



# Obstacles Faced by Blue Carbon Market Transactions and Legal Solutions

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## Abstract

In October 2021, the 26th Conference of the Parties to the United Nations Framework Convention on Climate Change further strengthened the concept of global carbon neutrality. In order to actively fulfill its international responsibility for global climate governance, China has put forward the goal vision of "striving to achieve carbon peak before 2030 and carbon neutrality before 2060". This is not only an important guide for domestic sustainable development, but also reflects its determination to assume international responsibility. In this context, blue carbon trading, as an emerging climate governance tool, plays an important role in promoting the achievement of global and national carbon neutrality goals. At present, China's blue carbon market is in its early stages, and various systems are not yet sound. At the same time, some problems need to be solved urgently in the trading process, such as unclear legal attributes of blue carbon sinks, unclear ownership of rights, difficulty in implementing ecological service payment systems, and imperfect supervision of blue carbon trading. It is necessary to promote specialized legislation related to blue carbon to clarify and regulate it, as well as introduce ecological compensation for blue carbon sinks.

## Keywords

Blue carbon, Carbon sink, Climate governance, Trading market

## 1. Research background

Blue carbon sink, also known as blue carbon, is a form of "carbon sink" that, like green carbon, captures and stores carbon dioxide through natural processes. However, "green carbon" refers to terrestrial plants absorbing atmospheric carbon dioxide and storing it on land. Blue carbon absorbs atmospheric carbon dioxide through contact with water, air, or gases in both, and stores it in marine ecosystems or coastal zones, hence it is called "blue carbon". Compared with green carbon, blue carbon ecosystems are highly efficient in capturing and storing carbon, and have greater potential in limiting, reducing, and mitigating the impacts of climate change.

At first, natural regulation methods to slow down climate change were almost entirely based on green carbon (carbon sequestration in terrestrial ecosystems), largely ignoring opportunities for coastal and marine carbon sequestration. Later, with the deepening of practice, the blue carbon ecosystem entered the public's vision, including seagrass beds, tidal swamps, mangroves, and so on. The blue carbon ecosystem is a widely distributed and highly productive coastal habitat with multiple ecological communities that support human well-being, provide food and coastal protection, prevent erosion and sea level rise, and affect the livelihoods of millions of people. These systems, due to their strong greenhouse gas removal effect, retain carbon for a long time and accumulate a large amount of storage, which can greatly contribute to carbon reduction (Macreadie et al., 2021). On the contrary, interference from blue carbon ecosystems may become a potential source of large-scale greenhouse gases. Therefore, the blue carbon strategy proposes protecting and restoring these ecosystems as strategies for mitigating and adapting to climate change.

This article is based on the theory of building a blue carbon trading market and various policies related to blue carbon issued by the country. The focus is on exploring the problems in the establishment and operation of the blue carbon trading market and proposing legal solutions. Intended to contribute my knowledge and strength to the construction and development of China's blue carbon trading market.

## **2. Theoretical basis of the blue carbon sink trading market**

### **2.1 Theory of ecosystem service payment**

Ecosystem service payment, also known as PES, refers to the theory that ecosystem functions are treated as a paid service, and buyers and sellers sign a voluntary transaction agreement to enjoy services and benefits based on who pays. This theory is based on the definition in the 2005 report of the International Center for Forestry Research, which is an agreement based on the voluntary agreement of both parties regarding a certain environmental service or land use (Liu Yanhong, 2016). This definition provides the key points of the system: firstly, both parties must be based on their voluntary participation; secondly, both parties can obtain the benefits they deserve from it. Thirdly, ultimately beneficial for the maintenance of the ecosystem. The establishment of the blue carbon market based on the ecosystem service payment theory can obtain funding to support the development and operation of projects focused on the protection and restoration of the blue carbon ecosystem, thereby promoting the sustainable development of the blue carbon ecosystem.

