ABMTs will heavily depend on member state compliance and cooperation with existing mechanisms.[39] However, existing mechanisms already struggle with insufficient management within their own scope, let alone possessing the capacity to support a broader ABMTs governance network in synergy with the BBNJ Agreement. This mutual weakness and dependency lead to a lack of practical resource for robust management complementarity, suggesting that the future ABMTs network may face an implementation dilemma of "strong rules but weak enforcement." To overcome this bottleneck, it is essential to promote substantive capacity-building in collaborative oversight and implementation network.

5 Pathways on cooperation: fostering institutional complementarity

Given the intricate issues presented between the BBNJ Agreement and existing mechanisms, it is crucial to gradually foster institutional complementarity. This section proposes recommendations for step-by-step pathways to address the challenges.

38 OSPAR Agreement: 2003-17, as amended by BDC 2007 (BDC 2007 Summary Record (BDC 07/12/1) § 3.43b), and BDC 2016 (BDC 16/9/1, § 5,27 and Annex 13).

39 The BBNJ Agreement, Article 26.

5.1 Coordinating objectives: from dialogue to shared strategic plans

To address the fundamental differences in objectives between the BBNJ Agreement and existing mechanisms, a progressive approach should be adopted—starting from communication and gradually advancing toward shared strategic plans.

Utilizing observer status offers an effective and widely recognized means to enhance communication on objectives. Observer status in international organizations originated from United Nations practices and has been adopted by numerous international organizations, each developing its own unique observer rules (Choi, 1991). For example, the ISA allows non-member States, intergovernmental organizations, and non-governmental organizations (NGOs) to participate as observers in the Assembly and Council of the ISA (Willaert and Soete, 2025).[40] Similarly, RFMOs grant observer status to non-members, international intergovernmental groups, and NGOs, allowing them to attend meetings of the commission and its subsidiary bodies.[41] The OSPAR Convention also extends this privilege, permitting observers to take part in its Commission meetings.[42] The BBNJ Agreement itself provides a pathway for IFBs to participate in ABMT discussions as observers. Article 48(2) of the BBNJ Agreement states, "all meetings of the Conference of the Parties and its subsidiary bodies shall be open to observers participating in accordance with the rules of procedure unless otherwise decided by the Conference of the Parties." Article 48(4) further expands participation, allowing "representatives of States not party to this Agreement, relevant global, regional, subregional and sectoral bodies, Indigenous Peoples and local communities with relevant traditional knowledge, the scientific community, civil society and other relevant stakeholders with an interest in matters" to apply for observer status. Thus, the BBNJ Agreement and IFBs can serve as observers for each other, fostering mutual communication.

Building on sustained dialogue, BBNJ and IFBs can work towards shared strategic plans that align objectives and clarify collaborative priorities (Kvalvik, 2012). In practice, MoUs and cooperative agreements are often used to establish cooperation. By assessing and clarifying the competence and the actions taken on high seas issues of related mechanisms (Freestone et al., 2025), cooperative agreements can specify the content of collaboration. Besides, the non-binding nature of these cooperative agreements allows for easier mitigation of conflicts of interest in the intricate realm of international relations (Shaffer and Pollack, 2010). For instance, the OSPAR Commission collaborates with the ISA on consultations regarding issues of mutual interest, environmental data and information collection, and works with the IMO to promote reporting and compliance, [43] as well as to share experiences and information within the scope of the London Convention and London Protocol.[44] Some RFMOs have entered into cooperative MoUs to promote collaboration through exchanges of fisheries data, technology, and management expertise, advancing their respective goals—particularly for fish stocks under their joint or overlapping mandates. Examples include NEAFC and GFCM, [45] SPRFMO and NPFC, [46] NPFC and NPAFC, [47] as well as CCAMLR's cooperative agreements with SIOFA[48] and SPRFMO[49].

However, the current cooperative agreement model clearly lacks a shared strategic objective. Formulating a shared strategic plan would better facilitate goal alignment. Given the diversity of mandates and interests of existing mechanisms, the BBNJ Agreement may require "tailored" plans with respective mechanisms. For example, the IWC's objectives align closely with biodiversity conservation, the shared strategic plan may be straightforward. In contrast, engaging with IMO or certain RFMOs—where tensions between shipping/fishing interests and conservation are more pronounced. It then would require identifying shared concerns from differences and reaching consensus. Through seeking common ground while reserving differences, it can gradually achieve more consensus and progressively translate this consensus into shared objectives. This approach not only lays a solid foundation for cooperation but also ensures sustained momentum for ongoing collaboration.

40 Rules of Procedure of the Assembly of the International Seabed Authority (ISBA/A/6). Rules of Procedure of the Council of the International Seabed Authority (ISBA/C/12).

