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Drivers and policy insights for enhancing blue carbon cooperation mechanism between China and ASEAN countries

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China and most of the Association of Southeast Asian Nations (ASEAN) countries locate around the South China Sea (SCS), which is home to an abundance of blue carbon resources including mangroves, seagrasses, and saltmarshes. Establishing a blue carbon cooperation mechanism between China and ASEAN countries will contribute greatly addressing climate change and sustainable development in the SCS region. As the climate change impacts, and both China and ASEAN countries have the demand for low carbon development needs, it is necessary for them to cooperate on blue carbon management. By providing a clear picture of the processes and challenges of blue carbon cooperation between China and ASEAN countries in the SCS region, this paper identifies opportunities for countries to develop blue carbon to reduce climate change pressures and support the long-term well-being of coastal communities, and explores new paths for blue carbon protection based on existing maritime cooperation, outlining cooperation policy options that China and ASEAN countries in the SCS region can consider.

KEYWORDS

blue carbon, China-ASEAN, South China Sea, cooperation, climate change

Highlights

- China and ASEAN countries have touched upon the development of blue carbon in several cooperation mechanisms, which shows their common desire to apply ocean-based solutions to address climate change. This lays foundation for further blue carbon cooperation in the SCS region.
- The governance structures related to blue carbon management between China and ASEAN countries in the SCS region are fragmented, establishing a regional marine environmental protection mechanism can be a solution.
- Utilizing market-based instruments to stimulate the sustainable development of blue carbon in the SCS will be a long-term task for China and ASEAN countries.

- China and ASEAN countries need to build a China-ASEAN blue partnership and ultimately advancing the construction of a China-ASEAN maritime community with a shared future.

1 Introduction

The historic Paris Agreement sets long-term goals to guide nations in limiting the global temperature increase within this century to 1.5–2°C (Paris Agreement). While, the 2021 Synthesis Report on Nationally Determined Contributions (NDCs) under the Paris Agreement indicates that, global greenhouse gas (GHG) emissions in 2030 considering implementation of the latest NDCs by 192 parties are expected to be only 16.3 per cent above the 2010 level (UNFCCC Secretariat, 2021; NDCs). It could result in a temperature increase by the end of the century of approximately 2.7 (2.1–3.5) °C unless there is a dramatic and rapid change (UNFCCC Secretariat, 2021). Reducing carbon emissions and increasing carbon absorption are two effective ways to cope with climate change. An emerging option to achieve both of these goals is natural climate solutions, including carbon sequestration through ecosystem management and reforestation (Marceadie et al., 2021). The term “blue carbon” describes methods of mitigating and adapting to climate change based on preserving and restoring vegetated coastal ecosystems, such as mangroves, seagrasses and saltmarshes (Nellemann et al., 2009; Mcleod et al., 2011). There is substantial mitigation and adaptation potential from the protection and restoration of blue carbon ecosystems (IPCC, 2023; Silverman-Roati et al., 2021). Many in the conservation and policy communities are drawn to the concept of “blue carbon” because it seems like a practical way to reduce GHG emissions while also achieving a number of other co-benefits, such as protecting against storms and extreme weather events, treating and filtering runoff from industry and agriculture, and providing habitat for important food species (Thomas, 2014; Wu et al., 2020; NASEM, 2022).

