



# China's Marine Environmental Protection Strategy in the Background of the COVID-19 Pandemic: Progress, Challenges, and Outlook

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**Abstract.** The issue of marine environmental protection is a strategic one. China's marine environmental protection strategy has gone through a process of development, however, there are still many problems remained. The COVID-19 pandemic outbreak has brought enormous challenges and opportunities to Chinese marine environmental protection sector. Therefore, This paper presents a comprehensive review of marine environmental protection during the epidemic, the achievements of marine environmental protection in China during the epidemic, and the key issues of marine environmental protection in China. Based on this, the study constructs a "people-centered" marine environmental governance model to provide theoretical references to provide solutions to China's marine environmental governance issues.

**Keywords:** Ocean · Sustainable development · Marine environmental protection · Marine ecology · Pandemic

## 1 Introduction

### 1.1 The Significance of Marine Environmental Protection Especially in the Background of the COVID-19 Pandemic

#### Environmental Challenges Brought by COVID-19 Pandemic

The COVID-19 pandemic outbreak has brought enormous challenges and opportunities to the global marine environmental protection sector. As a result of government restrictions to prevent the spread of the virus, the demand for individual usage, sanitation and hygiene water has increased, which have exacerbated water stress [1]. Furthermore, the rapid increase in the use of disposable plastic masks and other COVID19 related personal protective items has polluted the sea [2]. According to Oceans Asia, at least 1.56 billion discarded masks ended up in the ocean in 2020, and discarded masks have been found in the digestive tracts of many dead marine organisms [3]. Under these circumstances, it is

necessary to strengthen the ecological protection strategies at home and abroad, taking advantage of the strengths while circumventing weaknesses.

### **Marine Environment Development Helps Foster New Sources of Economic Growth**

The ocean economy, an ocean based economic growth model, including marine fishery industry, coastal tourism, marine mining industry and etc., is now recognized as a new economic frontier for the global economy to fulfill the United Nation's Sustainable Development Goals 14 (SDG14) [4]. It is a key source of food, energy, minerals, recreation, and transportation for hundreds of millions of people. Global economy slowed down during the pandemic. Promoting the ocean economy provides a new channel for overall economic growth. According to the OECD, the value added in the ocean economy in 2010 was USD 1.5 trillion, and it is expected to exceed USD 3 trillion by 2030, maintaining its share of 2.5% of total global GVA (Gross value added) (estimated at USD 120 billion in 2030). The combined compound annual growth rate of value added of the ocean-based industries between 2010 and 2030 is estimated at 3.45%, broadly in line with the anticipated compound annual growth rate for value-added of the global economy. Over the next 20 years, total employment growth in ocean-based industries (approximately 30%) is expected to outpace the overall global workforce growth (approximately 20%) [5]. For the first time in history, the Chinese ocean's gross national product surpassed 9 trillion Chinese yuan in 2021, an increase of 8.3% over the previous year. Approximately one-tenth of the Chinese economy is derived from the ocean economy. Therefore, maintaining a sustainable marine environment development is important from an economic standpoint.

### **Global Marine Environment Protection Initiative Receives Strong Support at UN**

The Decade of Ocean Science for Sustainable Development, which runs from 2021 to 2030, was established by the United Nations General Assembly in 2017 as a framework to identify, generate, and apply crucial ocean knowledge necessary for ocean management and achieving the world's climate, biodiversity, and human well-being goals [6]. Moreover, according to the UN Sustainable Development Goals report 2022, "Human activity is endangering the planet's largest ecosystem – its oceans and seas – and affecting the livelihoods of billions of people" [7]. Generally speaking, it draws public attention to the need for revolutionary solutions to the current and upcoming problems affecting the ocean and, consequently, human beings.

## **1.2 Marine Environmental Protection Circumstances in China**

China has an abundance of marine resources. With a 32600 km long coastline [8], 2,904,100 million m<sup>3</sup> of water [8], and 80,000 km<sup>2</sup> of islands it is home to 40% of the nation's population [9]. In 2021, China's sea area with first-class water quality made up 97.7% of the territory under its control, an increase of 0.9% over 2020 [10].