41 For example, SPRFMO Rules of Procedure of the Commission, Article 9 allows observers to participate in the Commission and its subsidiary bodies. Available online at: https://sprfmo.int/assets/Basic-Documents/Rules-of-Procedure-31Mar20.pdf (Accessed 21 November 2025).

42 OSPAR Convention, Article 11.

43 Memorandum of Understanding between the OSPAR Commission and the International Seabed Authority (OSPAR Agreement 2010-09).

44 Memorandum of Understanding (MoU) between the International Maritime Organization (IMO) and the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Commission) on the promotion of the London Convention and London Protocol (OSPAR Agreement 2018-10).

45 MoU between NEAFC and GFCM (2019). Available online at: https://www.neafc.org/system/files/MoU_GFCM-NEAFC_signed_dec_2019.pdf (Accessed 21 November 2025).

46 MoU between SPRFMO and NPFC (2023). Available online at: https://sprfmo.int/assets/Cooperation-with-others/MoUs/MoU-SPRFMO-NPFC_12July2023.pdf (Accessed 21 November 2025).

47 Memorandum of Cooperation between NPFC and NPAFC (2019). Available online at: https://uat.npfc.int/system/files/2019-08/MOC-NPFC-NPAFC.pdf (Accessed 21 November 2025).

48 Arrangement between the SIOFA and the CCAMLR (2018). Available online at: https://siofa.org/sites/default/files/files/Arrangement%20between%20SIOFA%20%26%20CCAMLR_0.pdf (Accessed 21 November 2025).

49 Arrangement between the SPRFMO and the CCAMLR (2022). Available online at: https://www.sprfmo.int/assets/Cooperation-with-others/Arrangement-SPRFMO-CCAMLR-2022-signed.pdf (Accessed 21 November 2025).

5.2 Promoting rule compatibility: from scientific guidelines to rule coordination

Resolving the incompatibility of rules regulating ABMTs cannot be achieved by replacing the current regulatory systems. A more feasible path involves a dual approach: on one hand, enhancing the capacity of current frameworks to address transboundary stressors through scientific and technical guidelines; and on the other, fostering legal connections between the BBNJ Agreement and existing rules (Sadat-Akhavi, 2003).

The design and implementation of ABMTs heavily rely on the best scientific information and technical standards. However, there is currently a lack of scientific guidelines under various mechanisms. For example, CCAMLR's "General framework for the establishment of CCAMLR Marine Protected Areas" has significant gaps in defining core concepts, scientific methodologies, and the design of management plans, leaving the establishment of Antarctic MPAs with weak scientific foundations and challenges in management evaluation (Scott, 2021). The ISA's REMP of the Clarion-Clipperton Zone does not impose incentivized uniform standards on survey activities within APEIs, resulting in severe data gaps and inconsistencies in the region (Johnson and Ferreira, 2015; Xu and Chen, 2025). Similarly, Annex I of the BBNJ Agreement- indicative criteria for identification of areas- is overly general and lacks actionable technical guidance. Therefore, promoting rule complementarity should begin with the standardization and mutual recognition of science and data. This requires unifying norms for data collection, reporting, and evaluation to address the current challenges of uneven data quality and difficulties in sharing across countries and mechanisms.

Drawing on the successful experience of FAO guidelines for high seas fisheries (Korseberg, 2018), the BBNJ STB could collaborate with experts and stakeholders from various mechanisms to jointly develop a "General Scientific and Technical Guideline for ABMTs". Its primary aim is to provide a common scientific benchmark and direction for all mechanisms (Yadav and Gjerde, 2020), particularly in the regulatory systems, such as climate-related impacts, ocean acidification and marine pollution (Friedrich, 2013). To enhance flexibility in application, this guideline or standard should be a non-binding instrument (Shaffer and Pollack, 2010). As such, it can influence the norm-making and enforcement of activities of existing mechanisms.

To promote the compatibility of rules, it is also necessary to employ specific legal tools to create direct connections among them (Sadat-Akhavi, 2003). As to the compatibility of rules regulating ABMTs, it also requires joint efforts from both the BBNJ Agreement and existing mechanisms. A feasible approach is to use "reference rules" that cite rules and standards from other frameworks to promote rule compatibility. For example, Section 5 of Part XII of the UNCLOS on preventing marine pollution does not prescribe detailed or technical rules but instead relies on "global and regional rules, standards and recommended practices and procedures" established by competent international organizations as reference rules for States to prevent marine pollution. This kind of "reference rules" not only avoids redundancy but also bridges the fragmentation between rules. The BBNJ Agreement and existing mechanisms can refer to this approach. For example, the management measures under the BBNJ Agreement can recognize that if an activity already meets the high standards of specific existing mechanisms, it may be deemed to fulfill the relevant requirements of the BBNJ Agreement. Conversely, existing mechanisms can also refer to the scientific standards established by the BBNJ Agreement in their decision-making processes. However, the scope and enforceability of the referenced rules and standards warrant discussion (Yu, 2023).

