China Council for International Cooperation on Environment and Development

Special Policy Study on

Promoting Nature-Positive Policies and Practice Innovation

CCICED 2026 AGM

September 2026

Members of the Special Policy Study Team

SPS Team Leaders:

Wei Fuwen	Academician, Chinese Academy of Sciences; Professor, Jiangxi Agricultural University
Frank Rijsberman	Global Head of Policy and Public Funding, The Nature Conservancy

SPS China Team Core Member:

Gao Jixi	Chief Scientist at the China Nanjing Institute of Environmental Protection, MEE, China
Wan Huawei	Director of the Department of Biodiversity Remote Sensing, Satellite Application Center for Ecology and Environment, MEE, China
Fan Huizhong	Researcher, China West Normal University
Zhang Yusha	Engineer of the Department of Biodiversity Remote Sensing, Satellite Application Center for Ecology and Environment, MEE, China
Guo Yutong	Doctor, Chinese Research Academy of Environmental Sciences
Wang Ye	Deputy Director, Division of Biodiversity Convention, FECOMEE
Liu Yan	Researcher, Nanjing Institute of Environmental Sciences, MEE
Ping Xiaoge	Senior Engineer, Institute of Zoology (IOZ), Chinese Academy of Sciences (CAS)
Lu Xiaoqiang	Professor, Nanjing Institute of Environmental Sciences, MEE
Qi Shanzhe	Assistant research fellow, Nanjing Institute of Environmental Sciences, MEE
Zhou Wenliang	Researcher, Southern Marine Science and Engineering of Guangdong Laboratory (Guangzhou)
Shi Suhua	Professor, Sun Yat-sen University
Huang Hui	Researcher, South China Sea Institute of Oceanology Chinese Academy of Sciences
Cao Ling	Professor, Xiamen University
Huang Mingpan	Postdoctoral, Southern Marine Science and Engineering of Guangdong Laboratory (Guangzhou)
Fang Zanshan	Doctor, Sun Yat-sen University

SPS International Team Members:

Nigel Dudley	Equilibrium Research
Zhou Guomei	Head of the Kunming Biodiversity Fund (Principal Coordination Officer), UNEP
Marco Lambetini	Council member at CCICED; Convenor, Nature Positive Initiative
Harvey Locke	President, Harvey Locke Conservation Inc.; Vice Chair, Nature Positive
Linda Krueger	Director of Biodiversity and Infrastructure Policy, TNC
Carolina Hazin	Sr Policy Advisor, Area-Based Conservation Measure, TNC
Peng Kui	Science Director, TNC China
Liu Jing	Land Protection Strategy Deputy Director, TNC China
Andreas Hansen	Senior Director of Policy, TNC
Ma Chaode	Assistant Resident Representative, UNDP China
Zhang Yimo	Program Director of Ocean, WWF China
Andreas Hansen	Senior Director of Policy, TNC
Marine Thomas	Associate Director of Conservation Program (Hong Kong), TNC
Leng Fei	National BIOFIN Program Coordinator, UNDP

SPS Team Coordinator

Hu Yisi	Associate Professor, Institute of Zoology (IOZ), Chinese Academy of Sciences (CAS)
Ping Xiaoge	Senior Engineer, Institute of Zoology (IOZ), Chinese Academy of Sciences (CAS)
Thomas Minney	Executive Director, West Virginia, The Nature Conservancy
Xin Xu	External Affairs Director, TNC China
Gao Lingyun	Senior Engineer, Secretariat of CCICED
Samantha Zhang	Project Officer, SISO of CCICED

* The co-leaders and members of this SPS serve in their personal capacities. The views and opinions expressed in this SPS report are those of the individual experts participating in the SPS Team and do not represent those of their organizations and CCICED.

Executive Summary

Innovation is needed to align China's leadership in the Kunming–Montreal Global Biodiversity Framework (KMGBF)with other international instruments, such as the High Seas Treaty (BBNJ), the Convention on International Trade in Endangered Species (CITES), and the Convention on Migratory Species (CMS), both nationally and in terms of international cooperation. The Chinese concept of Ecological Conservation Redlines (ECR) is examined in light of the KMGBF, with particular attention paid to the potential for ECR areas outside protected areas to be recognized as other effective area-based conservation measures (OECMs). The philosophy of harmonization and optimization between approaches is then taken further, with a section on synergies between multilateral environmental agreements (MEAs), looking in detail at the implications for ocean conservation and governance. Finally, keeping with the marine theme and the role of the ocean as a vital part of ecological civilization, the effectiveness of China's MPAs is discussed, and innovative management systems proposed, within the framework of the recently agreed Agreement on Marine Biological Diversity of Areas Beyond National Jurisdiction (BBNJ). Key policy recommendations are identified throughout, with some overall priorities listed below.

Policy Recommendations

1. Optimize the ECR indicator system and implementation by aligning with the KMGBF's compliance indicators, particularly for KMGBF area-based targets on spatial planning (target 1), restoration (2), area conservation (3), climate change (8), areas under sustainable production (10), and integration of biodiversity into decision-making (14). Indicators such as species, genetic, and phylogenetic diversity can be added to identify and optimize biodiversity-rich areas and hotspots, expand the scope of conservation, and improve its effectiveness. The ECR system supports China's achievement of national targets and could help other countries do the same. Policy support for promoting the ECR system internationally, including policies, planning, funding, and capacity building, will be proposed to contribute Chinese solutions and leadership to global implementation of the KMGBF.

2. Accelerate the formulation and release of a national-level OECM policy framework to support the establishment, implementation, monitoring, and reporting of OECMs, with broad participation from the whole of society. This will help determine how much of the 1.4 million square kilometres within China's ECRs that are not protected areas could be **recognized as** OECMs with the right management, governance, and enforcement approaches. Furthermore, many areas outside ECRs (including marine areas) could meet OECM standards. National standards for the identification, certification, management, and monitoring of OECMs, based on CBD and IUCN WCPA guidance, are urgently required, covering terrestrial, inland waters and coastal and marine areas, and thus establishing a unified framework for OECMs inside and outside ECRs. Within the framework and guidelines, the prerequisite for creating a new OECM also includes conducting relevant social and environmental screening and sufficient consultation. This would create a diversified OECM governance system, fostering inclusive in-situ conservation and sustainable development. OECMs, along with nature reserves and ECRs, would then form a systematic protection system covering important areas throughout Chinese lands and marine areas, accelerating the realization of the national vision of harmonious coexistence between humanity and nature.

3. Promote and support practical actions that enhance cooperation, collaboration, and policy coherence among multilateral environmental agreements and other relevant international instruments, frameworks and bodies with mandates relating to marine biodiversity, including in areas beyond national jurisdiction. This should include strengthening a national policy coordination mechanism for ocean governance processes, covering biodiversity, fisheries, shipping, seabed activities, and related international commitments, with a view to improving information sharing, inclusive governance, equitable benefit sharing, and implementation efficiency while avoiding duplication.

4. **Continue to promote synergies and policy coherence between the KMGBF and the BBNJ**. The BBNJ agreement establishes arrangements on area-based management tools including MPAs in the high seas, environmental impact assessments, marine genetic resources, benefit sharing and capacity building, and technology transfer. China could support science-based, transparent, and inclusive development of a network of MPAs through a seascape approach that connects areas within and beyond national jurisdiction, in accordance

with the BBNJ.

5. Integrate spatial networks, management systems, and financial mechanisms to establish a comprehensive marine conservation roadmap, featuring marine national parks and OECMs, integration of planning and fishery rights, and blue carbon accounting that addresses biological integrity. Actions should include enforcing strict spatial jurisdiction over core coral reefs and other marine regions via national parks, with surrounding co-managed areas as complementary OECMs. The marine spatial planning rights of the Ministry of Natural Resources and the fishery management rights of the Ministry of Agriculture and Rural Affairs need to be integrated to upgrade seasonal fishing bans to full-time, three-dimensional adaptive behavioural controls across depth gradients. Coral reefs, mangroves, and seagrass beds should be integrated into national structural carbon pool asset management and "biological integrity blue carbon" introduced to evaluate long-term ecological value, achieving a win–win for climate response, biodiversity conservation, and coastal sustainable development.

Contents

Executive Summary 1

Introduction 5

Topic I: Strengthening China's Biodiversity Conservation through Ecological Conservation Redline and Oecm Governance Systems in Compliance with The Kunming-Montreal Global Biodiversity Framework. 6

1.1. Introduction and Background 6

1.1.1 Background and significance of the KMGBF and the "30×30" target 6

1.1.2 Role of the ECR in China's biodiversity governance system 6

1.1.3 Necessity of analyzing the potential of the ECR to support the implementation of the KMGBF. 7

1.2. Potential of China's ECR to Support the Implementation of the KMGBF 7

1.2.1 Scientific connotation of China's ECR 7

1.2.2 Consistency between the ECR and international protected area and OECM systems 8

1.2.3 Potential and pathways of the ECR to support the implementation of multiple targets of the KMGBF 8

1.3. Development of a Monitoring Indicator System for the ECR to Support the Implementation of the KMGBF 9

1.3.1 Analysis of the strengths and weaknesses of the ECR assessment system against the monitoring indicators of the KMGBF 9

1.3.2 Development of an ECR monitoring and assessment indicator system aligned with selected action target indicators of the KMGBF 10

1.4. Optimization of Multidimensional Delineation Guidelines for the ECR and OECM Management Measures Serving the KMGBF 11

1.4.1 Optimization of the delineation principles and system composition of the ECR for the implementation of the KMGBF 11

1.4.2 Study on the OECM governance and management system based on the ECR 11

1.5. Policy Recommendations 12

Topic II: Identifying Synergies among Treaties and Exploring China'S Contribution to Marine Biodiversity Conservation 14

2.1: Introduction 14

2.2: Alignment of Marine Conservation Area Identification Criteria and Collaborative Governance Pathways 15

2.3: Collaborative Governance Mechanisms for Key Marine Protected Taxa ∪nder Multilateral Conventions 17

2.4: Where KMGBF Targets Relates to Ocean Governance 19

Topic III: Innovation in Protection and Management Strategies for Typical Marine Ecosystems 21

3.1 Introduction: Current Status and Misalignment of China's Marine Protection System 21

3.1.1 Review of existing management models: MPAs and seasonal fishing closures 21

3.1.2 Diagnosing the Institutional Gap: Distance between China's Management Standards and International protected and conserved areas Standards 22

3.1.3 Summary: Fundamental contradictions and the logic for restructuring the marine governance system

..... 22
3.2 Management Innovation: Cross Sector Coordination and Rights Based Adaptive Management 23
3.2.1 Boundary redefinition: Deep integration of spatial planning authority and fisheries administration 23
3.2.2 Upgrading Controls: Adaptive Spatial Use Regulation Based on Behavior and Fishing Gear ... 24
3.2.3 Institutional Innovation: Building a Market Based Compensation Loop and Green Finance Enabling 24
3.3 Spatial Optimization: Building a Climate-Resilient Marine Protection Network..... 25
3.3.1 Designing a Resilient Network Architecture for the MPAs 26
3.3.2 Implementation pathway for the “National Park + OECMs” combined model 26
3.4 Bridging National and High Seas Conservation Through a Seascape Approach..... 26
3.4.1 Overview of offshore MPAs 26
3.4.2 EEZ–ABNJ connectivity: Representativeness, networks, and the seascape approach..... 27
3.4.3 Multi-Sectoral Governance Lessons for High Seas Conservation 28
3.5 Synergistic Governance: The Climate–Biodiversity Nexus and Blue Carbon Assessment..... 29
3.5.1 Beyond source and sink: From micro-level carbon flux debates to structural carbon stock management..... 29
3.5.2 Innovative Synergistic Indicators: Introducing the Concept of “Biodiversity Integrity Blue Carbon” 30
3.5.3 Challenges and future transition pathways for synergistic governance 30
3.6 Policy Recommendations 31
Appendices..... 32
Appendix 1. Potential and Pathways of the ECR to Support the Implementation of Selected Targets of the KMGBF 32
Appendix 2. Current Assessment Indicator System for the Conservation Effectiveness of the ECR and Its Correspondence with Monitoring Indicators of the KMGBF..... 34
Appendix 3. Proposed Monitoring and Assessment Indicator System for the ECR 36
Appendix 4 Resources mobilization: Innovative Finance Solutions for Marine Ecosystem Conservation38
Appendix 5: Feasibility Pathway Analysis for Incorporating "Biodiversity-Integrity Blue Carbon" into the China Certified Emission Reduction (CCER) Methodology..... 40
References..... 42

Introduction

The world is well on the way to 2030, the deadline for not only the Kunming–Montreal Global Biodiversity Framework (KMGBF) but also the UN Sustainable Development Goals (SDGs). It is still too early to judge how many targets will succeed or fail. Within the KMGBF, particular attention has been paid to Target 3, popularly called 30×30, which aims to ensure that 30% of land, fresh water, and ocean is secured in protected and conserved areas, with many added caveats regarding effectiveness, ecological representation, and human rights and equity. Progress on area-based conservation in the marine realm has been boosted by ratification of the Agreement on Marine Biological Diversity of Areas beyond National Jurisdiction (the BBNJ Agreement), which gives the first opportunity to establish genuine protected areas in the high seas.

The current report looks in detail at three issues, all of which, to some extent, relate to KMGBF Target 3 and to China's contribution to area-based conservation. This includes both China's national conservation policies and its influence on other countries around the world. The text builds on issues raised in previous CCICED reports, which together form an emerging consensus on issues relating to how humanity interacts with the rest of nature.

Section 1 looks at how China's own planning and implementation system for area-based conservation—the Ecological Redlines (ECR) approach—matches the global standards agreed by the International Union for Conservation of Nature (IUCN). Some ECRs match full protected areas, others the relatively new designation of other effective area-based conservation measures (OECMs) and a few fall into broader categories like conservation corridors. Urgent action is needed to agree on firm policies for OECMs and integrate many ECRs outside protected areas into the broader framework of KMGBF Target 3.

Governments can waste a great deal of time and money if they tackle all the multilateral environmental agreements (MEAs) separately, as they are often assigned to different ministries and arms of government, despite having overlapping aims. The need for integration has been discussed in previous CCICED reports, and this year the focus is on marine issues in light of the BBNJ Agreement, and considering institutions such as the UN Convention on the Law of the Sea (UNCLOS), Regional Fisheries Management Organizations, Regional Seas Conventions and Action Plans, the International Maritime Organization, the International Seabed Authority and more.

Finally, all these tools—ECRs, protected areas, OECMs and an array of policy instruments and agreements— are brought to bear on biodiversity conservation in seas around China. The report calls for a comprehensive roadmap, integrating a variety of protection mechanisms, sustainable management approaches, and financial instruments. It also examines the role of coral reefs in carbon accounting, looking at their potential in trapping organic carbon from the open ocean.

The whole text follows the theme of integration. It starts by looking at the commonalities and differences among various approaches to area-based conservation, then calls for a range of marine policy instruments to work more closely together, and finally applies this to the seas surrounding China, as well as international waters. Its central message is one of optimism. Oceanic biodiversity faces equal, perhaps greater, threats than those on land. But the tools, policies and political determination exist to save what is left and restore much of what has been lost.

Topic I: Strengthening China's Biodiversity Conservation through Ecological Conservation Redline and OECM Governance Systems in Compliance with the Kunming–Montreal Global Biodiversity Framework.

1.1. Introduction and Background

1.1.1 Background and significance of the KMGBF and the "30×30" target

Over the past 50 years, global biodiversity has suffered a mounting series of losses, from species decline to habitat destruction. The scale is stark: the average size of monitored wildlife populations has declined by 73%, while freshwater species populations have decreased by 85% [1]. The severity of biodiversity loss has increased rapidly, and the interval between biodiversity-related crises has become much shorter [2]. In other words, global biodiversity is being lost at an unprecedented pace in human history.