From an international perspective, China has made substantial contributions to the conservation and sustainable use of global marine biodiversity and was in the first party to sign the Convention on Biological Diversity. On October 13, 2021, the first phase of the 15th Conference of the Parties to the United Nations Convention on Biological Diversity (CBD) adopted the Kunming Declaration in Kunming, China.

China was relatively late in implementing ocean governance compared to developed countries and is still challenged by multi-level ocean governance issues. Firstly, in terms of environmental issues, China's marine protected areas are small, with a total area of 124,000 square kilometers, accounting for only 4.1% of China's territory [11]. Offshore water is affected by inorganic nitrogen and active phosphate pollution, and local sea oil pollution and heavy metal pollution are still prominent [12]. Secondly, at legal level, despite China's early establishment of maritime legal system, there are still gaps in some areas. For example, some provisions are not properly aligned with the international law of the sea [13]. Thirdly, China's marine management functions tend to be decentralized at the management level while being centralized at the level of law enforcement. Problems emerged in the coordination among multiple departments, and reforms are lacking to prevent regulatory overlap and to improve the effectiveness of management.

More importantly, due to the disruptions in global market and supply chain during the COVID-19 pandemic, major sectors of the blue economy in China including coastal and maritime tourism, and the fishing and aquaculture industries were impacted detrimentally [2]. Furthermore, due to its commitment to a dynamic zero-COVID policy, China has seen an increase in the wasted masks discarded directly into the environment, which has polluted the land, air, and water resources [14].

In the context of the COVID-19 outbreak, this article explores how the Chinese government and people are calling for the protection of the marine environment. It also highlights difficulties in creating a system to protect the marine environment in China. Additionally, it outlines the actions that should be taken in terms of the economy and the environment, with reference to the idea of a "Blue Economy".

## **2 Progress of Marine Environmental Protection in China**

### **2.1 The Fourteenth Five-Year Plan of Marine Environmental Protection**

The Chinese government has focused on marine environmental conservation and marine ecotourism as part of the necessity towards a more sustainable and ecological economy. The chapter on oceans in the Five-Year Plan first appeared in the 11th Five-Year Plan in 2006, and it has continued ever since. The 14th Five-Year Plan of China outlines the country's economic and social development from 2021 to 2025. It advises that China should create influential contemporary maritime industrial clusters, as well as pilot cities and regions. It also suggests that China should modernize its maritime industrial infrastructure with a focus on burgeoning the marine sector [15].

The 14th Five-Year Plan places more emphasis on developing a global maritime community with a shared future, while previous ones were focused more on domestic ocean management. In addition, the 14th Five-Year Plan raises the level of requirements in the ocean economy, which is expressed as the "breakthroughs in the field of marine engineering, marine resources, marine environment, several key core technologies".

The COVID-19 pandemic has led to changes in domestic development patterns that increased the demand of domestic travel and enhanced peoples' perceptions of their access to the sea of local area [16]. In response, the 14th Five-Year Plan calls for "improving the level of development of marine cultural tourism" to further foster the potential of marine culture and tourism consumption. Green development has become

the keynote of marine fisheries, which not only focus on quantitative expansion but also on ecological green farming and the sustainable use of fishery resources.

## 2.2 Joint Enforcement Actions Between Departments

In recent years, the effective collaboration between various Chinese government departments has progressed. In April 2021, the China Marine Police Bureau, together with the Ministry of Ecology and Environment and other departments, launched the “Blue Sea 2021” joint law enforcement operation. The “Blue Sea 2021” initiative focused on marine factory construction projects, island protection, sea sand mining and transportation, marine waste dumping, marine oil exploration and development, and other eight aspects of law enforcement action to strengthen the supervision. It aims at strictly enforcing the law and combating illegal and criminal activities as well as lowering ecological and environmental risks [17]. In October 2022, the near-shore sea pollution prevention and control joint law enforcement action was carried out in Zhuhai City, Guangdong Province, by the Bureau of Ecology and Environment, the Municipal Bureau of Transport, the city's comprehensive marine law enforcement detachment, and the Zhuhai Maritime Bureau to jointly combat marine environment pollutions and marine ecological damages [18].