The South China Sea (SCS) is encircled by several low-lying coastal states, including China and most ASEAN countries, i.e., Brunei, Cambodia, Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. According to an Assessment Report of Intergovernmental Panel on Climate Change (IPCC), the SCS is experiencing profound environmental changes because of climate change. These changes will continue, to the detriment of the coastal inhabitants, ecosystems and economies, among others (Hoegh-Guldberg et al., 2014). In light of its recent significant loss and high blue carbon coverage rate, the SCS region is considered as one of the world’s most important areas for blue carbon development (Crooks et al., 2017; Stankovic et al., 2023) (Table 1). The SCS region’s coastline and ocean resources are under increasing strain due to population growth and continuous coastal migration. These activities have an adverse effect on the environment and society, which puts coastal ecosystems at risk of collapse. China and most ASEAN countries are traditional aquaculture countries with nutrient-rich water bodies, advanced aquaculture technology and large number of aquaculture farmers, which are the unique advantageous conditions for China and ASEAN countries to develop blue carbon cooperation. Take seaweed cultivation as an example, seaweed farming involves the growing of kelp and other macroalgae for the purpose of storing carbon in biomass, which may either be sequestered or utilized to replace more energy-intensive products (Silverman-Roati et al., 2021). In addition to carbon storage, there are economic as well as potential ecological co-benefits created by seaweed cultivation, such as supporting a large number of people’s livelihoods and providing a significant boost to the blue economy (NASEM, 2022). China, Indonesia, the Philippines, North and South Korea, Japan and Malaysia are the leading producers of cultivated seaweed, collectively accounting for 98% of global farmed seaweed production (Seaweed Insights, 2020). Since 2009, China has emerged as ASEAN’s most significant trading partner, and ASEAN has continued to rank third in terms of trade with China since 2011 (Soong, 2018). Under the promotion of 21st Century Maritime Silk Road Initiative, China and ASEAN countries

TABLE 1 Distribution of the major blue carbon ecosystem in the SCS region—mangroves.

Country	Area of Habitat Extent (km ²)	Net Change 1996–2020 (km ²)	Species	Species by the IUCN Red List
Brunei	114.97	+0.35	27	None
Cambodia	626.92	-19.64	29	None
China	215.81	-29.19	23	None
Indonesia	29,533.98	-1,739.04	47	5
Laos	/	/	/	/
Malaysia	5,245.75	-69.07	40	5
Myanmar	5,435.39	-385.81	36	2
Philippines	2,847.98	-79.34	34	2
Singapore	7.30	-1.11	31	1
Thailand	2,527.99	-70.20	35	2
Vietnam	1,871.47	-92.72	33	None

Source: Global Mangrove Watch, available at <https://www.globalmangrovetwatch.org/>. Prepared by the author.

have expressed interest in developing and maintaining sustainable blue coastal and ocean economies. The development of blue carbon is an opportunity for their governments and the private sector to work closely with coastal communities to provide direct benefits and serve as a signal to multiple potential avenues for financial support and development of blue economies (Thomas et al., 2022).

China and almost all ASEAN countries which located in the SCS region are parties to the United Nations Framework Convention on Climate Change (UNFCCC), and have submitted the NDCs to the Secretariat of the Conference of the Parties (COP) that includes specific GHG emissions reduction and conservation of blue carbon system commitment (Table 2) (NDCs). While the

TABLE 2 China and ASEAN countries' commitment on blue carbon in the NDCs.

Country	Commitment on Blue Carbon
Brunei	Specific projects, measures and activities to be implemented to contribute to mitigation co-benefits, which cover coastal resources.
Cambodia	Priority adaptation actions include GHG emission reduction through restoration of mangrove, construct the GHG inventory of mangrove selection of mangrove species resilient to climate change, preparation of mechanism, protection and management of protected area.
China	Based on systematic investigation to the distribution of national blue carbon ecosystems, China will protect and restore the existing blue carbon ecosystems by means of various blue carbon pilot projects and marine ecological protection and restoration projects. Carbon sequestration capacity of mangroves, seagrass beds, salt marshes and others will be tapped.
Indonesia	Taking an integrated, landscape-based approach in managing its coastal and marine ecosystems through actions including implementation of ecosystem-based adaptation in coastal zone development and integrated management of mangrove ecosystem.
Laos	There is no specific concern about blue carbon
Malaysia	Preservation of vulnerable terrestrial and marine ecosystem and expanding protected areas, including fisheries zones within the marine and coastal protection corridors will be given priority.
Myanmar	Actions include increasing private and community-owned mangrove wind and wave breaks; Mainstreaming climate change adaptations in marine protected areas and promoting nature-based solutions; Developing a coastal disaster defense/Green Belt through mangrove restoration and rehabilitation of mangroves having mitigation co-benefits.
Philippines	Adaptation measures include the sector of coastal and marine ecosystems.
Singapore	Specific projects, measures and activities to be implemented to contribute to mitigation co-benefits, including information on adaptation plans that also yield mitigation co-benefits, which covers coastal resources.
Thailand	To increase national forest cover to 40%, including mangrove forests. To develop participatory, integrated marine conservation and coastal rehabilitation plan to protect marine ecosystems.
Vietnam	Plant and protect forests with a focus on watershed protection forests, mangroves, and coastal protection forests; conserve biodiversity and ecosystems with a focus on developing marine and coastal conservation zones.