The major drivers of global biodiversity loss include climate change, habitat degradation caused by excessive human activities [3], environmental pollution [4], and invasive species [5]. Fundamentally, however, this loss is rooted in uncontrolled human disturbance. To reverse the global decline in biodiversity, the 15th Conference of the Parties to the United Nations Convention on Biological Diversity (CBD COP15) adopted the comprehensive and ambitious KMGBF, a nature-positive goal. The framework addresses biodiversity-related issues through long-term goals, including Long-term Goal A to restore and protect, with Targets 1–8 addressing threats to biodiversity [6]; Goal B regarding the benefits of biodiversity to people, with Targets 9–13 addressing sustainable use of biodiversity; Goal C, which focuses on equitable benefit sharing; and Goal D, which addresses financial support and Targets 14–23 aimed at mainstreaming biodiversity conservation.

This study focuses on Target 3, known as the "30×30" target, which aims to "ensure and enable that by 2030 at least 30% of terrestrial, inland water, coastal, and marine areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved." The 30×30 target addresses the challenge of global biodiversity loss and encourages countries to adopt more effective measures for biodiversity conservation through area-based measures.

1.1.2 Role of the ECR in China's biodiversity governance system

The *China' s National Biodiversity Conservation Strategy and Action Plan (2023–2030)* (NBSAP), released by the Ministry of Ecology and Environment in 2024, states that China aims to "continuously optimize its in-situ conservation system and further strengthen ex-situ conservation." In-situ conservation protects original habitats and natural ecosystems through measures such as the establishment of protected areas. Sustainable use measures outside protected areas, combined with ex-situ conservation, can serve as important complementary approaches.

In China, in-situ conservation largely relies on the protected area system. This covers 18% of the country's terrestrial area and encompasses examples of 90% of terrestrial ecosystem types and 74% of terrestrial wild animal and plant species under national key protection [7]. Building on the protected area system, the ECR incorporates key ecological function zones for biodiversity conservation, wind buffering and sand fixation, water conservation, and other important ecological functions, as well as ecologically sensitive and fragile areas. With broader spatial coverage and more comprehensive conservation approaches, it directly protects the habitats and living environments of key wild animal and plant species. The ECR covers examples of 92.86% of nationally protected wild animal species and 80.60% of nationally protected wild plant species. Compared with protected areas, the extent of ecological corridors within the ECR has increased by 37.14%, forming a denser ecological network and providing more space for migration and dispersal. From 2021 to 2024, the average vegetation coverage within ECRs increased by 1.29%, and net primary productivity rose by 2.22%. The average net primary productivity within the ECRs in each province reaches 0.16–1.16 kg C/m^2, thereby enhancing water conservation, soil and water retention, and resilience to climate change. Therefore, ECRs not only expand the spatial coverage of conservation areas but also contribute to the broader "nature-positive" vision of the KMGBF by supporting the halting of biodiversity loss and enhancing ecosystem integrity and resilience.

1.1.3 Necessity of analyzing the potential of the ECR to support the implementation of the KMGBF

Countries around the world mainly rely on two types of measures to achieve the area-based conservation

target under the KMGBF: protected areas [8] and OECMs [9]. However, as of April 2026, protected areas covered only 17.33% of the world's terrestrial and inland water areas and only 9.79% of marine areas, still far from the 30% conservation target. As an important complement to protected areas for in-situ conservation measures, the potential of OECMs to expand the area under biodiversity conservation remains at an early stage [10]. The Convention on Biological Diversity (CBD) only formally defined OECMs in 2018 and developed principles and criteria for their identification. Therefore, countries that regard OECMs as an effective supplement to protected area systems are now developing national policy frameworks to implement relevant global guidance. To date, the contribution of OECMs to expanding global conservation coverage remains below 2% [11].

Against this background, exploring new area-based conservation models that integrate large-scale spatial protection, ecosystem-level conservation, and collaborative governance by multiple stakeholders has become an important direction for advancing the implementation of the KMGBF. China's ECR model establishes boundaries for ecological space and applies strict protection to those parts of the ECR with important ecological functions, ecologically sensitive and fragile environments, and key biodiversity values. It has formed a systematic conservation network covering protected areas, ecological public welfare forests, important wetlands, and other ecological spaces, achieving notable progress in expanding the scope of biodiversity conservation and enhancing ecosystem integrity.

The ECR not only includes the protection characteristics of protected areas, but also of many ecological spaces that have not been formally designated as protected areas yet have long been effectively conserved and sustainably managed. This is highly consistent with the core concept of OECMs, namely the long-term, effective, in-situ conservation of biodiversity, and gives the ECR strong potential to serve as an OECM model with Chinese characteristics. However, the relationship between the ECR and OECMs has not yet been systematically studied, and its identification criteria, classification system, governance model, and monitoring and evaluation mechanisms require further clarification.

Characteristics and management objectives of parts of the ECR also potentially align with other area-based targets of the KMGBF (e.g., area to enhance resilience to climate change [Target 8], or small-scale, sustainable agricultural production [Target 10]). Therefore, it is necessary to systematically assess the potential of the ECR and potential OECMs to support the implementation and achievement of "nature-positive" goals of the KMGBF, develop a monitoring and evaluation indicator system aligned with the framework, and establish an OECM governance system under the ECR framework that conforms to international rules while reflecting Chinese characteristics. Promoting synergy and complementarity between this system and the PAs system is of great theoretical and practical significance for enriching global area-based conservation models, facilitating the international dissemination of China's ecological civilization concept, and providing policy tools and governance experience that can be used by other countries, especially developing countries.

1.2. Potential of China's ECR to Support the Implementation of the KMGBF

1.2.1 Scientific connotation of China's ECR

The essence of the ECR is to define boundaries, clarify baselines, ensure strict protection, and promote sustainable development consistent with the ecosystem values in the defined areas. Based on scientific assessment, areas containing China's most important natural resources are included within the protection scope for strict protection and orderly development. Local residents are allowed to live within the redline and carry out small-scale production and daily activities. National and local governments support these residents, through policy, financial, and other measures, in developing eco-tourism, understory planting, bamboo forest management, and related activities to increase local incomes.

1.2.2 Consistency between the ECR and international protected area and OECM systems

Existing studies show that the ECR is mostly consistent with protected area and OECM systems elsewhere in terms of conservation objectives, spatial attributes, governance mechanisms, and conservation effectiveness. [12,13] The ECR consists of two main parts dedicated to conservation in addition to parts dedicated to small-scale sustainable activities. One is the protected area system, mainly composed of national parks, nature reserves, and nature parks, which together provide long-term protection for important ecosystems, rare and endangered species, and their habitats through clear legal status and conservation management. The other includes areas with potential OECM attributes, such as important ecological function zones, ecologically sensitive and fragile

areas, and other small-scale conservation zones.

Important ecological function zones are identified by functions such as biodiversity conservation, water conservation, soil conservation, wind buffering, sand fixation, and flood regulation, and therefore directly or indirectly contribute to biodiversity conservation. These areas also contain rare and endangered wild species, endemic and range-limited species, glaciers, and other key components that maintain ecological health and resilience. Protection of important ecological functions indirectly affects the whole ecosystem. Through ecological function regulation, land-use restrictions, and other measures, these areas can achieve the simultaneous goals of biodiversity conservation and ecosystem service maintenance.

Therefore, by delineating clear ecological boundaries and implementing strict use control in a proportion of the ECR and long-term conservation management, the ECR achieves integrated protection of important ecosystems, key biodiversity areas, and ecologically sensitive and fragile areas. Its concept is consistent with the considerations of the "ecosystem approach" advocated by the KMGBF and the "long-term and effective conservation of biodiversity" under OECMs. With clear boundaries, stable management, and high conservation effectiveness, it provides an important foundation for supporting the implementation of area-based conservation targets, including Targets 1, 2, and 3 of the KMGBF.

Compared with international protected area and OECM systems, the ECR has institutional and technical advantages, including unified national-scale delineation, strict use control, and integrated space-air-ground dynamic monitoring (satellite imagery combined with site-monitoring). It provides a new and practical pathway for area-based conservation. At present, global OECM development is still at an early stage, and many countries are exploring area-based conservation models suited to their national conditions. As an original model developed by China, the ECR provides a practical basis for improving China's in-situ conservation system and exploring an OECM governance model with Chinese characteristics. It also offers policy tools and governance experience for the global community, especially developing countries, in promoting the implementation of the KMGBF.

1.2.3 Potential and pathways of the ECR to support the implementation of multiple targets of the KMGBF

The KMGBF sets out 23 global action targets, covering spatial planning, ecological restoration, area-based conservation, sustainable use, climate change responses, biodiversity mainstreaming, and other fields. Through ecological space regulation, ecological conservation and restoration, and dynamic monitoring and evaluation, the ECR has formed a comprehensive institutional system covering spatial planning, ecosystem conservation, and governance capacity building, showing clear synergies with multiple targets of the KMGBF.

For Target 3, the terrestrial area of the national ECR reaches 3.04 million km², accounting for more than 31% of China's land area. In addition to protected areas, about 1.4 million km² within the ECR has biodiversity conservation as a primary or secondary objective, with clear spatial boundaries, long-term stable management, and significant conservation effectiveness. These areas provide an important basis for identification as potential OECMs, as shown in Figure 1. Together with protected areas, their total area exceeds 2.95 million km², which can effectively support the implementation of the 30×30 target of the KMGBF.

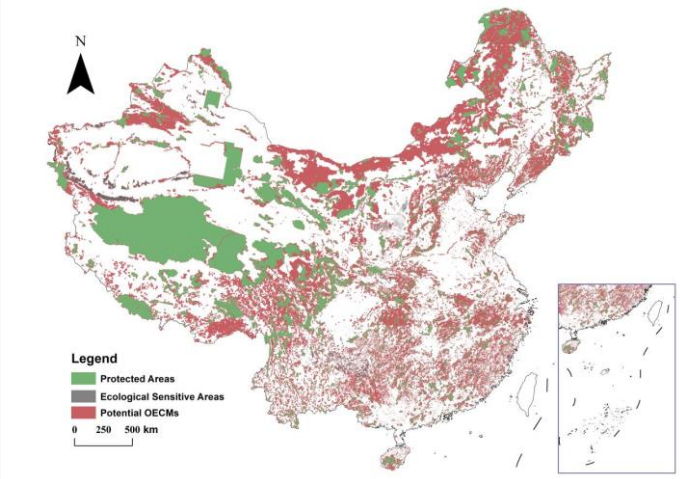


Figure 1. China's Ecological Protection Red Line and OECM Potential Areas

In addition, the ECR supports Targets 1 and 2, relating to spatial planning and restoration. It promotes the

integration of biodiversity conservation into territorial spatial planning and the whole process of economic and social development (Target 1). It also implements ecological conservation and restoration, thereby helping reduce biodiversity loss and promote the restoration of degraded ecosystems (Target 2). In addition, by protecting important ecosystems such as forests, wetlands, and grasslands, the ECR enhances natural carbon-sink capacity and ecosystem-based climate adaptation (Target 8 and/or 11). By guiding development, the ECR further promotes the integration of biodiversity conservation into the whole process of economic and social development. Through an institutional framework that balances strict conservation with sustainable use, ECR safeguards the sustainable resource-use rights of local communities while promoting biodiversity-friendly practices across agriculture, forestry, livestock production, and fisheries, thereby contributing to the mainstreaming of biodiversity conservation (Targets 10 and 14). Overall, the ECR provides a spatial conservation model and practical pathway with Chinese characteristics for the coordinated implementation of multiple targets of the KMGBF. Its potential is shown in Appendix Table 1.

1.3. Development of a Monitoring Indicator System for the ECR to Support the Implementation of the KMGBF

1.3.1 Analysis of the strengths and weaknesses of the ECR assessment system against the monitoring indicators of the KMGBF

1.3.1.1 Strengths of the ECR assessment system

The *Technical Specification for Supervision of ECR: Assessment of Conservation Effectiveness (Trial)* (HJ 1143-2020) states that, in accordance with the requirements of "no reduction in area, no change in attributes, no decline in functions" and strict supervision and management, the assessment indicator system for the effectiveness of the ECR includes four aspects: area, attributes, functions, and management, as shown in Table 2. This system reflects China's institutional features of rigid ecological space protection and whole-process supervision and has clear advantages in spatial control, maintenance of ecosystem integrity, and national-scale ecological security.

Supported by a long-term remote sensing-based dynamic monitoring system, China's ECR framework has developed a national-scale capacity for continuous monitoring and assessment of ecosystem changes, spatial dynamics, and human disturbances within ECRs. At the same time, the effectiveness assessment system of the ECR emphasizes ecological security and ecological functions. It focuses not only on biodiversity, but also on key ecosystem services such as water conservation, soil conservation, wind buffering and sand fixation, flood regulation, and coastal protection, reflecting China's distinctive approach to coordinated governance of ecological security, ecological functions, and biodiversity.

This management model, centred on holistic and systematic ecosystem protection, is highly consistent with the ecosystem-based conservation and governance concept emphasized by the KMGBF. It provides an important practical basis for achieving the global 30×30 target and promoting nature-based solutions (NbS). In addition, the ECR has been incorporated into the territorial spatial planning system, ecological and environmental supervision, and ecological conservation inspection system, forming strong institutional constraints and regulatory enforcement capacity. It therefore has notable institutional advantages at the global level.

1.3.1.2 Weaknesses of the ECR assessment indicator system

From the perspective of the monitoring requirements of the KMGBF, the existing ECR assessment system still has certain weaknesses. First, the system remains incomplete in relation to global indicators that characterize habitat quality, such as habitat connectivity and integrity, the area of degraded land caused by climate change, and other factors. The current system places emphasis on whether an area is protected and strictly regulated, but pays insufficient attention to equitable governance, multistakeholder participation, and the involvement of local communities and the public—or certainly gender equality. This leaves a gap in the KMGBF's requirements for governance equity and collaborative governance. Finally, the differences and links

between the ECR and OECMs have not yet been defined, nor has there been consideration of the identification and effectiveness of OECMs. ECR therefore needs better alignment with global monitoring.

For Targets 1–3, 8, and 10, priority should be given to improving assessments of ecosystem degradation and integrity, the impacts of climate change on biodiversity, progress in sustainable development, equitable governance, and multistakeholder participation. This will expand the ECR assessment system from one focused on ecological space to a monitoring and governance system for global biodiversity, further enhancing the leading role of China's ECR in global biodiversity governance.

1.3.2 Development of an ECR monitoring and assessment indicator system aligned with selected action target indicators of the KMGBF

In view of these shortcomings, it is necessary to develop an assessment indicator system aligned with the monitoring framework of the KMGBF.

First, the effectiveness assessment indicators of the ECR and in the future development of OECMs in China should be aligned more strongly with the global indicators of the KMGBF, relating not only to indicators of KMGBF Target 3 but those of several other relevant targets as well. National indicators should directly mirror and incorporate internationally agreed core metrics such as ecosystem integrity, functional connectivity and diversity alongside area-based targets. The correspondence between the two should be systematically reviewed, key gaps identified, and a monitoring indicator framework unified across national and global scales developed to improve the international comparability of China's implementation assessment.

Second, monitoring and assessment of ecosystem integrity, ecological connectivity, climate resilience, and how sectors incorporate concerns on biodiversity in respective policies and practices should be strengthened in line with KMGBF requirements. Indicators such as habitat integrity, landscape fragmentation, ecological connectivity, ecosystem resilience, and sustainable area and resource-based production should be improved, promoting a shift in monitoring and assessment from "area-based protection" to "quality protection" and "functional restoration."