5.3 Enhancing management: from collaborative capacity building to joint actions

To build complementarity in management, it is necessary to start with resource sharing and collaborative actions, integrating scattered and weak management into synergy. This involves a strategic roadmap that begins with joint capacity-building and pilot collaboration in the short term, and then evolves into long-term institutionalized coordination.

Once the BBNJ Agreement comes into effect, priority should be given to strengthening information sharing and joint capacity building. The exchange of information between the BBNJ Agreement and existing mechanisms is crucial for ABMTs (Wang and Zhang, 2024). The Clearing-House Mechanism (CHM) under the BBNJ Agreement can serve as an authoritative platform for ABMTs-related information data and scientific technologies (Gaebel et al., 2025). In this way, it can not only help the global community form a scientific understanding of the challenges posed by various impacts but also promote technological innovation in science, thereby enhancing the coordination of ABMTs and their capacity to address transboundary stressors (Robb, 2024). In line with the capacity-building and transfer of technology under the BBNJ Agreement, joint capacity-building initiatives can be launched to provide standardized technical training for countries and mechanisms with limited resources, thereby enhancing the overall implementation and regulatory capabilities of ABMTs (Rochette et al., 2014; Hannah et al., 2024).

Meanwhile, the BBNJ Agreement and existing mechanisms can promote flexible and pragmatic pilot collaborations. Priority could be given to launching such pilots in regions with established cooperation frameworks and prior experience—such as the Northeast Atlantic or the Southern Ocean. These pilots could target specific cross-border issues, such as the protection of migratory species, the impacts of climate change, or coordinated monitoring in specific sea areas. By aligning the resources and scientific techniques of relevant mechanisms, joint cruises, mutual recognition of data, and method validation could be carried out (Tian and Guo, 2025). Such pilot projects could accumulate operational experience and mutual trust at a relatively low political cost.

To effectively advance these pilot projects and address specific challenges, the successful practices of specialized joint working groups (JWGs) can serve as a valuable reference. For example, the JWG established by the FAO, IMO and International Labor

Organization (ILO) (the FAO-IMO-ILO *ad hoc* Joint Working Group) illustrates that informal mechanisms can play a significant role in addressing specific issues and potentially serve as a focal point for cooperation (Auld et al., 2023)[50]. The BBNJ Agreement can draw on relevant experiences, establishing a JWG for more targeted collaboration. The key lies in jointly discussing issues with existing mechanisms, formulating a unified strategic plan, and then dividing tasks among the mechanisms for implementation. Such substantive collaboration can advance the development of ABMTs while strengthening mutual trust and interaction. In the long term, the objective is to transform the models proven effective in pilot projects and collaborations into a standardized and institutionalized network for joint implementation.

6 Conclusion

This paper addresses a critical question in future ocean governance: how the BBNJ Agreement can foster cooperation with a patchwork of regional and sectoral mechanisms to establish a coherent ABMTs network. While the BBNJ Agreement highlights a critical demand for cooperation, actionable paths for cooperation remain elusive within current legal frameworks. Drawing on the concept of institutional complementarity, this paper argues that effective cooperation between the BBNJ Agreement and existing mechanisms lies in strengthening complementarity that stimulating synergy effects and forming a collaborative governance force. However, the BBNJ Agreement and existing mechanisms have significant gaps in complementarity across three major dimensions—strategic objectives, operational rules, and management—preventing them from achieving synergy, and thereby posing substantial challenges to effective cooperation. To address the challenges, this paper proposes stepwise pathways, including coordinating objectives from dialogue to shared strategic plans, promoting rule compatibility from scientific alignment to operational coordination, and enhancing management from collaborative capacity-building to joint actions.

The institutional complementarity provides a constructive perspective for examining the complex and dynamic interaction between the BBNJ Agreement and existing mechanisms, highlighting latent synergistic potential. However, effective cooperation requires sustained political commitment. Ultimately, the establishment of a coherent ABMTs network will depend on whether the Parties to the BBNJ Agreement and the member States of the existing mechanisms can overcome short-term interests and divergences to prioritize the long-term resilience of marine ecosystems as a shared goal.

50 See the website of FAO. Available online at: https://www.fao.org/iuu-fishing/tools-and-initiatives/joint-working-group-on-iuu-fishing/en (Accessed 21 November 2025).

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 author.

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