Prepared by the author.

climate change reduction benefits have largely been overlooked (Crooks et al., 2017). The next round of NDCs may permit for a more comprehensive focus (Crooks et al., 2017). This will set the stage for expanded bilateral and regional cooperation on blue carbon, development and expansion of emissions trading schemes, sharing of research, technology and capacity building.

While blue carbon ecosystems are becoming more widely acknowledged as important tools for climate mitigation, China and ASEAN countries' joint efforts in the SCS region continue to encounter structural barriers. Fragmented governance frameworks, different national policy priorities, and unresolved geopolitical tensions are a few examples. This paper systematically investigates the institutional and geopolitical constraints influencing China-ASEAN cooperation on blue carbon. Based on this analysis, the paper proposes an integrated policy framework that makes use of existing maritime cooperation mechanisms while introducing innovative market-based tools. The primary objective is to advance a dual agenda: enhancing ecological resilience in the SCS and accelerating regional progress toward low-carbon development targets.

2 Status quo of blue carbon cooperation between China and ASEAN countries

2.1 Bilateral cooperation mechanisms between China and ASEAN

With the growing awareness of the effects of climate change on the SCS, China and ASEAN have incorporated this topic in their maritime cooperation and have made great strides. In 2011, the China-ASEAN Environmental Cooperation Centre was established, which has become the main implementation agency and technical support force for the implementation of environmental protection cooperation strategies and related cooperation projects between the two sides (ASEAN Secretariat, 2011). In 2016, China and ASEAN jointly developed and published the China-ASEAN Strategy on Environmental Cooperation (2016-2020) (MEE and ASEAN, 2016-2020). Under this framework, the two sides developed environmental cooperation in priority areas including policy dialogue and exchange, management of environmental information and data, protection of biodiversity and ecosystems, and promotion of environmental industries and technologies for green development (MEE and ASEAN, 2016-2020). Meanwhile, through the intergovernmental meetings between China and ASEAN, bilateral cooperation documents involving the substance of the marine field and documents of willingness to carry out multilateral cooperation have been formed, and marine scientific research cooperation institutions or platforms have been established (Xue, 2019). These lay the foundation for China and ASEAN countries to collaborate deeply on blue carbon.

Along with the policies and plans mentioned above, China and ASEAN carried out various cooperation projects on blue carbon. Take mangrove as an example, a network for mangrove protection

was established by nongovernmental organizations from China and ASEAN countries in an effort to combat climate change and promote sustainable development (Xinhua, 2021). Additionally, they released an initiative for China-ASEAN mangrove conservation, which calls for the halting of illegal mangrove cutting, scientific restoration, the promotion of healthy mangrove ecosystems, increased regional cooperation to stop biodiversity loss, and the investigation of creative directions for regional governance (Xinhua, 2021). In order to collaboratively address climate change and co-manage the global environment, it is noteworthy that the 21st Century Maritime Silk Road Blue Carbon Program was proposed by China in 2017 (State Council of PRC, 2017). Its objectives include monitoring blue carbon ecosystems, developing technical standards, encouraging research on carbon sinks, releasing the 21st Century Maritime Silk Road Blue Carbon Report, and creating an international forum and mechanism for cooperation on Blue Carbon (State Council of PRC, 2017).