Third, the connection between the ECR and the OECM system should be strengthened, and indicators related to governance effectiveness and social participation improved. In accordance with the KMGBF's requirements for equitable governance, gender equality, multistakeholder participation, and the participation of Indigenous Peoples and local communities (IP&LCs), indicators of community participation, effectiveness of ecological compensation, ecological benefit-sharing mechanisms, local governance capacity, and public participation should be incorporated. Joint management by the government and multiple stakeholders should be strengthened to form a governance assessment framework. The proposed monitoring indicator system is shown in Appendix 3.

1.4. Optimization of Multidimensional Delineation Guidelines for the ECR and OECM Management Measures Serving the KMGBF

1.4.1 Optimization of the delineation principles and system composition of the ECR for the implementation of the KMGBF

The existing ECR focuses on protected areas, important ecological function zones, and ecologically sensitive and fragile areas as its core conservation targets. Its delineation principles emphasize important ecological and resource conservation dimensions, forming a relatively complete conservation network for rare and endangered species, typical ecosystem types, and important ecological functions. Indicators such as species diversity, genetic diversity, and phylogenetic diversity can be added to identify biodiversity-rich areas and hotspots, expand conservation coverage, and improve biodiversity conservation effectiveness.

In addition, broader social and community-level elements emphasized by the KMGBF were not fully reflected in the original delineation of the ECR. Since protected areas in China are usually governed and managed by government agencies, the updated ECR framework should take OECMs into account to address

insufficient participation by local communities, enterprises, and other non-governmental actors. Under the new framework, the general structure of the ECR can be expanded into "protected areas + OECMs, with some ECRs fitting neither approach." In this case, OECMs have the following characteristics:

Biodiversity conservation redline: This mainly includes habitats of nationally protected key wild species, key nodes along major species migration routes, priority areas for biodiversity conservation, typical ecosystems, and hotspots of genetic and phylogenetic diversity.

Ecosystem function redline: In view of their relevant biodiversity values, this includes areas for wind buffering and sand fixation, water conservation, soil and water conservation, flood regulation, carbon sequestration, and natural disaster mitigation.

Social benefits and human well-being: This includes cultural landscapes with high conservation value, local or traditional communities, and areas with both ecological conservation value and sustainable eco-tourism development value, along with biodiversity value.

1.4.2 Study on the OECM governance and management system based on the ECR

Although China's ECR covers more than 30% of its terrestrial area (including 18% protected areas and an anticipated 13% OECMs), the marine ECR remains far below the 30% coverage. Furthermore, setting marine ECRs creates particular challenges, including issues of vertical zoning, complex stakeholder relationships and often a lack of data, which need to be addressed. In addition, how potential OECMs inside the redline but outside protected areas, and potential OECM areas outside the redline, can be formally recognized as OECMs remains unclear, and a national OECM framework is still incomplete.

1.4.2.1 Principles for OECM identification

Based on the definition and identification criteria for OECMs adopted at CBD COP14, and in light of the characteristics of China's ECR system, the identification of potential OECMs within the redline should follow the following principles:

1) **Biodiversity conservation effectiveness:** The identified area should maintain important species, habitats, or ecosystem integrity over the long term and generate sustained and quantifiable biodiversity conservation outcomes.

2) **Complementarity with protected areas:** Attention should be given to identifying important ecological spaces within the ECR outside protected areas, so as to avoid double counting with existing protected areas and ensure they play a complementary role in area-based conservation.

3) **Ecological integrity:** The identified area should have high ecosystem integrity and connectivity and be able to maintain key ecological processes and ecosystem service functions.

4) **Long-term stable management:** The identified area should have clear boundaries, unlikely to be changed under adjustments to territorial spatial planning, and a long-term stable management mechanism to ensure the continuous achievement of conservation objectives.

5) **Categorized management:** OECM implementation should be carried out based on different ecosystem types, governance actors, and management objectives.

1.4.2.2 OECM identification process and governance system

Based on the above identification principles, this section proposes a basic process for OECM identification within and outside the ECR. The process includes identification of potential areas, submission of application, technical review, recognition and approval, reporting to global databases, routine and adaptive management, and long-term monitoring and assessment of effectiveness.

First, a national assessment identifies areas important for biodiversity and prioritizes them for conservation or protection. Second, eligible individuals or organizations, including enterprises, local communities or community management bodies, social organizations, environmental protection organizations, and research institutions, based on the national assessment, conduct preliminary screening of areas outside protected areas that may meet the global OECM identification criteria. Candidate areas are then systematically assessed using the IUCN OECM assessment tool. For areas that meet the identification criteria and obtain the informed consent of relevant stakeholders, the applicant prepares OECM application materials and initiates the formal application process.

After the application materials are submitted, a review committee composed of independent experts conducts a technical review according to unified OECM identification criteria to verify whether the candidate area meets the requirements for OECMs. Areas that pass the technical review are included in the OECM

candidate list and submitted to relevant competent authorities—such as the Ministry of Ecology and Environment, the Ministry of Natural Resources, and the State Oceanic Administratio—for review, recognition, and final approval. After approval, the Ministry of Ecology and Environment files the OECM records in a unified manner and clarifies the management body and OECM type.

During the management stage, the applicant is mainly responsible for routine operation, management optimization, and public participation in the OECM. The Ministry of Ecology and Environment is responsible for unified supervision and guidance and for establishing a dynamic management mechanism. According to the OECM type, relevant competent authorities regularly conduct long-term monitoring and assessment of conservation effectiveness, focusing on biodiversity conservation outcomes, ecosystem integrity, and governance effectiveness. The assessment should be constructive, identifying issues and proposing recommendations for improvement. Where requirements remain unmet despite improvement efforts, final assessment results shall determine whether the area should remain on the national OECM list, thereby forming a closed-loop management process of "OECM identification–management–monitoring–assessment–dynamic adjustment."

1.5. Policy Recommendations

(1) Optimize the delineation and assessment indicator systems for terrestrial and marine ECRs by aligning them with the implementation indicators of the KMGBF**, especially Targets 1–3, Target 8, Target 10, Target 14, Targets 22-23 and their corresponding monitoring indicators.**

Firstly, indicators such as species diversity, genetic diversity, and phylogenetic diversity can be added to identify biodiversity-rich areas and hotspots, expand conservation coverage, and improve biodiversity conservation effectiveness. This will enable the ECR to support China's national biodiversity strategy and action, including the targets of spatial planning, species conservation, climate adaptation, and sustainable use under the KMGBF, and help other countries carry out similar actions. **Secondly,** other indicators that could be explored include equitable governance, inclusive participation and social outcomes. Monitoring may need to be disaggregated to understand how different groups experience and benefit from ecological conservation. **Thirdly,** establishing a policy support system for the international promotion of the ECR system, covering policy, planning, funding, and capacity building, could contribute Chinese solutions and leadership to global implementation.

(2) Accelerate the development and release of a national OECM policy framework to support the establishment and conservation of diverse OECMs with broad participation from society.

Firstly, support identifying the 1.4 million km² of non-protected areas within China's ECR that can become OECMs through effective governance and management. **Secondly,** there are still many areas outside the ECR, including marine areas, that meet OECM criteria. Therefore, it is recommended that, based on relevant CBD and IUCN-WCPA guidelines, China introduce national identification and management standards for terrestrial/freshwater and marine OECMs as soon as possible. **Thirdly,** a unified OECM identification, certification, management, and monitoring framework should be established for areas both inside and outside the redline, forming a diversified OECM governance system and promoting its implementation. Within the framework, the prerequisite for creating a new OECM also includes conducting relevant social and environmental screening and sufficient consultation. This will advance inclusive in-situ conservation and sustainable development, and enable OECMs, protected areas, and the ECR to form a systematic conservation system covering terrestrial, freshwater, coastal, and marine areas, accelerating the realization of the national vision of harmony between humanity and nature.

Topic II: Identifying Synergies among Treaties and Exploring China's Contribution to Marine Biodiversity Conservation

2.1. Introduction

The global community has entered a new phase of ocean governance through the entry into force of the BBNJ Agreement. The BBNJ Agreement sits alongside a number of instruments with increasingly overlapping and/or complementary mandates, geographic remits, and operational demands, including the CBD, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on Migratory Species (CMS), the International Maritime Organization (IMO), regional fisheries management organizations (RFMOs), Regional Sea Organizations (RSOs), and the International Seabed Authority (ISA). These multiple legal frameworks reflect the scale and complexity of tackling the biodiversity crisis across the global ocean but also create risks of fragmented implementation, duplicated efforts, and missed opportunities for efficiency. Coordinated implementation across these multilateral environmental agreements and ocean governance instruments and bodies is essential to ensure that policy commitments are coherent and translate into measurable outcomes at sea, harmonize conservation standards, and reduce administrative costs. With its explicit focus on cooperation, the BBNJ Agreement offers an opportunity for increased coherence.

China occupies a unique strategic position in this evolving governance landscape. As president of CBD COP15, which adopted the seminal KMGBF, and as an early signatory to the BBNJ Agreement, China has demonstrated leadership in advancing multilateral cooperation on biodiversity. China is also a key member of a number of other international instruments that influence ocean governance and global biodiversity policy, placing it at the intersection of multiple governance regimes with shared responsibilities for ocean health. This positioning offers China the opportunity to integrate its considerable domestic conservation expertise—built through decades of terrestrial and coastal protected area management—into the design and implementation of global ocean governance mechanisms and promote policy coherence across the instruments to tackle the global biodiversity crisis.

The urgency of this integration is underscored by the marine conservation gap that persists at both national and global levels. Currently, only approximately 4.8% of China's marine waters are formally protected [14] while globally around 10% of ocean area is designated as marine protected areas (MPAs) [15], with credible estimates suggesting that only around 3% are effectively managed [16]. Against the backdrop of Target 3 of the KMGBF to conserve and effectively manage at least 30% of terrestrial, inland waters, and coastal and marine areas by 2030, closing this gap represents one of the most pressing imperatives in international environmental policy to ensure the global ocean remains healthy and productive for future generations. Meeting Target 3 will require coordinated action both within national jurisdictions and in areas beyond national jurisdiction, where the BBNJ Agreement provides new legal tools but where governance capacity remains nascent.

This section examines how synergies among multilateral environmental agreements and ocean governance instruments and bodies can be leveraged to accelerate marine biodiversity conservation, with particular attention to China's role in catalyzing coordinated global action. The analysis is structured in three parts. The first reviews the alignment of marine spatial frameworks under multiple conventions, including the correspondence between Ecologically or biologically significant marine areas under the CBD and area-based management tools (ABMTs) under the BBNJ Agreement, as well as related spatial mechanisms under other ocean governance instruments and bodies. The second assesses synergistic approaches among species-focused multilateral environmental agreements and the BBNJ Agreement to identify governance gaps and overlaps in the sustainable use of marine species. The third examines linkages between the targets of the KMGBF and the implementation of the BBNJ Agreement, situating China's participation in ocean governance bodies within a coherent global framework.

2.2: Alignment of Marine Conservation Area Identification Criteria and Collaborative Governance Pathways

The BBNJ Agreement establishes an overarching framework for the conservation and sustainable use of

marine biological diversity in areas beyond national jurisdiction. Its provisions in ABMTs provide procedural and institutional channels for considering spatial management measures, but their implementation depends heavily on scientific data and cooperation among global, regional, and sectoral competent bodies. Upon entry into force, the BBNJ Agreement provides a new legal basis for considering and, where appropriate, establishing ABMTs, including MPAs. At the same time, and taking into account their differing objectives, various spatial or spatially relevant instruments have been developed under other regimes: Ecologically or Biologically Significant Marine Areas (EBSAs) under the CBD, Particularly Sensitive Sea Areas (PSSAs) designated by the IMO, Vulnerable Marine Ecosystems (VMEs) designated and managed by RFMOs, environmental management areas or areas of particular environmental interest established by the International Seabed Authority (ISA), and finally, existing regional MPAs or comparable spatial measures in areas beyond national jurisdiction under relevant regional arrangements.

EBSAs offer a comprehensive scientific basis for identifying marine areas of high ecological and biological value, but they do not themselves set management measures or impose legal obligations. PSSAs primarily address shipping-related environmental risks; VMEs focus on mitigating the impacts of fishing activities on vulnerable deep-sea ecosystems; ISA-related spatial instruments target environmental management of human activities in the international seabed area; MPAs established by Regional Seas Conventions, are established with the objective of conserving biodiversity. These mechanisms differ significantly in legal authority, geographic scope, decision-making procedures, management objectives, and regulated activities. While this pluralistic landscape forms a basis for management, it also leads to fragmented governance, as the same marine space may be subject to disparate regulatory logic with poor coordination.

EBSAs are identified based on seven criteria: uniqueness or rarity; special importance for life-history stages of species; importance for threatened, endangered, or declining species and habitats; vulnerability, fragility, or slow recovery; biological productivity; biological diversity; and naturalness. These criteria remain key for identifying ecologically valuable areas, but the logic of EBSA identification differs from that of ABMT establishment. EBSAs explain why an area is ecologically or biologically significant, whereas ABMT proposals are more comprehensive and must specify conservation objectives, environmental pressures and threats, management measures, implementation arrangements, monitoring requirements, and linkages with existing instruments and competent bodies. Accordingly, EBSAs should not be equated with ABMTs; their appropriate and valuable role is to provide scientific input for case-by-case scoping, developing, and reviewing ABMT proposals, including MPA proposals under the BBNJ Agreement. This reflects the potential complementarity between EBSA criteria and the indicative criteria for ABMTs under the BBNJ Agreement, but does not imply automatic translation from EBSA identification to ABMT designation.

While EBSAs can inform the scientific basis for an ABMT proposal, it is important to highlight that they will likely need to be complemented with additional information, as science progresses with further collection of data and understanding of the areas. Scientifically, the current EBSA portfolio is the most comprehensive effort to date to identify areas of ecological and biological importance in the high seas, drawing on contributions from hundreds of experts. While EBSAs therefore are the best available current evidence, the data still has some challenges, including uneven data coverage, regional and taxonomic biases, inconsistent expert-based identification methods, limited capacity for dynamic updating under climate change, and mismatches between broad EBSA boundaries and the fine spatial resolution required for management. Some EBSAs are large and ecologically heterogeneous, such as the Tongan Archipelago in the western South Pacific Ocean, or the vast Southeast Kamchatka coastal and shelf waters in the Russian Federation, making direct translation into single management units challenging. Institutionally, EBSAs are non-binding scientific designations under the CBD, while ABMTs require formal proposal, scientific and technical review, decision-making by the Conference of the Parties, and subsequent implementation and reporting. Thus, the core practical issue is not whether EBSAs can be granted direct legal effect, but how EBSA information can be incorporated into BBNJ procedures as a recognized and usable scientific evidence base, without pre-judging the outcome of intergovernmental decision-making.

Comparative analysis with other marine spatial management mechanisms further shows that alignment requires balancing ecological criteria and institutional mandates. VMEs, PSSAs, and ISA spatial tools target specific sectors and human activities: VMEs focus on demersal fishing control and deep-sea vulnerable ecosystem protection; PSSAs aim to reduce environmental risks from international shipping; ISA spatial measures support environmental governance of deep-seabed mineral activities. These instruments may spatially overlap with EBSAs and future ABMTs but do not necessarily share the same conservation objectives or management scope. This means BBNJ implementation cannot simply absorb or replace existing mechanisms;

instead, it must leverage institutional complementarity: maintaining effective existing tools, while coordinating the identification of gaps where biodiversity objectives are unmet, or advising on measures that could be adjusted or introduced, and promoting coordination among multiple bodies operating in the same area.