The coordinated efforts of the judicial and law enforcement branches in China have significantly increased the effectiveness of fighting against crime. On a global scale, the Chinese Maritime Police Bureau and the Ministry of Maritime Affairs and Fisheries of the Republic of Korea held video conference on fisheries law enforcement for 2021. The two sides evaluated the operation of the China-Korea Fisheries Agreement, thoroughly discussed and exchanged opinions on the cooperation among maritime law enforcement departments, and reached a broad consensus on joint patrols and information sharing [19].

## 2.3 The Cooperation Between Government and Enterprises

In 2016, Dang & Hai, V (2016) found that the lack of robust national enforcement mechanisms in legislation prevented the general public from taking an active role in the discussion of the marine environment. Recently, the situation has changed [20]. The State Council issued the “Opinions on Encouraging and Supporting Social Capital Participation in Ecological Protection and Restoration” to encourage and support social capital participation in ecological protection and restoration projects through independent investment, government cooperation, and public participation [21].

In 2021, the Third Institute of Oceanography of the Ministry of Natural Resources of China, the Guangdong Zhanjiang Mangrove National Nature Reserve Administration, and the Beijing Entrepreneurs Environmental Protection Foundation jointly signed the first “Blue Carbon” project carbon sink transaction in China. “Blue carbon” refers to the process, activity, and mechanism that uses ocean activities and marine organisms to absorb carbon dioxide from the atmosphere [22]. By introducing social funds into blue carbon ecosystem protection, the project demonstrates its positive commitment to achieving the ecological value of blue carbon.

Moreover, through strict protection and large-scale ecological restoration, China is one of the few countries in the world to have seen a net expansion of mangrove forests. Data from the third national land survey shows that China's existing mangrove land area is 40.60 million acres [23].

Further, intelligent environmental protection concept was introduced into marine ecosystem construction. The "Internet Plus" survey mechanism, which combines traditional survey system with internet technology, has been activated through the national unified "Land Survey Cloud" platform to establish full quality control, ensure data accuracy. The nationwide mangrove resources satellite remote sensing monitor has helped mangrove protection effectively [24].

## 2.4 Legal Enforcement Has Been Strengthened

The 14th Five-Year Plan of National Marine Ecological Protection has made "promoting marine plastic waste treatment" a key task [25]. In January 2020, to improve the whole life cycle of plastic products, the National Development and Reform Commission and the Ministry of Ecology and Environment jointly issued the "Opinions on Further Strengthening Plastic Pollution Control". It establishes a special interdepartmental working scheme in controlling plastic pollution, restricting the production, sale, and use of some plastic products in accordance with the law which aims to regulate the recycling of plastic waste and promotes the management system [26].

In terms of local regulations, at the end of 2020 the Standing Committee of the Hainan Provincial People's Congress released the Regulations on Ecological Protection Compensation in Hainan Province, which clarifies the ecological protection compensation mechanism and policies that are compatible with the strategy of free trade port in Hainan [19].

From the perspective of law enforcement practice, the Ministry of Natural Resources implements tighter measures to protect and manage uninhabited islands. By using a variety of regulatory tools, including drones, satellite remote sensing technology and dynamic monitoring system, it has strict oversight of any illegal use of the sea and islands. In 2021, authorities nationwide discovered and stopped 19 suspected illegal reclamation sites, 98 suspected illegal structures for sea use, and 22 suspected illegal island use [24].

## 2.5 Civil Society Advocacy (NGO)

Attracting public participation in environmental protection activities and strengthening the power social organizations are also important progress of marine environmental governance. Improve the efficiency of participation in governance and form a virtuous circle. As the ocean economy develops, it is essential to support the development of the marine-related non-governmental organizations, which could, to a certain extent, replace the governmental responsibility in serving the development of ocean economy and marine society. It is an important measure to promote the smooth transformation of the Chinese government's functions [27].

Guangdong Ocean Association, with 159 unit members and 8 types of maritime expert teams, builds bridges between government units and enterprises and the public,

establishes information exchange platforms, provides advisory services and intellectual support to the government, facilitates communication between enterprises and institutions, conduct marine environmental surveys, and promote national marine policies [28].