2.2 Cooperation between China and ASEAN countries in the sub-regional level

In the sub-regional level, threats to the Coral Triangle region reflect many of the challenges that are pertinent to the SCS region, such as the devastation caused by climate change, marine pollution, and destructive fisheries activities (CTI-CFF Regional Secretariat, 2016). In 2007, the Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF) was established as a multilateral partnership of six countries with the goal of addressing critical issues like marine biodiversity and climate change in order to sustain exceptional marine and coastal resources. As part of the CTI-CFF Regional Plan of Action, the Climate Change Adaptation (CCA) Working Group is responsible for implementing the “Climate Change Adaptation Measures Achieved” (CTI-CCA, 2012). A key focus of the CCA is the exploration of blue carbon and how it can be integrated into climate adaptation and mitigation, as well as strengthening understanding of blue carbon ecosystems through the sharing of knowledge and experience, establishing a knowledge network for the CTI-CFF region, increasing capacity, and identifying pathways and next steps for restoring and preserving blue carbon ecosystems (CTI-CCA, 2017). In addition, the bilateral blue carbon cooperation between China and individual ASEAN countries also happened, e.g., China and Thailand signed the “Arrangement of the Sino-Thai Joint Laboratory on Climate and Marine Ecosystem” to research the impact of climate change on the marine ecosystem of the SCS. Actually, bilateral or small-scale sub-regional cooperation is easier to form a common perception of interests due to the small number of actors involved, and thus more likely to promote practical cooperation (Arase, 2010). Therefore, the bilateral cooperation on blue carbon between China and the ASEAN countries will play the role of a “pathfinder” and gradually radiate to the SCS regional scale.

2.3 Blue carbon cooperation in the trans-regional level

China and ASEAN countries also joined some trans-regional programs related to blue carbon. There are two main environmental programs in the Asia-Pacific region involving both China and ASEAN countries, namely the Coordinating Body of the Seas of East Asia (COBSEA) and the Regional Program on Partnerships in Environmental Management for the Seas of East Asia (PEMSEA), which have roles in blue carbon protection. In accordance with the East Asian Seas Action Plan 1994, COBSEA was established in order to handle wastes, prevent coastal pollution, protect coral reefs, mangroves, as well as sea grasses, and evaluate the effects of human activities on the marine environment (UNEP, 1994). As a participant in UN Environment’s Regional Seas Program, COBSEA makes it possible to leverage UN Environment’s international initiatives, e.g., SDG 14, concerning blue carbon (COBSEA, 2018). The PEMSEA jointly sponsored by the United Nations Development Program (UNDP), International Maritime Organization (IMO), the Global Environmental Facility (GEF) and the World Bank. Blue carbon has been included in the most recent Sustainable Development Strategy for Seas of East Asia (SDS-SEA) Implementation plan (2018–2022) for the sake of biodiversity conservation and climate adaption and mitigation (PEMSEA, 2018). The SDS-SEA Implementation plan further sets schedule, specific activities, indicators and expected outcomes for the management and conservation of blue carbon (PEMSEA, 2018). PEMSEA Country Partners is also conducting research to expand on the framework that aims to provide a better understanding of the blue economy in East Asia. This framework covers the following topics: (a) Definitions and methodologies for evaluating blue economy; (b) The contribution of blue economy activities to East Asian national economies, including the importance of ecosystem services in coastal and ocean areas; (c) Policy and incentive measures aimed at facilitating and encouraging investments in the blue economy; (d) Investment opportunities and growth sectors in emerging markets (Crooks et al., 2017).

3 Challenges ahead

Although China and ASEAN countries have achieved certain accomplishments in blue carbon cooperation, there is a continued need to enhance the efficiency of cooperation mechanisms in order to overcome governance constraints and address emerging challenges.

Firstly, The existing cooperation mechanisms lack integrity and coordination. The governance structures related to blue carbon management between China and ASEAN countries in the SCS region are fragmented, with multiple agencies and organizations responsible for different aspects of coastal and marine management. The fragmentation characteristic may lead to the problem of overlapping cooperation contents and reduce the efficiency of cooperation. As stated in the China-ASEAN Environmental Protection Cooperation Strategy 2009–2015: “lack of effective

cooperation mechanisms makes it difficult for China and ASEAN to move towards deeper and broader cooperation on environmental protection.” (MEE and ASEAN, 2009-2015).