Three preliminary pathways for using EBSA information to support ABMT-related assessment and proposal development may be considered:

1) **Scientific Reference Pathway**: For well-documented EBSAs, EBSA information may serve as an important scientific reference for further assessment of possible ABMTs, including MPAs. This pathway is most relevant for areas with clear ecological values, robust scientific evidence, and a favourable policy context.

2) **Scientific Input and Refinement Pathway**: For data-limited EBSAs, their initial recognition information could be used as an initial screening layer rather than as fixed boundaries. Remote sensing, species distribution models, deep-sea surveys, pressure mapping, and human activity data could be used to refine conservation objectives, possible management options, and potential ABMT boundaries. This pathway is broadly applicable in the near term, as it avoids over-reliance on EBSA status while retaining their scientific value.

3) **Dynamic Adaptive Pathway**: For mobile, seasonal, or climate-sensitive ecological features, EBSA information could be combined with AIS data, satellite observations, and near-real-time ecological indicators to support adaptive management approaches or ABMTs. This approach demands stronger monitoring capacity and institutional flexibility but better addresses spatiotemporally dynamic ecological processes.

Aligning marine spatial management frameworks essentially involves building functional linkages among existing governance regimes. EBSAs provide a critical scientific foundation but may require dynamic updating and additional data before they can support operational ABMTs. Sector-specific instruments under IMO, RFMOs, and ISA offer practical management experience but need alignment with broader biodiversity objectives. The BBNJ Agreement creates institutional space for such coordination while respecting existing mandates, and its effectiveness depends on integrating scientific information, sectoral mandates, and political decision-making. Future efforts should advance cross-mechanism integrated spatial assessments and systematic comparisons of ecological criteria, while enhancing information exchange among the BBNJ COP and its Scientific and Technical Body, the CBD Secretariat, IMO, RFMOs, ISA, and relevant regional organizations. Standardized spatial data formats and interoperable databases could help translate coordination from concept to practice. Coordination should also be strengthened with Regional Seas Conventions that have mandates covering areas beyond national jurisdiction (ABNJs) and species-specific MEAs, whose listed species informed some of the described EBSAs.

China has accumulated extensive experience in deep-sea scientific research, marine biodiversity monitoring, and participation in CBD and BBNJ processes. It can leverage these capacities, in cooperation with relevant countries, organizations, and scientific networks, to support EBSA information updates and broader spatial data improvement. China can also actively engage in discussions on the rules and procedures of the BBNJ Scientific and Technical Body, particularly regarding how EBSA information and other spatial datasets should be referenced in ABMT proposal development and technical review without prejudging specific designations. In addition, capacity-building cooperation with developing countries can be strengthened in biodiversity data integration, EBSA identification, marine spatial analysis, and ABMT proposal development. Such engagement enables China to contribute scientific resources while promoting inclusive and balanced BBNJ implementation.

2.3: Collaborative Governance Mechanisms for Key Marine Protected Taxa under Multilateral Conventions

Marine biodiversity conservation is addressed by numerous international conventions and organizations, including the CBD for overall biodiversity conservation and sustainable use, the CMS for migratory species protection, CITES for regulating international wildlife trade, RSOs the Ramsar Convention for wetland ecosystem and critical habitat protection, the International Convention for the Regulation of Whaling (ICRW) for cetacean conservation and management, the Inter American Convention for the Conservation and Protection of Sea Turtles (IAC), the United Nations Framework Convention on Climate Change (UNFCCC), and the new-force BBNJ Agreement.

The CBD addresses marine conservation and sustainable use through dedicated agendas on halting species extinctions, sustainable wildlife use, and genetic resource benefit sharing. CMS addresses multiple threats to migratory species—including climate change, light pollution, underwater noise, illegal hunting, and fisheries bycatch—by establishing global cooperation platforms, facilitating international collaboration, supporting scientific research, and developing conservation agreements and action plans, thereby providing full-cycle protection for migratory species, habitats, and migration routes through cross-border cooperation among range states. CITES regulates international trade in marine species via its wildlife import/export permit system, notably the Introduction from the Sea (IFS) regime, which strictly controls the introduction of CITES-listed species captured in areas beyond national jurisdiction. The ICRW established the International Whaling Commission (IWC), which focuses on approximately 15 large and medium-sized cetaceans historically targeted by commercial whaling, achieving conservation through a global commercial whaling ban. The IAC promotes the protection, conservation, and recovery of populations of sea turtles and those habitats on which they depend, on the basis of the best available data and taking into consideration the environmental, socioeconomic, and cultural characteristics of the Parties. Additionally, RFMOs are responsible for high-seas fisheries governance; adopting legally binding conservation and management measures for transboundary, highly migratory, and high-seas fish stocks; reducing fishing impacts on ecosystems through catch quotas, gear restrictions, and spatial/temporal controls; and promoting sustainable fisheries.

All instruments above are relevant for establishing coordinating and collaborating mechanisms with the BBNJ Agreement. However, for the subsequent analysis, CITES and CMS have been selected, considering that these conventions cover a broader taxonomic scope, have a larger number of Parties, and both adopt an appendix-based listing approach, whereby species of concern are included in their appendices and managed accordingly to achieve conservation goals. They are therefore species-specific instruments that complement the BBNJ and KMGBF. However, their focus and objectives differ, with variations in taxa coverage. CITES regulates international wildlife trade via graded appendices and permits, listing species in three appendices based on extinction and trade risk: Appendix I for endangered species, trade permitted only under exceptional circumstances (e.g., scientific exchange, captive breeding); Appendix II for species not yet endangered but requiring trade controls to avoid survival risks; Appendix III for species subject to trade control at the request of at least one Party. CMS lists migratory species in two appendices based on conservation status and international cooperation needs, with distinct obligations: Appendix I for endangered migratory species requiring strict protection; Appendix II for species with unfavourable conservation status needing international agreements for conservation, management, and sustainable use, or benefiting significantly from international cooperation, protected through global/regional binding Agreements or non-binding Memoranda of Understanding.

As of 23 March 2026, according to the Species+ database (https://www.speciesplus.net/) jointly covering CITES and CMS appendices, a total of 41,120 species are listed in CITES appendices: 1,175 in Appendix I, 39,407 in Appendix II, and 538 in Appendix III, including 6,689 animals and 34,431 plants (Appendix II >95%, plants >83%). CMS lists 1,205 animal species/subspecies, with Appendix II >84% and birds >80%. CMS covers mammals, birds, reptiles, fish, and one insect, while CITES also includes amphibians, corals, and other invertebrates. Of the over 6,000 animal species in CITES appendices, more than 2,000 are marine. In recent decades, an increasing number of marine species—especially widely distributed high-seas sharks—have been added to CITES appendices. CMS also lists approximately 200 marine species, including cetaceans, sea turtles, sharks, and seabirds.

A total of 369 species/subspecies are listed in both conventions, concentrated in birds, mammals, fish, and reptiles across 28 orders, with Falconiformes (falcons) and Cetacea (whales and dolphins) accounting for over half. Acipenseriformes (sturgeons, etc.), Artiodactyla (even-toed ungulates), Gruiformes (cranes, rails, etc., Carnivora (cats, dogs, bears etc.), Passeriformes (perching birds, songbirds), and Ciconiiformes (storks) together exceed 25%, reflecting consensus on joint protection for highly migratory species at risk of cross-border trade. All CMS-listed reptiles are Testudines (turtles), all in CITES appendices. Both conventions also jointly cover the European eel (*Anguilla anguilla*) and some widely distributed shark species.

Multiple international conventions and organizations form a complementary framework addressing inherent governance gaps. CITES enables precise control of international trade via permits and non-detriment findings (NDFs) but cannot address habitat loss or domestic trade. Its high-seas regulatory challenges include strong cross-border mobility, complex vessel ownership, difficulties verifying catch locations and traceability, widespread transboundary bycatch and misreporting, inconsistent Introduction from the Sea implementation standards, poor data sharing with RFMOs, and high concealment in small-scale fisheries, unreported catches,

and cross-border transshipment, leading to permit evasion, false declarations, and regulatory loopholes. CMS addresses diverse threats, such as habitat degradation and migration disruption, but does not automatically trigger binding conservation obligations; without supplementary agreements, implementation depends on uneven national participation. The CBD is an "umbrella" biodiversity conservation body with targets for species protection, but it has limited scope for measures in the high seas. In addition to conservation, it focuses on benefit sharing and sustainable use but emphasizes frameworks and global targets, with implementation relying on Party commitment and resources.

RFMOs are responsible for the conservation, management, and sustainable use of fish stocks within their respective Convention Areas. Frequently, RFMOs prioritize resource utilization over ecosystem-wide protection, centring their work on target species quotas and fishing controls with limited coverage of non-target species, VMEs, deep-sea habitats, and marine genetic resources, covering only ~5% of high-seas fisheries. Data discrepancies lead to a negative conservation impact on non-target species or species that are less frequently caught (endangered, highly migratory, and benthic species). RFMOs are regionally fragmented with inconsistent standards, and implementation capacity and track records. As the BBNJ Agreement just entered into force and will soon start operating, there is a real opportunity that this instrument catalyzes or promotes strengthened collaboration among CITES, CMS, CBD, IWC, IAC, RFMOs, and BBNJ for marine biodiversity conservation, by encouraging that species of priority concern under one convention are embedded in the decisions and work plans of other conventions, so that conservation measures are mutually reinforcing and complementary at the species level. It is also an opportunity to develop joint work plans that define collaborative timelines and division of responsibilities among conventions on shared objectives, avoiding duplication and policy conflicts; promote cross-participation of technical and scientific body experts through mutual observer arrangements, joint workshops, or collaborative scientific assessments, to facilitate information sharing and methodological harmonization; resolve taxonomic inconsistencies; and align listed species as much as possible. China should push for data interoperability between conventions in areas such as population, threat, trade, fishing, and habitat data to support informed decision-making. Collaborative mechanisms at international and national levels should broaden funding sources, providing comprehensive biodiversity protection beyond single-species solutions.

2.4. Where KMGBF Targets Relate to Ocean Governance

The KMGBF provides the overarching global policy framework for halting biodiversity loss across all ecosystem realms, including the ocean. Although not all KMGBF targets explicitly reference marine ecosystems, the Framework applies equally to marine and coastal biodiversity by virtue of the CBD's scope and the crosscutting design of the goals and targets. Its targets collectively address the main drivers of marine biodiversity loss through provisions on spatial planning and area-based conservation (Targets 1 and 3), sustainable use of wild species and fisheries (Targets 5, 9 and 10), pollution reduction (Target 7), climate change and ocean acidification (Target 8), ecosystem restoration and nature-based solutions (Targets 2 and 11), and biodiversity mainstreaming across sectors and decision-making processes (Targets 14 and 15).

Within this broader policy architecture, the BBNJ Agreement complements the KMGBF by providing a legally binding framework to operationalize these global biodiversity objectives in the high seas. While the KMGBF sets shared goals and targets, the BBNJ Agreement establishes concrete mechanisms—such as AMBTs, environmental impact assessments, capacity building and technology transfer, and benefit sharing for marine genetic resources—that directly support the achievement of KMGBF targets in areas beyond national jurisdiction. In this way, the BBNJ Agreement functions as a key implementation pathway for the high seas, for translating the KMGBF's ambition into action where sectoral fragmentation and governance gaps have historically constrained conservation outcomes.

Against that backdrop, China's membership in a wide range of frameworks spanning biodiversity conservation, fisheries management, maritime transport, and seabed activities positions the country to contribute constructively to greater alignment across regimes**.** This engagement encompasses, inter alia, the United Nations Convention on the Law of the Sea (UNCLOS), various RFMOs (both tuna and non-tuna-focused bodies), CCAMLR (for conservation of marine life and regulation of fisheries), IMO, ISA, and Regional Seas Action Plans (e.g., the NorthWest Pacific Action Plan [NOWPAP]) and the species/taxa-related conventions and bodies

(as Section 2.3 above outlines). Alignment is particularly important for addressing cumulative pressures on marine biodiversity, such as overfishing, pollution, climate change, and emerging seabed activities. More integration can reduce fragmentation, strengthen ecosystem-based management, and support a science-based approach to conserving and sustainably using the ocean.

Given its engagement across multiple ocean-related sectors and institutions, China is uniquely positioned to support alignment between existing ocean governance bodies and the objectives of the KMGBF, without duplicating or supplanting existing mandates. In practical terms, this contribution lies less in the creation of new institutions and more in a consistent policy position across bodies while also promoting the consistency of objectives, standards, and practices across sectoral processes relevant to marine biodiversity conservation.

This role is reflected both domestically and internationally. Domestically, by embedding KMGBF goals in national ocean policies and implementation frameworks, China can strengthen national coherence in, for instance, marine protection, fisheries management, marine spatial planning, and offshore development, while promoting inclusive and equitable governance and generating transferable experience. Sharing lessons and technical approaches internationally can support a science-based, inclusive, effective ocean governance system aligned with KMGBF implementation.

At an international level, China can support more joined-up ocean governance by working through the existing sectoral and biodiversity bodies in which it participates, enabling it to reinforce policy coherence through coordinated positions, information sharing, and cross-referencing of biodiversity objectives in decision-making. A practical avenue is to promote greater consistency of positions across fisheries, shipping, seabed activities, and biodiversity fora by systematically reflecting agreed KMGBF objectives—particularly Target 3—in sector-specific discussions and decisions. By supporting measures that are compatible with area-based conservation, including the acceleration of a network of MPAs, using a seascape approach, bridging national and international waters, and encouraging information exchange between biodiversity-related and sectoral processes, China can help reduce policy incoherence without creating new institutional structures. China can also exercise a coordination role through agenda setting and convening, particularly in multilateral and South–South cooperation contexts and may also be able to fill some of the gaps in the science network (for instance in the IPCC and IPBES).

These international efforts can be further reinforced through BBNJ implementation. China can operationalize coordination by actively using cooperation provisions under the BBNJ Agreement and supporting cross-sectoral pilot initiatives in international waters. Sharing policy experience, engaging in technical dialogues, facilitating shared use of scientific data, and documenting lessons learned through dialogue platforms, pilot initiatives, and cooperation mechanisms would allow China to contribute constructively to coherent implementation, international learning, and confidence building. Through convening roles, technical cooperation, and learning-by-doing approaches, China can act as an enabling actor that strengthens alignment across ocean governance systems to establish the first generation of high-seas MPAs, while respecting existing mandates.

This systemwide approach is reflected in national biodiversity planning. With respect to China's NBSAP, an assessment of the updated version shows strategic alignment with the KMGBF through phased objectives and guiding principles tailored to national circumstances. In relation to ocean protection, the updated NBSAP (2023–2030) reflects the comprehensive, cross-ecosystem scope of the KMGBF by embedding marine and coastal biodiversity considerations within broader biodiversity, sustainability, and development objectives. Rather than treating the ocean as a standalone sector, the NBSAP aligns with the KMGBF's ecosystem-wide approach by addressing key drivers of marine biodiversity loss—such as habitat degradation, pollution, climate change impacts, and unsustainable use—through integrated targets on spatial planning, restoration, sustainable fisheries and aquaculture, pollution control, and biodiversity mainstreaming across sectors.

Through this alignment, China's NBSAP provides a domestic policy bridge between global biodiversity commitments under the KMGBF and international ocean governance efforts, including those under the BBNJ Agreement. By applying KMGBF-consistent objectives to national planning and implementation frameworks,

China strengthens coherence between actions within national jurisdiction and its engagement in international processes, affecting areas beyond national jurisdiction. This approach supports learning-by-doing, facilitates international cooperation and reporting coherence, and contributes to a more integrated, science-based implementation of global biodiversity goals across land and sea.