### **2.2 Land sea coordination theory**

In 2004, Zhang Haifeng first proposed the concept of "land-sea coordination" at the "600th Anniversary Report of Zheng He's voyages to the West" held at Peking University. In 2015, the "Opinions of the Central Committee of the Communist Party of China and the State Council on Accelerating the Construction of Ecological Civilization" proposed to "strengthen the comprehensive management of marine environment, ecological protection and restoration of sea areas and islands, effectively protect important, sensitive, and fragile marine ecosystems," and "establish a mechanism for marine ecological environment protection and restoration that integrates land sea coordination and regional linkage" (Liu Yuxiao, 2024). Land and ocean are two ecosystems that interact and constrain each other. In real life, the connection between land ecological environment protection and marine ecological environment protection in China is not close, and there are even some uncoordinated phenomena. This situation has led to many contradictions in the overall ecological environment protection to a certain extent (Li Zhiping, 2021). Marine pollution cannot be controlled solely by controlling the ocean, but also by preventing land-based pollution, which requires a comprehensive perspective of integrating land and sea.

### **2.3 Climate responsibility theory**

The climate responsibility theory initially advocated for the internal moral constraints of the responsibility of countries around the world to mitigate temperature change, but later on, countries gradually developed an external constraint in their practical operations. As a legislative concept, climate responsibility theory provides guidelines for legal activities such as climate change legislation in countries and regions around the world, and also plays a value-leading role (Pan Xiaobin, 2017). The concept of marine ecological protection is gradually shifting towards mitigating global warming. The construction purpose of the blue carbon trading market is also to reduce the concentration of greenhouse gases in the atmosphere and promote environmental protection and sustainable development by providing an economic incentive. Governments of various countries should, under the theoretical guidance of climate responsibility theory, promote the successful establishment of the blue carbon market through legislation, and regulate the blue carbon market well on the basis of not affecting the normal operation of the market.

## **3. The problems faced by the blue carbon trading market**

### **3.1 Unclear ownership and legal attributes of blue carbon sinks**

If a product wants to be listed for trading, it is first necessary to have a clear understanding of who should own the profits, that is, the ownership of property rights. Taking mangroves, one of the blue carbon ecosystems, as an example, when mangroves are traded in the blue carbon trading market, forestry carbon sinks, and forest rights are separated,

and the ownership of carbon sinks should belong to whom, specifically to the forest owner or other relevant parties. Currently, there is no clear legal provision to determine the ownership, which can easily lead to property rights disputes, significantly increasing the cost of carbon sink trading and reducing the enthusiasm of trading participants. If it is the carbon sequestration generated by marine organisms, it may also involve the right to use the sea area, the right to pass pipelines, and so on. Regarding the legal attributes, whether blue carbon sinks belong to usufructuary rights or quasi-property rights, some scholars believe that blue carbon sinks belong to usufructuary rights, while others believe that from the perspective of the functions and beneficiaries of blue carbon, it is public and should be given a public right color, belonging to some quasi property rights. Therefore, in order to list and trade blue carbon sinks and protect and develop the blue carbon ecosystem, the ownership and legal attributes of blue carbon sinks need to be clarified (Lin Jing, 2019).

### **3.2 The regulatory mechanism of the blue carbon trading market is incomplete**

Since 2013, China has successively established carbon emission trading exchanges in Beijing, Tianjin, Shanghai, Shenzhen, Guangzhou, Hubei, and other regions, and constructed carbon emission trading systems that reflect the characteristics of their respective regions. However, China's blue carbon market is still in the pilot stage and is not yet mature in all aspects. The regulation of the blue carbon trading market can refer to the regulation of forestry carbon sinks. Forestry carbon sink projects are often carried out under the leadership of the government (Bai Yang, 2021). Therefore, in the regulation of the blue carbon market, government participation and guidance seem inevitable. However, when the government takes the lead in the regulatory process, the problem is that the regulatory system is not perfect enough, resulting in the actual regulatory effectiveness not achieving the expected goals. Firstly, as the government may participate as a trading entity in the development of blue carbon projects, there may be an inability to guarantee the neutrality of its identity. Secondly, monitoring and evaluating the blue carbon trading market and its environmental effects requires extensive professional knowledge and technical capabilities, and relying solely on existing government personnel resources makes it difficult to effectively carry out this task, which may lead to low regulatory efficiency and ultimately affect the healthy development of the blue carbon sink market.

### **3.3 The payment system for ecological services makes it difficult to achieve the expected results**

Paid ecosystem services are a mechanism, but there is still a lack of unified payment standards. This inconsistency is partly due to the comprehensive nature of ecosystems and the specific ecological functional differences of different regions and species, which makes it complex to determine which services should be compensated for. For example, mangrove plants can provide wood and medicinal resources with certain economic value, while also having ecological value such as wind and wave protection, carbon sequestration, and carbon storage, which have ecological effects. For marine ranches engaged in shellfish and large-scale algae farming, the emphasis on economic functions may be relatively high (Lin Jing, 2019). In addition, it is necessary to consider the information imbalance, bargaining power inequality, and possible free-riding phenomenon between service providers and beneficiaries. Ultimately, these reasons have led to difficulties in achieving the expected results of the ecological service payment system.