Secondly, China and ASEAN countries differ greatly in terms of economic development, blue carbon technology and blue carbon resources, which has led to differences in the focus of policy and regulatory formulation in each country. For example, Thailand attaches importance to the improvement of energy efficiency and the promotion of carbon sequestration technologies, while the Myanmar and Cambodia have long suffered from floods and droughts, and the governments considers sectors such as agriculture as priority sectors for climate change adaptation in its policy planning (ASEAN Centre for Energy, 2019; Kingdom of Cambodia Ministry of Environment, 2013). Indonesia and Malaysia have placed greater emphasis on large-scale mangrove restoration to bolster coastal livelihoods. With the support of the Global Environment Facility (GEF), Indonesia has implemented the Blue Forest Project for four years, established the National Blue Carbon Center, and prepared the Strategic Plan for Blue Carbon Sink Research (Wang, 2022). Singapore is implementing measures to protect its coastlines from rising sea levels, such as constructing sea walls, enhancing coastal vegetation, and elevating new reclamation land. It has established a Coastal Protection Fund to finance these initiatives (SNWA, 2025). As a landlocked country, Laos has not explicitly involved blue carbon in its climate policy, while took efforts on forest carbon sink development (NDCs). These differences can create challenges when trying to harmonize approaches to blue carbon management.

Thirdly, geopolitical tensions in the SCS region and political considerations can affect cooperation on environmental issues, including blue carbon. China-ASEAN cooperation follows the “ASEAN Way” (Cheng-Chwee, 2005). China takes the lead at the same time by utilizing its greater resources and political entrepreneurship (Arase, 2010). Generally, ASEAN countries have a nuanced attitude towards China’s rise. While China’s trade and economic growth present ASEAN countries with opportunities, the ascent of Chinese power also creates a sense of insecurity for the smaller ASEAN countries (Arase, 2010). As a result, China is the target of long-standing mistrust in some ASEAN countries, which could stand in the way of China and ASEAN cooperation. Furthermore, coastal ecosystems and blue carbon habitats are often transboundary in nature. Disputes over maritime boundaries and conflicting interests will pose challenges to the transboundary blue carbon cooperation and management efforts. Any unilateral attempt to address blue carbon development or protection in in disputed areas may be viewed by other parties as sovereign action due to the intricate web of maritime boundary and sovereignty disputes in the SCS region. While, despite these challenges, low-sensitivity areas of cooperation, such as blue carbon conservation, offer a promising pathway to fostering mutual trust.

4 Prospects

4.1 Short-term goals

The short-term goals within the 1–3 year timeframe are designed to enhance the willingness to cooperate and deepen the

scope of collaborative efforts. Successful achievement of these short-term objectives is crucial, as it provides the necessary support and builds confidence for the subsequent advancement towards long-term goals.

Firstly, raising awareness of all the SCS countries to jointly strengthen blue carbon cooperation. As Alexander Wendt said, the core of international structure is “shared knowledge”, which influences state identities and interests in addition to state conduct (Wendt, 1999). The same goes for international cooperation. If the “shared knowledge” is cooperative, the actors within the system have developed the idea of cooperation, established their identity as partners, and thus clarified that their interest is no longer a self-interest, but a collective interest, and then realize from this that the way to gain benefits is through cooperation with other members (Wendt, 1999). The way to strengthen blue carbon cooperation between China and ASEAN countries is to think how to gain collective identity firstly. Through existing international cooperation platforms, e.g., the Bo’ao Forum for Asia (BFA), blue carbon academic exchange, technology and equipment display, and project release mechanism to discuss the future development of new models and business forms of blue carbon should be established. It is necessary to promote the think tanks of China and ASEAN to jointly build a pragmatic cooperation platform for blue carbon, to increase the popularization of blue carbon science and jointly enhance the awareness of blue carbon cooperation.