Topic III: Innovation in Protection and Management Strategies for Typical Marine Ecosystems

3.1 Introduction: Current Status and Misalignment of China's Marine Protection System

The "30×30" target of the KMGBF calls for an integrated approach to marine biodiversity protection, using different area-based conservation tools in complementary ways. These tools include spatial planning, MPAs, and OECMs. The effectiveness of marine conservation also requires careful consideration of the marine-freshwater interface, particularly in the case of mangroves and coral reefs, incorporating a continuity perspective that spans watersheds, coastal zones, and the open ocean.

For China, aligning with the global framework requires a scientifically prudent, two-track strategy: expanding protected area coverage and improving management effectiveness are equally important. At present, China's marine spatial protection tools are anchored on MPAs and ECRs, supplemented by a sector-led seasonal fishing moratorium. Together, they form the foundation of a strict spatial and temporal control system. However, under the dual pressures of intensive marine resource use and climate change, the existing management model reveals mismatches in three areas when it comes to handling the three-dimensional fluidity of marine ecosystems and aligning with international OECM standards: spatial layout, management standards, and long-term mechanisms. Each of these dimensions are now examined to diagnose institutional, capacity, and financial gaps, and to provide a reference for building a modern marine governance system.

3.1.1 Review of existing management models: MPAs and seasonal fishing closures

China's marine protection and sustainable use measures need more coherence at the top-level of institutional design, mainly visible as overlapping tools and fragmented responsibilities. Nature reserves, special MPAs, and ECRs intersect in their legal authority, spatial boundaries, and departmental jurisdiction, making it difficult to pool governance resources. Spatially, protection resources are heavily skewed toward nearshore areas. Places where tenure is clear and administrative boundaries are easy to draw—such as mangroves—receive most of the investment. In contrast, subtidal habitats further offshore, including coral reefs, seagrass beds, and kelp forests, as well as the vast deep sea, suffer from ambiguous jurisdiction and severely insufficient protection coverage [17]. This structural bias—"nearshore heavy, offshore light"—further weakens the overall resilience of the protection network as climate impacts intensify. In the South China Sea, for example, rising sea temperatures, worsening acidification, and frequent extreme marine heat waves have already caused widespread coral bleaching. The bleaching risk also shows significant regional variation, adding further uncertainty to the entire marine protection network [18].

Currently, ECRs function mainly by capping sea-use intensity and using administrative orders to push fisheries and transport out of designated areas. However, the accompanying benthic habitat restoration is costly, and needs long-term ecological monitoring and stable funding. Whether non-market restoration models can integrate with natural succession and be sustained over the long term remains uncertain. At the same time, the summer fishing moratorium is a central tool in China's fisheries management, but it is essentially a temporary administrative intervention aimed at securing the current year's supply of commercial fish. Without clear fishing rights and long-term compensation mechanisms for coastal communities, fishing intensity often rebounds sharply once the moratorium lifts, quickly consuming the biological resources accumulated during the closure [19]. There is a fundamental tension between this kind of short-term control and the long-term recovery needs of ecosystems, meaning that governance inputs are difficult to translate into lasting biodiversity gains. The analysis above points to an urgent need to move from periodic administrative controls to a multi-dimensional solution, plus a permanent spatial management system supported by compensation, so as to achieve coordinated spatial and temporal governance.

3.1.2 Diagnosing the institutional gap: Distance between China's management standards and international protected and conserved area standards

Measured against the OECM standards of the KMGBF, China's current marine protection and management measures show clear gaps in three key dimensions: long-term durability, management effectiveness, and sustained governance [20].

The **durability standard** requires spatial protection measures to be continuous and long-lasting. The summer fishing moratorium is a temporary administrative measure. Once it ends, fishing intensity rebounds rapidly, consuming the biological accumulation of the closure period, which makes it difficult to be internationally recognized as a long-term in-situ conservation measure. ERCs, although spatially stable, face challenges to their long-term authority under the pressure of periodic adjustments in territorial spatial planning; local governments may compromise between economic development and conservation commitments.

The **management effectiveness standard** demands that area-based management produces quantifiable and verifiable biodiversity outcomes. The management effectiveness assessment of non-PA area-based measures (such as ecological redlines and seasonal fishing bans) in China is still in progress. Assessments show that while governance bodies have become clearer after institutional reform, notable weaknesses remain in both process management and output effectiveness [21]. Improving management effectiveness requires efforts on three fronts: strengthening grassroots professional management capacity, attracting private sector participation, and establishing long-term monitoring systems for key target species. The ultimate goal is to shift protected area management from "static compliance"—meeting only paperwork requirements—to adaptive management, which means dynamically adjusting measures based on monitoring data so as to continuously generate biodiversity gains.

The **sustained governance standard** requires management mechanisms to be maintained over time and across cycles, so that biodiversity benefits are consolidated rather than dependent on short-term interventions. China's current marine environmental governance relies to some extent on short-term, concentrated campaigns. These can boost local indicators quickly, but once administrative pressure eases, governance gains often reverse. The way forward should be a shift from campaign-style actions to long-term management, underpinned by routine rule-of-law safeguards and supported by multilateral market mechanisms, to ensure that governance outcomes remain stable over time.

It is worth noting that China's statutory MPAs—including marine nature reserves and special protection zones—face comparable challenges in terms of the completeness of management effectiveness assessment systems, the continuity of long-term monitoring data, and the institutionalization of adaptive management. To a certain extent, this reflects a common institutional bottleneck across China's marine area-based conservation tools. However, a systematic analysis of these issues lies beyond the scope of this section and will not be elaborated here.

3.1.3 Summary: Fundamental contradictions and the logic for restructuring the marine governance system

Based on the analysis above, China's marine governance system contains two fundamental contradictions that urgently need to be resolved.

Contradiction one: Structural Bias in Conservation Policies and the Limitations of Short-Term Administrative Control. Current spatial planning heavily favours highly visible nearshore wetland habitats, such as mangroves. At the same time, subtidal habitats that extend further offshore within the same large system—coral reefs, seagrass beds, tidal salt marshes and others—lack adequate institutional protection. This bias reduces the overall resilience of marine ecosystems in the face of climate change. The existing spatial and temporal control model is administratively efficient but has insufficient mechanisms for stakeholder participation. Traditional fishing communities have borne most of the costs of spatial displacement, without sharing in the long-term benefits of conservation.

Contradiction two: Systemic Discrepancies Between Domestic Management Standards and International OECM Requirements. When benchmarked against the recognition criteria for OECMs under the KMGBF, China's current marine conservation measures exhibit significant shortcomings across three core dimensions: long-term durability, management effectiveness, and sustained governance. Both the temporary nature of seasonal fishing moratoriums and the uncertainties surrounding ecological conservation redlines under

periodic planning adjustments indicate that current governance remains largely at the "static compliance" stage. The system has yet to develop an adaptive management framework capable of spanning temporal cycles and generating continuous ecological benefits.

In summary, China's marine protection has entered a critical phase where "expanding scale" and "improving effectiveness" must advance together. Meeting the "30×30" target of the KMGBF requires not only accelerating spatial coverage to fill gaps, but also pressing ahead with a deep institutional reform. The goal is to build a dynamic marine spatial management system that combines sufficient area with effective management, aligns with international protected areas and OECM standards, and is resilient to climate change.

3.2 Management Innovation: Cross-Sector Coordination and Rights-Based Adaptive Management

For a long time, China's marine fisheries management has been dominated by temporal controls, most notably the summer fishing moratorium introduced in 1995. However, under the combined pressures of intensifying climate change and more intensive ocean exploitation, simply limiting fishing periods can no longer address the degradation of benthic habitats. The seasonal closure also leaves obvious spatial gaps, as it does not effectively constrain small-scale fishing on sensitive habitats such as coral reefs and shallow-water island reefs that fall outside formally protected areas.

The core direction for management innovation is to nest targeted spatial controls onto critical habitats, achieving coordinated temporal and spatial governance. "Spatial-temporal synergy" means that while the seasonal moratorium continues, specific sensitive marine areas are placed under long-term or permanent spatial protection, thereby compensating for the limitations of relying on temporal controls alone. This model moves beyond a consumption-oriented logic of fisheries resource recovery. By adopting the OECM framework, it aims to protect ecosystems while maintaining sustainable use [22]. Under international standards, potential OECM sites should be identified on a case-by-case basis, considering ecosystem services and, when applicable, socioeconomic values.

3.2.1 Boundary redefinition: Deep integration of spatial planning authority and fisheries administration

To achieve precise spatial governance with spatial-temporal synergy, the primary task is to break down barriers within the current administrative system. We recommend integrating the marine spatial planning functions of the Ministry of Natural Resources and the fisheries administration of the Ministry of Agriculture and Rural Affairs and reshaping marine management units based on ecosystems within a unified macro-policy framework. Spatial planning must implement differentiated boundary demarcation and spatial management strategies tailored to different typical habitats. For islands, reefs, and atolls, the management model should take the coral reef extension zone as its boundary and shift from seasonal fishing restrictions to year-round protection of coral reef ecosystem integrity. For mangrove patches, it is recommended to use the maximum intertidal line, adjacent mudflats, and shallow waters no deeper than 6 metres as benchmarks, expanding the scope of management from mere tree protection to the connectivity and integrity between land and sea, while simultaneously taking into account blue carbon development and seedling cultivation functions. For typical estuaries and bays, management areas should be delineated based on seabed topography and the thermohaline interface, with management objectives upgraded from single-species fishing bans to safeguarding fish migration corridors and maintaining the overall ecological functions of the marine area. The delineation of spatial geographic units should also incorporate the principle of three-dimensional control. Drawing on international experience for marine OECMs, given there is no direct or indirect impact on other non-target species and on the habitat, spatial boundaries can be sliced vertically, with differentiated rules for marine use established based on water depth: human activities can be conducted in distinct water layers without compromising core habitats. This approach effectively protects deep-sea benthic habitats while leaving room for low-impact shipping or traditional, if small-scale and sustainable, fishing in midwater and surface layers, enabling multidimensional compound use.

Governance practices in typical offshore island and reef areas provide valuable insights in this regard. Instead of relying solely on temporal controls, local management authorities designated specific ecological

restoration zones, deployed artificial reefs, and intercepted land-based pollution, creating a routine spatial protection barrier. This approach not only markedly improved benthic habitat quality but also provided stable habitats for rare marine mammals [23]. These cases show that cross-sector coordination can reduce transaction costs in policy implementation and help align China's Ecological Conservation Red Lines with international OECM standards at the institutional level.

3.2.2 Upgrading controls: Adaptive spatial use regulation based on behaviour and fishing gear

To address the spatial gaps of temporal controls, it is recommended that permanent "negative lists" of prohibited activities and gear-specific access rules be piloted in specific geographic units, creating routine coordination with the seasonal fishing moratorium.

The priority is to restrict bottom-contact fishing that causes long-term physical disturbance to critical habitats. The operation of traditional high-frequency, bottom-towed gear on sandy areas fringing coral reefs and on seagrass beds can easily sever ecological connectivity between key habitats. At the same time, sediment resuspension caused by bottom trawling may reduce photosynthetic efficiency of benthic plants and trigger the release of organic carbon long stored in sediments, creating multiple pressures on the regional marine environment [24].

Adaptive management should therefore set differentiated gear access standards based on geographic units. In coral reefs and adjacent sensitive habitats, a policy of permanently excluding bottom-contact gear could be trialled. Phasing out highly destructive practices such as bottom trawling, while keeping reasonable accommodation for traditional low-impact fishing methods, generally yields better ecological and social returns than uniform temporal restrictions [25].

Precision control measures cannot be implemented without the support of spatial information technology. Intelligent systems that integrate vessel dynamic identification with geospatial information can provide real-time monitoring capacity for spatial use regulation. By analyzing continuous trajectory features such as vessel speed and heading, regulatory agencies can rapidly identify and classify violations in spatially defined redline areas [26]. Beyond its jurisdictional waters, China governs its distant-water fleets through participation in eight RFMOs and continues to improve the integration of measures such as vessel licensing, catch documentation, and observer programs into domestic regulations.

3.2.3 Institutional innovation: Building a market-based compensation loop and enabling green finance

At the heart of modernizing marine spatial governance is the institutional alignment of international OECM standards with China's ECR system. ECRs provide a legal foundation for large-scale spatial use regulation and also create conditions for identifying candidate OECM sites. Nearshore coral reef patches, for example, could be gradually brought under long-term management through this alignment mechanism. However, policy alignment must adhere to routine case-by-case review. Specifically, particular blocks within the ECRs should be assessed to determine whether they genuinely deliver long-term, in-situ biodiversity conservation outcomes while allowing regulated sustainable activities.

ECRs emphasize "activity prohibition," while OECMs stress "long-term ecological outcomes." During this transition, permanent spatial controls may structurally affect the livelihoods of some traditional fishers. The core of policy design should focus on establishing a government-led compensation mechanism financed by sea area use fees—statutory charges levied by the state on entities and individuals that use sea areas for exclusive development activities, under the Sea Areas Administration Law. We suggest channelling a portion of these fees back into marine conservation through a well-designed fiscal transfer payment arrangement, providing economic compensation and livelihood transition support for fishers who have to leave traditional fishing grounds due to spatial controls. The core of policy design should be to build a market-based compensation mechanism anchored on the system of paid sea area use. In practical terms, we suggest using a targeted recycling of sea area use fees to create a well-designed transfer payment arrangement, providing economic compensation and livelihood transition support for fishers who have to leave traditional fishing grounds because of spatial controls. At the same time, green financial instruments such as green credit and ecobonds should be introduced to provide low-cost capital for coastal fishing communities to shift toward green industries like whale watching and restorative ecodiving. Within the institutional framework, coastal communities, and fishing associations could be granted stewardship rights over specific geographic units. This would help align the incentives of all stakeholders, moving traditional fishers from being the targets of regulation to becoming co-managers and beneficiaries of marine ecological assets.

Guide: This section focuses on domestic marine conservation compensation mechanisms and initial applications of green finance instruments in China. For international innovative financing tools—including parametric insurance, debt-for-nature swaps, blue bonds, as well as the methodology and governance framework under the Taskforce on Nature-related Financial Disclosures (TNFD)—please refer to Appendix 4 for a detailed discussion.

3.3 Spatial Optimization: Building a Climate Resilient Marine Protection Network

Intensifying climate change requires MPAs to combine dynamic resilience networks with traditional static protection. Traditional protected areas remain indispensable for safeguarding fragile ecosystems such as core coral reef flats. However, as species redistribute and ecological processes reorganize under environmental pressure, fixed boundary spatial controls may no longer be sufficient. They need to be complemented by more dynamic approaches; the two should work together. Ecological connectivity in the South China Sea is driven largely by seasonal monsoon currents. Climate warming is altering regional hydrodynamic features, which in turn may reshape larval dispersal pathways and pelagic survival times [27]. When designing protected and conserved areas networks, the "stepping-stone" effect driven by ocean currents must be fully accounted for, so that gene flow among populations is not interrupted by environmental stress.

At the heart of building a climate-resilient marine protected and conserved network is systematic spatial optimization: strengthening ecosystem recovery after extreme climate events and maintaining species migration and connectivity along environmental gradients [28]. This process follows four principles: representativeness, replication, connectivity, and priority protection of climate refugia. Representativeness requires the network to cover the full spectrum of habitats within a biogeographic region, especially areas that span depth and temperature gradients, so that species have somewhere to move as conditions change. Replication means protecting the same type of ecosystem at different geographic locations, reducing the risk that a single catastrophic event will cause systemic collapse. Connectivity is the core of resilience; it not only maintains gene flow among populations but also provides "biological compensation" to damaged areas through larval dispersal and adult migration. Climate refugia are areas that remain relatively stable amid large-scale fluctuations because of local dynamic factors such as internal wave cooling or cold-water intrusion. They serve as havens for species during extreme climate events. Establishing a marine national park network centred on key Islands in the South China Sea is a concrete step toward the 30×30 target of the KMGBF. It is also a strategic choice to address the mounting climate risks in the South China Sea and to maintain the ecological security barrier of the tropical ocean.