## **4. Legal approaches to issues in the blue carbon trading market**

### **4.1 Clarify the ownership and legal attributes of blue carbon sinks**

In order to enhance the legal standardization of China's blue carbon sequestration industry and gradually reduce reliance on policy adjustments, we need to accelerate the modification of existing laws and regulations and the establishment of new ones. Establish the legal status of rights and responsibilities related to the protection of blue carbon, and confirm and ensure the reasonable use mode of blue carbon (Li Bingqiang, 2024). The Marine Environmental Protection Law of the People's Republic of China, as the fundamental law for marine environmental protection in China, should introduce the concept of blue carbon sink and clarify its legal attributes. At the same time, it should clarify the ownership of blue carbon sink property rights. For example, the relevant provisions of the Civil Code of the People's Republic of China can be referred to, using mangroves as an example. If mangroves are traded by the owners of mangroves, carbon sinks should belong to the owners of mangroves. If the owners of mangroves and carbon sink operators are not the same entity, the ownership of blue carbon sink products should belong to the operators of carbon sinks.

## 4.2 Optimizing the regulation of the blue carbon trading market

In order to ensure the fairness, transparency, and effectiveness of the market, it is recommended to authorize independent third-party regulatory agencies with appropriate powers to intervene and supervise the operation of the blue carbon market. The responsibilities of these regulatory agencies should include reviewing the market access conditions for blue carbon projects, ensuring fairness and impartiality in the bidding process for carbon offset certificates, and monitoring the compliance of actual delivery of blue carbon (Pan Xiaobin, 2018). In terms of regulatory measures, it is crucial to establish a comprehensive dynamic monitoring mechanism and information-sharing platform to track every link of blue carbon trading in real time, ensuring the authenticity of data and transparency of transactions (Hu Feng, 2023). In addition, when carrying out regulatory tasks, it is necessary to strengthen the legal responsibility of the government in the process of converting the value of blue carbon ecosystem services.

## 4.3 Apply ecological compensation system to blue carbon sinks

At present, China's marine ecological compensation mainly focuses on compensating the implementers of marine and coastal development projects that cause serious damage to the marine ecological environment, as well as establishing specific marine nature reserves by the government to restore affected ecosystems. The scope of this approach is relatively limited, so it is necessary to expand the field of marine ecological compensation.

When formulating marine ecological compensation measures, China has always paid less attention to the importance of biological resources. Therefore, it is recommended to clearly include biological resources within the scope of compensation. At the same time, compensation measures should not be limited to the ocean itself, but should also extend to nearshore ecosystems, including important environmental elements such as wetlands and mangroves, to ensure timely and effective compensation for these areas.

When determining compensation standards and methods, evaluations should be made from both economic and ecological perspectives. In terms of economic value, theoretically, it should reflect the value of ecological services provided by ocean carbon sinks. However, due to the difficulty in accurately measuring certain marine service functions, compensation standards need to consider two key factors: first, the direct and indirect benefits that protecting marine carbon sinks can bring; The second is the cost required to repair the carbon sink function, which also includes the investment required to achieve intergenerational equity. Marine ecological compensation can take various forms, and the most effective method for compensating marine carbon sinks should be to combine habitat compensation and financial compensation. In practical operation, the ecological service payment mechanism established to protect blue carbon has not yet formed a complete system, and the proportion of funds invested in the protection of marine blue carbon sinks is not high at present (Zhu Hui, 2022). To improve this situation measures such as levying marine ecological compensation fees can be considered to increase funding sources. This needs to be approached from two aspects: firstly, to strengthen the evaluation and quantitative analysis of carbon storage in marine carbon sinks, and to construct a standard framework for carbon storage; The second is to clarify the relevant responsible parties, beneficiaries, compensation standards, and compensation methods for blue carbon ecological damage compensation. Specifically, the main entities responsible for ecological damage compensation are those individuals or legal entities who have caused damage to or benefited from the development and utilization of marine carbon sink resources and therefore have an obligation to assume corresponding responsibilities.

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