Secondly, enhancing marine environmental cooperation within the ongoing negotiations of the Code of Conduct (COC). China and ASEAN countries made their commitment in the Conduct of Parties in the South China Sea (DOC) to work toward the eventual attainment of the COC in the SCS on the basis of consensus, which charted the course for future rules-making and mechanism-building in the SCS. The DOC and the future COC are important practices for exploring the application of relevant treaties and general international law in SCS region. As the DOC already includes cooperation on marine environmental protection, it is imperative to take advantage of the momentum generated by negotiations on the COC to strengthen existing cooperative activities to address environmental challenges in the SCS and to explore opportunities to expand cooperation (Gong and Trajano, 2018). By enhancing marine environmental cooperation into the COC, both parties may take use of the potential of blue carbon ecosystems to reduce climate change, promote sustainable development, and enhance environmental resilience in the SCS region.

Thirdly, jointly promoting international environmental legislation to pay more attention to blue carbon issues. At present, the entire international environmental law system has given some consideration to the protection of blue carbon. The preservation and sustainable use of the oceans and marine resources, as outlined in Goal 14 of the 2030 Agenda for Sustainable Development, has emerged as a critical objective for the international community in the future (UN, 2015). However, the work is still at a hesitant and wandering stage, with far less attention and no entry into the Joint Implementation (JI) or

Emission Trading (ET) mechanisms under the Kyoto Protocol (Lin, 2019). China and ASEAN countries could promote the focus on blue carbon in the implementation of the Paris Agreement, e.g., suggesting to further strengthen the use of climate finance, including the Clean Development Mechanism (CDM), Verified Carbon Standard (VCS), and carbon insurance in the field of blue carbon. Additionally, the linkage between blue carbon and biodiversity conservation is also an entry point. The 2001 Marrakesh Accords, reached at the 7th COP to the UNFCCC, firstly linked forestry carbon sinks to biodiversity conservation (Marrakesh Accords & Declaration). While blue carbon has not yet received attention from the Marrakesh Accords, the ideas incorporated within should be applicable to the blue carbon domain. China and ASEAN countries, for instance, could propose that aquaculture activities should contribute to the biodiversity protection and the sustainable use of marine resources, and natural mangroves should not be easily destroyed and replaced by artificial mangroves.

4.2 Long-term goals

Grounded in considerations of systematicity and sustainability, the establishment of long-term goals is aimed at achieving enduring benefits from blue carbon cooperation through the enhancement of policies, agreements, and market mechanisms. This process might necessitate a long-term commitment over an extended period ranging from 3 to 10 years.

In the blue carbon conservation domain, establishing a long-term mechanism for collaboration on marine environmental protection in the SCS region is needed. There are typical models of regional marine environmental protection mechanisms have been developed worldwide, e.g., the marine environmental protection cooperation mechanism in the North-East Atlantic, the Baltic and the Mediterranean. The construction of SCS marine environmental protection mechanism could learn from these regional cooperation experiences. For example, the SCS marine environmental protection mechanism may draw inspiration from the Mediterranean model, which adopts the form of a framework convention plus protocols (Barcelona Convention and Protocols). The framework convention outlines the basic responsibilities of the parties and establishes the different regimes and guiding principles for the protection of the marine environment. At the time of signing the framework convention, states must ratify at least one of the protocols, and may subsequently ratify others according to its own reality. The protocols can mainly include the prevention of land-based pollution, ship pollution, ocean dumping, seabed development pollution, fisheries development and marine biodiversity, etc. Such an approach is both principled and flexible.