3.3.1 Designing a resilient network architecture for MPAs

Modern marine spatial planning should integrate multiple dimensions of scientific information. Three categories are particularly important: environmental change trends, ecological network node analysis, and biodiversity patterns and their maintenance. Among these, sea surface temperature evolution models and network centrality metrics can broadly map regional heat wave stress patterns and the physical corridors of large-scale larval dispersal. This provides a foundational spatial framework for identifying potential temperature refugia and ecological connectivity hubs. Physical and network indicators alone, however, are not enough; they must be calibrated against the actual responses of biological communities. Taking coral reef fishes as an illustrative case, incorporating the spatial and depth-related distribution patterns can reveal vertical ecological connectivity—from low to high latitudes and from shallow reef flats to the mesophotic zone—and help assess the carrying capacity of deeper waters as vertical refugia for benthic organisms during extreme heatwaves.

At the same time, analyzing community maintenance mechanisms deepens understanding of how ecosystems recover from species turnover and structural degradation. Community assembly involves two types of processes: niche-based, deterministic processes, where species are selected by environmental filters, and neutral stochastic processes, where species distribute according to dispersal and random events. Disentangling the relative roles of these two processes allows a more accurate assessment of the ecosystem's intrinsic resilience. Combining macroscale physical networks with microscale community mechanisms can serve as a core policy

indicator for evaluating the stability and connectivity of marine climate refugia. For the spatial layout of candidate marine national park areas, differentiated protection strategies should be adopted based on each region's natural conditions and climate gradients, including species richness, heat stress, connectivity, etc. For the climate-resilient areas, full protection should be implemented, and the establishment of a vertical three-dimensional management belt—from surface reef flats down to the deep sea—should be explored. The mesophotic zone can be used rationally as a vertical refuge for shallow-water corals during extreme heat waves.

3.3.2 Implementation pathway for the "National Park + OECMs" combined model

The ocean covers a vast geographic area and involves multiple governance actors. A single national park model faces inherent limits in coverage and enforcement cost due to administrative boundaries. To optimize the spatial governance system, a cross-boundary combined model of "National Park + OECMs" is recommended.

Under this combined model, national parks exercise rigid spatial jurisdiction over core reef flats, while OECMs are incorporated into the network as complementary spatial units. OECMs may include collaboratively managed marine areas that meet the criteria, coastal community conservation areas, and voluntary corporate stewardship zones. Sustainable use activities that are permitted within OECM boundaries must not compromise ecological integrity and must remain subordinate to the conservation function. This tiered and layered management model can fill the spatial gaps between formal protected areas and reduce administrative enforcement and coordination costs. At the same time, it helps connect critical marine ecosystems into a continuous whole, significantly enhancing the spatial connectivity of the protected area network.

3.4 Bridging National and High Seas Conservation through a Seascape Approach

3.4.1 Overview of offshore MPAs

To resolve China'\'s structural conservation bottlenecks—namely nearshore saturation, offshore deep-water vacancies, and subtidal under-representation—the evolving paradigms of global large-scale offshore MPAs and the progression of the BBNJ Agreement offer critical multidimensional strategic insights. Over the past two decades, the establishment of vast area-based designations, such as the Pacific Remote Islands Marine National Monument in the United States, the Phoenix Islands Protected Area in Kiribati, the Ross Sea Region MPA in the Southern Ocean, and the NACES MPA in the North Atlantic (one of eight MPAs established by OSPAR within ABNJs), has yielded valuable experience in seascape-scale management. As nations begin to explore the designation of the first generation of high-seas MPAs under the BBNJ Agreement framework, several empirical observations carry direct relevance for China: first, MPA boundaries must be driven by primary ecological targets rather than the mere avoidance of commercial or economic conflicts; second, the vertical depth and horizontal range of designations must align precisely with baseline biological objectives, as demonstrated by the NACES MPA expanding its jurisdiction from the water column to include the seabed; and third, continuous monitoring and enforcement remain the acute operational bottleneck for remote designations, though recent innovations in vessel trajectory data processing and remote sensing offer viable institutional solutions.

The evolution of these high-seas governance frameworks is inherently intertwined with China's broader marine strategic interests. Beyond continuously scaling up its domestic protective networks into offshore and deeper water column zones, China is a critical stakeholder in global ocean spaces, where its distant-water fishing fleets, seabed mineral exploration, and maritime shipping operations exert direct and indirect influences on ABNJ ecosystem health. Consequently, China's domestic empirical experience in area-based management and its evolving diplomatic positions on BBNJ instruments are inextricably linked to seascape-scale governance. Facing the universal reality that mere geometric delineation cannot deliver tangible conservation outcomes unless paired with robust enforcement infrastructure, the future paradigm of spatial management must transcend the traditional administrative fragmentation dividing territorial waters and other areas under national jurisdiction (the exclusive economic zone [EEZ]) from the high seas. By extracting global lessons on ecological prioritization, three-dimensional water-seabed integration, and advanced technological monitoring, China can

strategically deploy the "seascape" methodology as a spatial-ecological continuum. This approach will align domestic nearshore and offshore MPA practices with the multilateral BBNJ framework, weaving a three-dimensional and climate-resilient governance matrix that spans from local coastal zones to the deep ocean floor.

3.4.2 EEZ–ABNJ connectivity: Representativeness, networks, and the seascape approach

The emergence of MPAs offshore (within EEZs) and in international waters provides a pathway toward a connected MPA network, to provide the ecological connectivity essential for survival of species and ecological processes over time [29]. For the ocean, ecological connectivity is described in several ways, but both the IUCN WCPA [30] and Popova et al. (2019) [31] distinguish between two main forms of connectivity:

1) **Circulation or structural connectivity,** which includes how ocean currents transport larvae, nutrients, pollutants, and carbon, contributing to carbon sinks across jurisdictional lines, linking coastal productivity and food security to upstream conditions in ABNJs.

2) **Migratory or functional connectivity**, the purposeful, often long-distance movements of fish, seabirds, marine mammals, and sea turtles across jurisdictional boundaries to fulfill breeding, foraging, and other critical life-history functions.

A global synthesis developed migratory network models for 109 species using over 16,000 animal-borne tags, demonstrating that marine megafauna maintain extensive transboundary connectivity and that no country can manage its migratory species alone [32]. This conclusion is also reached by Dunn et al. (2019) [33]. Connectivity implies shared political management responsibility [34], as the following examples demonstrate. Migratory fish stocks, notably, are overfished at twice the rate of those that remain within a single jurisdiction, indicating that governance fragmentation has measurable conservation and food security consequences [33]. Similarly, strong management action that protects migratory seabirds in one jurisdiction can be nullified by unmitigated threats in another [35].

These connectivity dynamics carry direct implications for the quality standards embedded in KMGBF Target 3, which calls on Parties to conserve and manage at least 30% of lands and waters by 2030 through "ecologically representative, well connected and equitably governed systems of protected areas and other effective area-based conservation measures." This shows that area coverage alone is insufficient: networks must be designed with reference to the ecological processes that link them [34]. These requirements hold particular significance for bridging conservation between EEZs and ABNJs, as the jurisdictional boundary at 200 nautical miles separating EEZs from ABNJs has no ecological reality. Marine species, ocean currents, and the ecosystem processes that underpin coastal livelihoods routinely cross this "invisible political line," meaning that what happens in international waters is not ecologically or economically separable from what happens within national jurisdictions.

Three mechanisms exist to incorporate migratory connectivity into international conservation policy: site-selection criteria (targeting areas critical to specific life-history stages), network design criteria (ensuring that the network covers the complete migratory cycle and maintains connectivity among its components), and policy recommendations (embedding connectivity requirements in legally binding or politically agreed instruments). The BBNJ Agreement provides an institutional vehicle for all three, through its provisions on ABMTs and the overarching goal of a comprehensive, representative, and connected system of high-seas protection (BBNJ Agreement, Article 17(a)). Looking forward toward the first generation of MPAs in international waters as a practical step toward a seascape approach could start with designation of sites that are clearly rich in biodiversity and important for life stages of key marine species, followed by the establishment of protected corridors, and even the consideration of dynamic protection to respond to future climate change. While the latter will require more work, much research has already been done on biodiverse areas of the High Seas, including through the description of Ecologically and Biologically Significant Areas (EBSAs), creating a strong scientific basis for a first wave of MPA designation and implementation.

3.4.3 Multi-sectoral governance lessons for high-seas conservation

The fragmented nature of approaches to management of ABNJs has been mentioned above. The system has been characterized as one where "there is little, if any interaction, between such efforts and designated responsibilities and they remain mostly sectoral in their approach," [32] constraining the ecosystem-based management that EEZ–ABNJ connectivity requires.

There are examples of multi-sectoral arrangements that have sought to address some of this fragmentation [32]. Some of these arrangements are under non-binding frameworks, such as the Sargasso Sea Commission, a voluntary intergovernmental body that developed management proposals for an area that is primarily high seas.

This commission seeks effective delivery of its objectives through collaborative, ecosystem-defined institutions. Conversely, the Western and Central Pacific Fisheries Convention (WCPFC), a binding fishing body, extends its conservation and management measures across both EEZ and high-seas portions of its Convention Area, providing a model of spatial continuity across jurisdictional boundaries that the BBNJ Agreement can reinforce. In the Western Indian Ocean, a ministerial-level Strategic Action Programme formally recognizes transboundary threats from and into high seas areas and has developed management mechanisms that address the interests of coastal states in adjacent ABNJs. Furthermore, CCAMLR is the body that established the first large-scale MPA on the high seas, finding compromise across fisheries management and biodiversity conservation [36]. The collaborative arrangement between the OSPAR Convention, an RSO with a conservation mandate, and the Northeast Atlantic Fisheries Commission (NEAFC), a regional fisheries management organization, is another well-known and studied example of multi-sectoral interaction acting in the high-seas area.

The 2023 BBNJ Agreement represents a significant structural and programmatic development in high-seas governance since UNCLOS itself. The agreement establishes a framework for AMBTs, including MPAs in ABNJs, mandates environmental impact assessments for activities in international waters, provides for capacity building and technology transfer, and sets up a system for sharing the benefits from marine genetic resources. Critically, the BBNJ Agreement calls for an integrated, cross-sectoral approach, which balances the holistic approach of the agreement with a principle to "not undermine" the authority of existing bodies, such as RFMOs. Getting this balance is the central governance challenge in BBNJ implementation. In addition to its explicit mandate to conserve and sustainably use marine biodiversity in areas beyond national jurisdiction, the BBNJ Agreement also contains several mechanisms and obligations that position it to improve on the current, fragmented governance framework. First, the agreement requires Parties to promote its objectives in other international bodies and institutions, thereby advancing policy coherence. The BBNJ Agreement also contains language explicitly calling for cooperation with other relevant bodies, making coordination part of its modus operandi. Finally, the BBNJ Agreement provides for decision-making by majority vote, should all efforts to reach consensus have been exhausted

For China, policy coherence across ocean governance bodies is directly relevant. China is one of the world's largest distant-water fishing nations, operating across major RFMO Convention Areas, is a significant player in cargo shipping, is one of the dozen countries in the world with licences for exploration of seabed mining, has actively participated in BBNJ negotiations, and was instrumental in the agreement of the KMGBF. Productive engagement by China in multi-sectoral BBNJ governance will therefore be critical for the effectiveness of new high-seas management measures.

Therefore, it is recommended that China establish a national policy coordination mechanism that helps ensure policy coherence across ocean governance bodies in support of Target 3 of the KMGBF, including through the establishment of a network of MPAs in areas beyond national jurisdiction.

3.5 Synergistic Governance: The Climate–Biodiversity Nexus and Blue Carbon

Assessment

Global environmental governance is undergoing a paradigm shift. Climate change and biodiversity loss are no longer seen as two parallel environmental issues, but as a compound crisis in which each drives the other [37]. The ocean is the largest carbon reservoir on Earth, holding roughly 93% of the global carbon cycle, while also supporting exceptionally high biodiversity. Based on high carbon sequestration rates and mature accounting methods, the Intergovernmental Panel on Climate Change (IPCC) currently recognizes only mangroves, seagrass beds, and salt marshes as established blue carbon ecosystems. However, the meaning of "blue carbon" is expanding toward the emerging concept of "general blue carbon," broadening its scope from plankton pumps to large marine vertebrates, and even to the biogeochemical processes of coral reef complex ecosystems. This expansion signals a fundamental shift in governance logic: from simply offsetting carbon emissions to a synergistic approach centred on ecosystem integrity [38] and positive social outcomes.

3.5.1 Beyond source and sink: From micro-level carbon flux debates to structural carbon stock management

Synergistic governance of ocean climate and biodiversity requires a shift from debates over micro-level physical and chemical processes to innovation in macro-level carbon accounting standards. When evaluating complex ecosystems such as coral reefs within marine carbon accounting systems, the focus should be less on technical disputes over micro-level inorganic and organic carbon fluxes or single-year absorption rates. Policy should instead focus squarely on maintaining the overall stability of structural carbon pools as a national asset management strategy.

Because of the dynamic balance between ecosystem calcification and organic carbon burial, coral reefs have long been at the centre of carbon accounting controversies. From an inorganic carbon cycle perspective, the process of building calcium carbonate skeletons releases CO_2 into seawater. Consequently, many traditional carbon accounting models label coral-dominated reef areas as net sources of atmospheric CO_2. However, through physical damping, the complex three-dimensional structure of coral reefs continuously traps and buries organic carbon from the open ocean and adjacent habitats on millennial timescales, functioning as a "sediment trap" [39]. Blue carbon strategies need to be assessed on a case-by-case basis; [40] evidence to date suggests that reef systems can be sources or sinks due to local conditions. Corals in the South China Sea, for instance, appear to be a source of atmospheric CO_2, but also provide a much larger carbon store due to their high biological productivity and carbonate productivity. [41] National blue carbon accounting frameworks must therefore go beyond a simple "net carbon-sink flux" metric. Protecting the overall stability of the coral reef structural carbon pool should be treated as a core task in safeguarding critical natural assets, ensuring that reefs continue to deliver integrated ecosystem services such as coastal protection, biodiversity maintenance, and stabilization of the whole-system carbon pool [42].

3.5.2 Innovative synergistic indicators: Introducing the concept of "Biodiversity-Integrity Blue Carbon"

The blue carbon market is increasingly recognizing that carbon sinks without biodiversity support are unstable. Frontier governance practices internationally are beginning to integrate biodiversity integrity indicators into blue carbon assessment frameworks, aiming to directly link ecosystem health with the long-term durability of carbon-sink functions. The High-Quality Blue Carbon Principles and Guidelines released in 2022 explicitly establish the protection of biodiversity and ecological integrity as the cornerstone of high-standard projects [43] The role of key functional groups in coral reefs is particularly prominent under this framework. Parrotfish offer a telling example: healthy populations graze on rock-surface algae and clear attachment space for coral recruits, effectively preventing the ecosystem from shifting to an "algal bloom" alternative state. This enhances the resilience of the coral reef ecosystem and indirectly supports the long-term stability of multiple ecosystem services, including carbon cycling [44]. From a capital and market perspective, this kind of synergistic governance is reshaping the value of blue carbon.

Two relevant financial instruments have emerged on the market. The first is premium carbon credits. Building on traditional blue carbon credits, they convey a project's ecological integrity to buyers through third-party certifications such as the Climate, Community & Biodiversity Standards or the Sustainable Development Verified Impact Standard [45]. The second is standalone biodiversity credits. This is a new financial instrument that exists in parallel with carbon credits, designed specifically to reward measurable contributions to species conservation or ecological restoration. Mega-diverse countries like the Philippines already use this mechanism to directly link MPA development with private investment. In voluntary carbon markets, projects with proof of high biodiversity integrity are already commanding a premium. Market data show that projects certified under third-party biodiversity standards typically sell for 50% to 100% more than standard projects, reflecting a shift by corporate buyers from a pure "carbon neutrality" goal toward a "nature-positive" strategy [46].

Based on the market trends analyzed above, we propose establishing a "Biodiversity-Integrity Blue Carbon" innovative financing mechanism to create a sustainable funding loop for marine conservation. The mechanism comprises three tiers:

1) **National methodology standardization.** Develop a domestic blue carbon accounting methodology that integrates ecosystem integrity indicators—incorporating key functional groups (e.g., benthic biodiversity of mangroves, herbivorous fish biomass) into carbon stock estimation and additionality assessment, making "high ecological integrity" a quantifiable and verifiable carbon asset attribute.

2) **Instrument bundling and blended finance**. Promote the joint development of carbon credits and

biodiversity credits at the project level, with third-party certification (e.g., CCB) to realize premium pricing. Supplement this with blended finance—using public funds or green bonds to absorb upfront monitoring and verification costs, and parametric insurance to hedge carbon stock loss risks from extreme climate events—thereby lowering the entry barrier for private capital.

3) **Targeted revenue recycling**. Channel transaction proceeds from premium carbon and biodiversity credits back to coastal communities through fiscal transfer payments or dedicated trust funds, supporting ecological stewardship and livelihood transition, ensuring an equitable distribution of conservation costs and benefits, and closing the loop: "conservation generates credits → credits generate revenue → revenue reinvests in conservation and communities."

3.5.3 Challenges and future transition pathways for synergistic governance

While synergistic governance of climate and biodiversity holds great promise, the risk of "greenwashing" in the market must be guarded against. Greenwashing refers to the practice of using false or exaggerated environmental claims to cover up real negative environmental impacts, thereby creating a green image and gaining economic advantage. Assessments of the past two decades of voluntary carbon markets show that many projects claiming biodiversity benefits have actually seen an increase in the human impact index within their project areas, largely due to a lack of effective monitoring [47], and little evidence of benefits to local communities. This suggests that without a rigorous verification system based on satellite and ground-based monitoring, biodiversity commitments may remain little more than marketing. In addition, emerging marine carbon dioxide removal techniques, such as artificial upwelling and large-scale seaweed cultivation, still lack internationally recognized monitoring, reporting, and accounting frameworks. This could lead to double counting or overestimation of carbon removal credits. We should therefore take a precautionary approach to these techniques [48].

Future governance pathways should focus on deep integration at the national policy level. Concretely, this means setting synchronized indicators within the nationally determined Contributions under the UNFCCC and the KMGBF under the CBD. At the same time, a paradigm shift in financing models is needed. Coastal and marine ecosystems—mangroves, coastal salt marshes, seagrass beds, and coral reefs—should be treated as a whole as national "critical natural infrastructure," using insurance and parametric payout mechanisms to attract institutional investors. Sovereign debt assessments should also incorporate the macroeconomic risks posed by biodiversity loss, and the ecological fiscal space of countries should be improved through the implementation of blue carbon projects.

3.6 Policy Recommendations

Integrate spatial networks, management systems, and financial mechanisms to establish a comprehensive marine conservation roadmap, featuring Marine National Parks and OECMs, the integration of planning and fishery rights, and blue carbon accounting that addresses biological integrity. Actions need to include enforcing strict spatial jurisdiction over core marine regions via national parks, with surrounding co-managed areas as complementary OECMs. The marine spatial planning rights of the Ministry of Natural Resources and the fishery management rights of the Ministry of Agriculture and Rural Affairs need to be integrated to upgrade seasonal fishing bans to full-time, three-dimensional adaptive behavioural controls across depth gradients. Coral reefs, mangroves, and seagrass beds should be integrated into national structural carbon pool asset management and "biological integrity blue carbon" should be introduced to evaluate long-term ecological value, achieving a win–win for climate response, biodiversity conservation, and coastal sustainable development.

Appendices

Appendix 1. Potential and Pathways of the ECR to Support the Implementation of Selected Targets of the KMGBF

Target	Target content of the KMGBF	Potential and supporting pathways of the ECR
Target 1 (Spatial planning)	Ensure that all areas are under participatory integrated biodiversity-inclusive spatial planning and/or effective management processes addressing land and sea use change, to bring the loss of areas of high biodiversity importance, including ecosystems of high ecological integrity, close to zero by 2030, while respecting the rights of indigenous peoples and local communities.	The ECR covers a broad spatial planning scope, including important ecological function zones, ecologically sensitive and fragile terrestrial and marine areas, and areas important for biodiversity. Corresponding management requirements and conservation measures are formulated according to ecological functions and conservation targets.
Target 2 (Ecosystem restoration)	Ensure that by 2030 at least 30% of areas of degraded terrestrial, inland water, and coastal and marine ecosystems are under effective restoration, in order to enhance biodiversity and ecosystem functions and services, ecological integrity, and connectivity.	Ecological restoration is an inherent requirement of ECR management. The ECR requires not only strict protection, but also natural recovery and artificial restoration. Relevant documents clearly state that active measures must be taken to restore and rehabilitate degraded ecosystems and damaged ecological environments within redline areas, so as to improve ecosystem quality and stability.
Target 3 (Ecosystem conservation)	Ensure and enable that by 2030 at least 30% of terrestrial, inland water, and of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing Indigenous and traditional territories, where applicable, and integrated into wider landscapes, seascapes and the ocean, while ensuring that any sustainable use, where appropriate in such areas, is fully consistent with conservation outcomes, recognizing and respecting the rights of Indigenous Peoples and local communities, including over their traditional territories.	The terrestrial ECR covers about 3.04 million km², accounting for more than 30% of China's land area. This area includes protected areas that are highly important for biodiversity and ecosystems, as well as potential OECM areas that perform important ecological functions. The ECR also has a positive list that allows limited human activities, thereby safeguarding the rights and interests of indigenous and local residents.
Target 8 (Climate change response)	Minimize the impact of climate change and ocean acidification on biodiversity and increase its resilience through mitigation, adaptation, and disaster risk reduction	By strictly maintaining the ECR, ecosystem integrity, stability, and resilience can be maintained and improved. This helps build a green barrier against climate change

	actions, including through nature-based solution and/or ecosystem-based approaches, while minimizing negative and fostering positive impacts of climate action on biodiversity.	through natural processes, supports climate change adaptation and mitigation, reduces the impacts of climate-related disaster risks, and promotes synergies between ecosystem conservation and restoration and climate change response.
Target 10 (Sustainable use)	Ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably, in particular through the sustainable use of biodiversity, including through a substantial increase of the application of biodiversity-friendly practices, such as sustainable intensification, agroecological, and other innovative approaches contributing to the resilience and long-term efficiency and productivity of these production systems and to food security, conserving and restoring biodiversity and maintaining nature's contributions to people, including ecosystem functions and services.	Development-oriented construction is prohibited within the ECR. On the premise of not damaging ecological functions or expanding existing construction and resource use, Indigenous and local residents and other legitimate rights holders are allowed to carry out planting, grazing, fishing, and aquaculture activities in accordance with the law, excluding artificial reef-based marine ranching and sea-enclosure aquaculture. This institutionally safeguards villagers' rights to the reasonable and sustainable use of land and natural resources, reflects the principle of giving equal emphasis to strict protection and rational use, and helps encourage the application of biodiversity-friendly practices in agriculture, forestry, animal husbandry, and fisheries within the redline.
Target 14 (Biodiversity mainstreaming)	Ensure the full integration of biodiversity and its multiple values into policies, regulations, planning and development processes, poverty eradication strategies, strategic environmental assessments, environmental impact assessments, and, as appropriate, national accounting, within and across all levels of government and across all sectors, in particular those with significant impacts on biodiversity, progressively aligning all relevant public and private activities, fiscal and financial flows with the goals and targets of this framework.	The ECR has been incorporated into the Chinese government's overall governance of important ecological spaces. Productive, economic, and other activities carried out within ECR areas must follow the principle of sustainability. A series of rules and regulations has been developed, making an important contribution to the mainstreaming of biodiversity-related laws and policies.

Appendix 2. Current Assessment Indicator System for the Conservation Effectiveness of the ECR and Its Correspondence with Monitoring Indicators of the KMGBF

Regulatory requirement	Assessment indicator	Main data acquisition method	Corresponding monitoring indicator of the KMGBF
No reduction in area	Proportion of ECR area (%)	Local data, remote sensing monitoring, ground verification	Target 1-1.1 Percentage of land and sea areas covered by biodiversity-inclusive spatial planning; Target 3 Coverage of protected areas and other effective area-based conservation measures
No change in attributes	Area affected by human activities (km^2)	Remote sensing monitoring, ground verification	Target 3-3.1 Coverage of protected areas and other effective area-based conservation measures
	Proportion of ecological restoration area (%)	Local data, remote sensing monitoring, ground verification	Target 2-2.1 Area under restoration
	Proportion of natural ecological land area (%)	Remote sensing monitoring, ground verification	Target 1-A.2 Extent of natural ecosystems
	Retention rate of natural marine shoreline (%)	Remote sensing monitoring, ground verification	Target 11-B.1 Services provided by ecosystems
No decline in functions	Vegetation cover index	Remote sensing monitoring, ground verification	Target 11-B.1 Services provided by ecosystems
	Water conservation capacity	Remote sensing monitoring, data analysis	Target 11-B.1 Services provided by ecosystems
	Soil and water conservation capacity	Remote sensing monitoring, data analysis	Target 11-B.1 Services provided by ecosystems
	Wind prevention and sand fixation capacity	Remote sensing monitoring, data analysis	Target 11-B.1 Services provided by ecosystems
	Flood regulation capacity	Remote sensing monitoring, data analysis	Target 11-B.1 Services provided by ecosystems

	Conservation rate of key biological species (%)	Ground observation, data analysis	Target 3-CT.2 Species Protection Index
	Density of linear infrastructure (km/km²)	Local data, remote sensing monitoring	-
Strict supervision and management	ECR system and implementation	Local data	Target 14.b Number of countries integrating biodiversity and its multiple values into policies, regulations, planning, development processes, poverty eradication strategies, and, as appropriate, national accounting at all levels of government and across all sectors, and progressively aligning all relevant public and private activities, fiscal and financial flows with the long-term goals and action targets of the Kunming–Montreal Framework
Strict supervision and management	Public satisfaction (%)	Questionnaire survey, sample survey	Target 22-22.b
	Ecological damage and environmental pollution incidents	Local data, 12,369 reports, public opinion monitoring information, etc.	Target 3-3.1 Coverage of protected areas and other effective area-based conservation measures

Appendix 3. Proposed Monitoring and Assessment Indicator System for the ECR

Assessment indicator	Corresponding KMGBF indicator	Status	Indicator description
1. ECR area	1.1 Percentage of land and sea areas covered by biodiversity-inclusive spatial planning	Existing	Effectively supports KMGBF Target 1 and Target 3
2. Proportion of natural ecosystem area	A.2 Extent of natural ecosystems	Existing	Effectively supports the indicator on the extent of natural ecosystems under Target 1
3. Habitat fragmentation		Newly added	
4. Habitat integrity		Newly added	
5. Proportion of degraded natural ecosystem area	2.1 Area under restoration	Newly added	Can effectively support progress in implementing Target 2
6. Ecological corridor connectivity	3.1 Coverage of protected areas and other effective area-based conservation measures; 3.CT.1 Protected Area Connectedness Index	Newly added	Effectively supports the requirement under Target 3 that protected areas be well connected
7. Area of human disturbance		Existing	Effectively supports the effective management of protected areas under Target 3
8. Identified OECM area		Newly added	Effectively supports Target 3, under which at least 30% of important areas should be under the conservation and management of protected areas or OECMs
9. Ecosystem resilience index	CT.2 Bioclimatic Ecosystem Resilience Index	Newly added	Effectively supports Target 8 by addressing the impacts of climate change on biodiversity and improving ecosystem resilience
10. Natural forest/planted forest area	10.2 Progress toward sustainable forest management	Newly added	Effectively supports progress in sustainable forest management under Target 10
11. Ecosystem service functions	B.1 Services provided by ecosystems	Existing	Comprehensively assesses water conservation, soil and water conservation, wind prevention and sand fixation, and flood regulation capacity, effectively supporting ecosystem functions under Target 11
12. ECR system and implementation	Target 14-14.b Number of countries integrating biodiversity and its multiple values into policies, regulations, planning,	Existing	Effectively supports biodiversity mainstreaming under Target 14
13. Ecosystem service value		Newly added	Effectively supports Target 14 by assessing the multiple values of

	development processes, poverty eradication strategies, and, as appropriate, national accounting at all levels of government and across all sectors, and progressively aligning all relevant public and private activities, fiscal and financial flows with the long-term goals and action targets of the Kunming–Montreal Framework		biodiversity during the evaluation period
14. Public participation in ecological conservation	21.CT.2 Participation of Indigenous Peoples and local communities in decision-making related to the implementation of the Convention at all levels	Newly added	Although corresponding to a component indicator under Target 21 of the Kunming–Montreal Framework, it can effectively support the recognition and respect of the rights of Indigenous Peoples and local communities under Target 3
15. Proportion of local community participation		Newly added	

Appendix 4. Resource Mobilization: Innovative Finance Solutions for Marine

Ecosystem Conservation

The conservation of typical marine ecosystems—including coral reefs, mangroves, and seagrass beds—faces a structural financing deficit that conventional public budgets cannot bridge alone. While the Kunming–Montreal Global Biodiversity Framework has set ambitious targets for MPA expansion, their operationalization requires diversified financing architectures beyond grant-dependent models. The Shandong branch of the People's Bank of China, along with 10 other provincial departments, released the Blue Finance Standards (trial) in 2026, which aim to promote the blue and marine industries in a sustainable manner.

Methodological

Replicate the methodology used in the Biodiversity Finance Initiative for the Blue Finance, including the Policy and Institutional Review, Expenditure Review, Financial Needs Assessment, and Blue Finance Plan. However, this needs to be adapted to the marine context. By incorporating fisheries policy, coastal tourism, and marine spatial planning into the analysis, we can develop financial solutions that are rooted in the institutional and ecological realities of marine systems rather than relying on terrestrial models.

Blue finance instruments.

Parametric insurance, debt-for-nature swaps, and blue bonds are vital components of the marine conservation finance toolkit. Seychelles' 2016 debt-for-nature swap—the world's first for ocean conservation—converted USD 21.6 million of external debt into long-term marine protection funding, expanding the country's MPAs from 1% to 30% (approximately 400,000 km²) and catalyzing a USD 15 million blue bond in 2018, backed by a World Bank partial credit guarantee and a GEF concessional loan, with proceeds allocated to conservation grants and sustainable fisheries lending.

In parametric insurance, Quintana Roo (Mexico) launched the world's first coral reef insurance in 2018, which was first triggered by Hurricane Delta in 2020, generating approximately USD 850,000 for emergency reef restoration[1]. The Mesoamerican Reef Insurance Programme, a pre-coverage development project started in 2020, with the insurance program first placed in 2021, extended this model across the region, with Hurricane Lisa (2022) generating USD 175,000 for reef brigade mobilization at Turneffe Atoll, Belize. Fiji launched a pilot program in 2024 covering Vatuvara Island, Yacata, and Kaibu in the Lau Islands, with support from UN Development Programme under its "Future is Blue" initiative, which works with the Fiji Government, WTW, and other partners to raise funds for premium support and scale this innovative insurance mechanism from the Caribbean to the Pacific Small Island Developing States. Collectively, these instruments demonstrate diverse pathways from debt restructuring to risk transfer.