From an integrated coastal management perspective, blue carbon habitats in the SCS region are important for their role as essential resources for the development of a blue economy in this region (Crooks et al., 2017). Efforts towards maintaining blue carbon ecosystems provide economic, social, and environmental

benefits to coastal communities, the same triple pillars that underpin the blue economy (Thomas et al., 2022). In light of the interdependencies between blue carbon and blue economy, utilizing market-based instruments to stimulate the sustainable development of blue carbon in the SCS will be a long-term task for China and ASEAN countries, which will also benefit national economies and SCS regional development. An effective market mechanism is essential to realize the social and economic value of blue carbon (Li et al., 2024; Ullman et al., 2013). One of the market-oriented tools being applied by governments worldwide to control greenhouse gas emissions is the carbon market (Michaelowa et al., 2019). The development of a regional carbon market on the basis of the national carbon markets provides a significant development direction to better utilize the role of the carbon market (Tian, 2021). The European Union launched the world's first international emissions trading systems (ETS) in 2005. More subnational and national ETS have continued to operate or are being developed since that time. In the SCS region, China launched the ETS in 2021, and then released the industry standard "Accounting Methods for Ocean Carbon Sink", which has been officially implemented since 1 January 2023 (MNR of PRC). Indonesia planned to launch its pilot emissions trading scheme in 2022, and Malaysia, Thailand and Vietnam are also actively preparing for national carbon trading markets. A connection between the carbon trading markets of regional countries will help countries in the SCS to gain carbon sink revenue by enabling more efficient transactions and greater liquidity on the market (Tian, 2021). Integrating the carbon trading market, negotiating a unified standard for blue carbon measurement, carbon trading and carbon tariff, and further completing carbon emission trading at low cost through this unified regional trading market will be a long-term task for the countries in the SCS region.

At a strategic level, the construction of a China-ASEAN blue partnership is critical to advancing the vision of a China-ASEAN maritime community with a shared future. The concept of "maritime community with a shared future" underscores the proactive role of regional actors in shaping maritime security and advocates for collaborative efforts to establish a community of shared interests in maritime cooperation (Yang, 2023). In 2017, China proposed the Blue Partnership initiative (State Council of PRC, 2017). To date, China has established blue partnerships with EU, Portugal, and Seychelles. For example, China and EU signed the *Declaration on the Establishment of a Blue Partnership for the Oceans: Towards Better Ocean Governance, Sustainable Fisheries and a Thriving Maritime Economy between the European Union and the People's Republic of China* (MARA of PRC). Extending blue partnership to ASEAN will be a strategic step to consolidate and expend China-ASEAN maritime cooperation. China and ASEAN countries could consider blue carbon cooperation, which is characterized by its low sensitivity and high consensus, as an optimal entry point for building trust and expanding the scope of the blue partnership. Such an approach not only facilitates more productive collaboration in ocean-related matters but also contributes to the broader objectives of regional stability and environmental sustainability.

5 Conclusion

To proceed with the task of utilizing blue carbon in a sustainably, socially and ecologically responsible way, cooperative effort is required. The SCS is one of the world's hotspots for surviving blue carbon ecosystems, yet its loss rate is very significant. Given the severe situation of blue carbon development, the increasing global environmental governance issues and the strong demand for low carbon in both China and ASEAN countries, the two sides need to deepen their collaboration in the field of blue carbon. The key issues, including the lack of public awareness of blue carbon, the low level of political mutual trust, and the absence of a market trading mechanism for blue carbon should be concerned. International climate policies and legal instruments offer a chance to reinforce the significance of blue carbon ecosystems and provide practical solutions for adaptation and mitigation. Action is strongly encouraged by the NDC's developing structure. Blue carbon ecosystems have been included in the NDCs of China and most ASEAN countries. Although mitigation opportunities of blue carbon have been overlooked to date, future rounds of NDC restatements will enable a more thorough emphasis on this issue. For China and ASEAN countries to achieve concrete results in emission reduction, and to promote environmental government in Asia in a better direction, the two sides should strengthen the construction of "Blue Partnership", deepen communication of development policies, increase understanding of blue carbon, strengthen cooperation at different levels.

Author contributions

LZ: Funding acquisition, Formal analysis, Resources, Data curation, Visualization, Writing – original draft, Project administration, Investigation, Validation, Conceptualization, Writing – review & editing, Software, Methodology, Supervision.

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