Government-market-community governance triangle

The effectiveness of innovative instruments depends on governance mechanism design. The Seychelles Conservation and Climate Adaptation Trust (SeyCCAT) operates as a non-governmental entity (with only three of nine board seats held by government), ensuring financial independence and investor confidence, while capacity building and benefit-sharing mechanisms remain prerequisites for effective community participation. The reef brigade model under parametric insurance similarly demonstrates that rapid payouts must be accompanied by local response capacity; otherwise, funds cannot translate into ecological outcomes.

Nature-related financial disclosures

The Taskforce on Nature-related Financial Disclosures provides systematic standards for risk-identification, assessment and disclosure in marine investments. Its LEAP approach (Locate, Evaluate, Assess, Prepare) requires financial institutions to identify their operational interface with marine ecosystems—including coral reef distribution, spawning grounds, and migratory corridors; evaluate dependencies on ecosystem services such as coastal protection, fisheries productivity, and tourism revenues; and assess material financial risks arising from ecological degradation, regulatory changes (e.g., MPA expansion), and reputational exposure. By translating marine biodiversity data into investable risk language, nature-related financial disclosures drive

shipping, port operations, and marine industries to integrate biodiversity factors into commercial decision-making and capital allocation. For marine conservation finance, nature-related financial disclosures serve as a critical bridge between ecological science and capital markets: they render “ocean health” a quantifiable, comparable, and investable variable, thereby directing institutional capital toward sustainable ocean management.

Marine conservation finance innovation is not merely a technical exercise in instrument design, but a governance challenge requiring the systematic integration of ecological data, financial architecture, governance mechanisms, and disclosure standards. Only when financing instruments, implementing actors, and risk disclosure frameworks are mutually aligned can marine ecosystem protection move from policy commitment to sustainable financial closure. China has built sufficient capacity to advance blue finance instruments, including coral reef insurance, making such pilot initiatives both feasible and timely.

Appendix 5: Feasibility Pathway Analysis for Incorporating "Biodiversity-Integrity Blue Carbon" into the China Certified Emission Reduction (CCER) Methodology

Existing foundation: CCER marine carbon-sink methodologies are preliminarily established

Since 2023, China has successively released three marine carbon-sink CCER methodologies covering mangrove restoration, seagrass bed restoration, and coastal salt marsh restoration. Among these, the methodologies for mangrove restoration (CCER-14-002-V01), coastal salt marsh restoration (CCER-14-003-V01), and seagrass bed restoration (CCER-14-004-V01) were jointly issued by the Ministry of Ecology and Environment and the Ministry of Natural Resources, making China the first country to simultaneously include all three blue carbon ecosystem types in its national greenhouse gas voluntary emission reduction trading mechanism. In March 2026, the Xiapu Mangrove Project led by the Third Institute of Oceanography, Ministry of Natural Resources, was officially registered, becoming the country's first marine-sector greenhouse gas voluntary emission reduction project. These developments provide both institutional interfaces and technical foundations for incorporating "biodiversity-integrity blue carbon" into CCER.

However, the existing CCER methodological framework focuses primarily on carbon stock changes (e.g., vegetation biomass carbon pools and soil carbon pools) and has yet to establish systematic quantitative mechanisms for incorporating ecosystem "biological integrity"—that is, the completeness of species composition, functional group structure, and ecological processes. This constitutes the core breakthrough direction for integrating "biodiversity-integrity blue carbon" into CCER.

Accounting standards: Establishing a dual-layer "Carbon + Biological Integrity" accounting framework

Incorporating biological integrity into the CCER methodology requires adding a second accounting dimension on top of the existing carbon accounting framework. Specific recommendations are as follows:

Indicator System Design

Indicator tier	Accounting content	Quantification method	Data source
Core Carbon Indicators (existing)	Changes in vegetation biomass carbon stocks and soil carbon pools	Plot surveys + remote sensing inversion	Project monitoring data
Biological Integrity Indicators (new)	Abundance/biomass of key functional groups (e.g., herbivorous fish, reef-building coral cover)	Underwater transect surveys + eDNA monitoring	Project baseline + annual monitoring
Ecological Structure Indicators (new)	Habitat connectivity index, changes in species richness	Spatial analysis + species inventory	Remote sensing + field surveys
Resilience Assessment Indicators (new)	Resilience indicator score based on critical slowing down	Underwater transect surveys + eDNA monitoring	Long-term stationary monitoring

Design principles for the accounting methodology

1. **Dual-criteria additionality demonstration:** Beyond demonstrating carbon sequestration increments, projects must also prove that they produce a net positive impact on biological integrity—meaning that the biological integrity index within the project area is not lower than the baseline level and shows significant improvement.
2. **"Biological integrity adjustment factor" for carbon accounting:** Introduce an adjustment coefficient

into carbon accounting, weighting the carbon sequestration volume according to the biological integrity rating of the project area.

3. **Monitoring frequency and cycles:** Carbon indicators should follow existing CCER requirements (typically with a 5-year verification cycle); biological integrity indicators are recommended to be monitored every 2–3 years to capture ecological changes in a timely manner.

4. **Methodology hierarchy:** It is recommended that the existing three blue carbon CCER methodologies serve as "parent methodologies," with "biological integrity supplementary modules" developed separately for each ecosystem type—i.e., adding a biological integrity accounting appendix to the mangrove restoration, seagrass bed restoration, and coastal salt marsh restoration methodologies, rather than developing standalone methodologies. This approach reduces institutional costs and maintains the unity of the methodology system.

References

[1]World Wide Fund. Living Planet Report 2024[EB/OL]. (2024-10-10)[2025-04-09]. https://www.wwf.org.uk/our-reports/living-planet-report-2024.

[2] IPBES Intergovernmental science-policy platform on biodiversity and ecosystem services. Summary for policymakers of the thematic assessment of the interlinkages among biodiversity, water, food and health (Nexus Assessment)[R]. Bonn, Germany: IPBES Secretariat, 2024.

[3] Liu C, Duan X, Zhong R, et al. Exploring the impact of human activities on habitat quality to support sustainable zoning management in transboundary basins: evidence from the lancang-mekong river basin[J/OL]. Geography and Sustainability, 2026, 7(3), 100457

[4] UNEP annual report: global cooperation delivered environmental gains in 2025[EB/OL]. (2026-11-02)[2026-05-06]. https://www.unep.org/news-and-stories/press-release/unep-annual-report-global-cooperation-delivered-environmental-gains

[5] Quitian M, Planas-Sitja I, Morooka M, et al. Coinvasional disruptions to island pollinator networks[J/OL]. Conservation Biology, 2026

[6] 徐靖, 王金洲. 《昆明-蒙特利尔全球生物多样性框架》主要内容及其影响[J/OL]. 生物多样性, 2023, 31(4): 7-15.

[7] 生态环境部. 中国生物多样性保护战略与行动计划（2023-2030 年）[R]. 2024.

[8] Locke H, Dearden P. Rethinking protected area categories and the new paradigm[J/OL]. Environmental Conservation, 2005, 32(1): 1-10.

[9] Alves-Pinto H, Geldmann J, Jonas H, 等. Opportunities and challenges of other effective area-based conservation measures (OECMs) for biodiversity conservation[J/OL]. Perspectives in Ecology and Conservation, 2021, 19(2): 115-120.

[10] 王晓倩, 邓毅. 与《昆明-蒙特利尔全球生物多样性框架》衔接的中国 OECMs 关键问题与推进策略[J]. 生物多样性, 2025, 33(3), 24569.

[11] 赵维洋, 王伟, 马冰然. 其他有效的区域保护措施(OECMs)研究进展与展望[J]. 生物多样性, 2025, 33(3).

[12] Choi CY, Shi X, Shi J, et al. China's Ecological Conservation Redline policy is a new opportunity to meet post-2020 protected area targets[J/OL]. Conservation Letters, 2022, 15(2), e12853.

[13] [13] Schmidt-Traub G, Locke H, Gao J, et al. Integrating climate, biodiversity, and sustainable land-use strategies: Innovations from China[J/OL]. National Science Review, 2021, 8(7), nwaa139.

[14] UNEP-WCMC (2026). Protected area profile for china from the world database on protected areas, April 2026. www.protectedplanet.net

[15] UNEP-WCMC, April 2026. https://www.unep-wcmc.org/en/news/world-reaches-milestone-for-nature-10-of-ocean-now-officially-protected

[16] Pike EP, MacCarthy JMC, Hameed SO, et al. Ocean protection quality is lagging behind quantity[J]. Conservation Letters, 2024, 17(3) , e13020.

[17] 江南, 徐卫华, 刘增力. 我国自然保护地对海洋生物多样性的保护现状[J/OL]. 国家公园, 2024, 2(2): 72-80.

[18] Response and adaptation to climate change in the south China sea and coral sea | springer nature link[EB/OL]. [2026-05-14]. https://link.springer.com/chapter/10.1007/978-3-319-50094-2_10.

[19] Zou J, Jin X, Shan X, et al. Whether the summer fishing moratorium can improve the status of fisheries resources in the yellow sea and bohai sea[J/OL]. Heliyon, 2024, 10(19), e38100.

[20] OECM 系列研究：OECM 中国海域适用性研究-自然资源保护协会[EB/OL].[2026-05-13]. https://www.nrdc.cn/information/informationinfo?id=389.

[21] Chen M, Zeng C, Zeng X, et al. Assessment of marine protected areas in the east China sea using a management effectiveness tracking tool[J/OL]. Frontiers in Marine Science, 2023, 10: 1081036.

[22] Other effective area-based conservation measures - 30×30 solutions toolkit 30×30 solutions toolkit[EB/OL]. [2026-05-13]. https://www.30x30.solutions/other-effective-area-based-conservation-measures/.

[23] Government of Canada. Guidance for recognizing marine other effective area-based conservation measures 2022[EB/OL]. (2022-12-09)[2026-05-13]. https://www.dfo-mpo.gc.ca/oceans/publications/oecm-amcepz/guidance-directives-2022-eng.html.

[24] Bottom trawling: new report highlights need for action[EB/OL]. [2026-05-13]. https://www.oceancare.org/en/stories_and_news/report-trawling/.

[25] To manage global trawling impact, think local | NOAA fisheries[EB/OL]. [2026-05-13]. https://www.fisheries.noaa.gov/feature-story/manage-global-trawling-impact-think-local.

[26] Nakayama S, Dong W, Correro RG, et al. Comparing spatial patterns of marine vessels between vessel-tracking

data and satellite imagery[J/OL]. Frontiers in Marine Science, 2023, 9: 1076775.
[27] Huang D, Chen J, Xu L, et al. Larval fish assemblages and distribution patterns in the Zhongsha Atoll (macclesfield bank, South China Sea)[J/OL]. Frontiers in Marine Science, 2022, 8, 787765.
[28] Lopazanski C, Foshay B, Couture J L, et al. Principles for climate resilience are prevalent in marine protected area management plans[J/OL]. Conservation Letters, 2023, 16(5), e12972.
[29] CMS [Convention on Migratory Species of Wild Animals]. (2024). Ecological Connectivity, Resolution 14.16, Samarkand, Uzbekistan (12-17 February 2024). UNEP/CMS/Resolution 14.16. [EB/OL]. [2026-05-13] https://www.cms.int/sites/default/files/document/cms_cop13_res.12.26_rev.cop13_e.pdf
[30] Brennan S, Reeves J, Chaudhary SM, et al. Scaling up: conservation in a connected world. [M] IUCN WCPA Issues Paper Report Series, 2025, No.8. Gland, Switzerland, IUCN.
[31] Popova E, Vousden D, Sauer WHH, et al. Ecological connectivity between the areas beyond national jurisdiction and coastal waters: Safeguarding interests of coastal communities in developing countries[J/OL]. Marine Policy, 2019, 104, 90–102.
[32] Bentley LK, Nisthar D, Fujioka E, et al. Marine megavertebrate migrations connect the global ocean[J/OL]. Nature Communications, 2025, 16, 4089.
[33] Dunn DC, Harrison AL, Curtice C, et al. The importance of migratory connectivity for global ocean policy[J/OL]. Proceedings of the Royal Society B: Biological Sciences, 2019, 286(1911), 20191472.
[34] Beal M, Dias MP, Phillips RA, et al. Global political responsibility for the conservation of albatrosses and large petrels[J]. Science Advances, 2021, 7(10), eabd7225.
[35] Dias MP, Martin R, Pearmain EJ, et al. Threats to seabirds: A global assessment[J]. Biological Conservation, 2019, 237, 525–537.
[36] Brooks CM. Geopolitical complexity at the bottom of the world: CCAMLR's ongoing challenge of adopting marine protected areas[M]. In J. N. Vince & D. A. Day (Eds.), Governing marine living resources in the polar regions (pp. 43–65). 2019. Edward Elgar Publishing.
[37] UNFCCC. Linkages between biodiversity and climate change and the role of science-policy-practice interfaces for ensuring coherent policies and actions[R/OL]. 1-21. https://unfccc.int/sites/default/files/resource/Thematic Paper 2 Linkages Between Biodiversity and Climate Change and the Role of Science-Policy-Practice Interfaces for Ensuring Coherent Po.pdf.
[38] He J, Cao M. The United Nations and global blue carbon governance: A policy and practice review of frameworks, challenges, and possible pathways[J/OL]. Frontiers in Marine Science, 2026, 12, 1734688.
[39] Van Dam BR, Zeller MA, Lopes C, et al. Calcification-driven CO2 emissions exceed "Blue Carbon" sequestration in a carbonate seagrass meadow[J/OL]. Science Advances, 2021, 7(51), eabj1372.
[40] Howard J, McLeod E, Thomas S, et al. The potential to integrate blue carbon into MPA design and management[J/OL]. Aquatic Conservation: Marine and Freshwater Ecosystems, 2017, 27(S1), 100–115.
[41] Yan H, Shi Q, Xu L, et al. Carbon budgets of coral reef ecosystems in the South China Sea[J/OL]. Frontiers in Marine Science, 2024, 11,1335662.
[42] Chen Y, Zhou W, Qiu L, et al. Corals and reef‐dwelling fish regulate carbon storage and cycling processes in coral reef ecosystems[J/OL]. Advanced Science, 2026: e20612.
[43] Landis E. High-quality blue carbon principles and guidance[J]. Seeks to Drive Sustainability and Equity in the Blue Carbon Market, 2022. [2026-05-13]. https://www3.weforum.org/docs/WEF_HC_Blue_Carbon_2022.pdf
[44] Randazzo-Eisemann Á, Molina-Hernández AL, Alvarez-Filip L, et al. Strong linkage between parrotfish functions and habitat characteristics[J/OL]. PLOS One, 2024, 19(12), e0315179.
[45] Earth security. strategic intelligence on planetary risk & capital markets[R/OL]. [2026-05-14]. https://www.earthsecurity.org/research/unlocking-the-blue-carbon-premium.
[46] Carbon and biodiversity: quantifying the ROI of Co-benefits in the voluntary carbon market[EB/OL]. [2026-05-14]. https://www.sylvera.com/blog/biodiversity-premiums-co-benefits.
[47] Zhou ZY, Almond D. The biodiversity promise of carbon markets looks weaker than advertised[J/OL]. 2026[2026-05-14].https://www.ecgi.global/publications/blog/the-biodiversity-promise-of-carbon-markets-looks-weaker-than-advertised.
[48] Boettcher M, Winkler M, Michaelowa A. Accounting and monitoring challenges for blue carbon enhancement in national climate policy targets and international carbon markets[J/OL]. Carbon Management, 2025, 16(1): 2585895.