### **3 Key Issues and Challenges of Marine Environmental Protection in China**

#### **3.1 Challenges of Ecological Situation**

As economy grows, the ecology remains in a state of low priority. According to the China Marine Economic Statistical Yearbook 2020, China is one of the world's largest fish farming and fishing country. However, only 5.4% of China's territorial waters are marine protected areas that contain 136 kinds of endangered species of fish [29]. In addition, 44 bays with over 100 square kilometers that were monitored in the spring, summer, and fall of 2021 was rated poor Class IV in water quality, with inorganic nitrogen and reactive phosphate levels above the standard. The data also shows that 75% of the 24 typical marine ecosystems that were monitored are in a sub-healthy state [30]. Besides, persistent organic pollutants, environmental hormones, microplastics, pathogenic microorganisms, and other new environmental pollution problems are emerging. The loss of coastal wetlands, the frequent occurrence of red tide, green tide, oil exploration and oil spills, hazardous chemical leaks, and other environmental problems are also reported.

Economic development and utilization of China's coastal areas have peaked in the last two decades, and the uncontrolled exploitation of the oceans has resulted in a drastic decline in marine resources and the destruction of ecosystems, which led to a range of problems.

Also, data on China's marine ecosystem is not updated frequently. It has not been updated for 20 years since the second national marine pollution baseline survey was conducted during 1996–2002. According to the Chinese National Marine Environmental Monitoring Center, the working conference for promoting the third national marine pollution baseline survey has been held successfully in November 2022 [31]. Although the Ministry of Ecology and Environment publishes comprehensive environmental reports annually, key data and standards for environmental assessment and monitoring are still lacking. For instance, the differences between surface water and marine water assessment and monitoring indexes restrict joint prevention and control between the sea and land. The standard for quality, emission, monitoring and evaluation, and other technical systems for the marine ecological environment still need to be improved [32].

#### **3.2 Plastic Problem and Waste Disposal Problem**

Plastic and waste disposal problems remain serious. The amount of PPEs and other healthcare supplies used during the pandemic contributed to the rapid rise in municipal solid waste and biomedical waste. Although the Chinese government has developed a practical manual for the disposal of epidemic-related garbage and medical waste during

the COVID-19 epidemic, the efficiency of execution is unknown. The placement of medical waste bins in residential areas is quite rare, yet homeowners use a significant amount of masks every day as masks are required in public areas.

According to China's marine ecological environment status bulletin, plastic litter makes up the majority of the floating, beach, and seabed litter, and the average density of floating micro-plastics on the sea surface of the monitored section is 0.44 per cubic meter [33]. Although China's overall marine litter pollution level is in the medium to lower range globally, efforts should still be put into prevention and control, which will challenge the development of China's marine environmental governance system and related industries [34]. One of the primary causes of plastic pollution in China is the unpredictable plastic waste disposal behavior and uncontrolled disposal process. The source of pollution and the route to the sea are very complex. The floating nature of plastics, the invisibility of microplastics, and the tides and currents of the ocean all make it very difficult to clean up. The migration path of plastic waste and microplastics complex undoubtedly increases the responsibility shared between the major entities and stakeholders in charge of pollution control [35].

### **3.3 Challenge of Administrative Efficiency**

In recent years, China has been exploring new reforms in its ocean management system. In March 2018, the Central Committee of the Communist Party of China (CPC) issued the Program for Deepening the Reform of Party and State Institutions. The National Oceanic Bureau was dismissed and its rights and liabilities were decentralized. The new decentralized system and new distribution of rights will lead to higher collaboration costs and redundant communication costs. The Ministry of Land and Resources and the State Oceanic Administration were merged to manage the development and protection of marine resources.

The Ministry of Ecology and Environment was formed to specifically review the supervision of marine ecology and environment to achieve land and sea integration within the same ministry. The Ministry of Agriculture and Rural Development was formed to unify the management of fisheries and fishery administration, integrate the management of fisheries and other agriculture, and to achieve scale management [36].

Therefore, the administrative efficiency and mechanism of interdepartmental cooperation need to be improved. Robert L. Stephenson pointed out that, when conducting marine environmental governance, it is important to take into account factors that reduce the effectiveness of marine governance, such as conflicts between various actors, inconsistencies in sectoral approaches, jurisdictions with overlapping mandates, and a lack of communication among governance institutions [37].

### **3.4 Challenge of Public Participant Awareness**

The Chinese government has always taken the lead in marine environmental governance. Despite the development of the cooperative governance model, it continues to be dominated by cooperation between government departments, with fewer options for cooperation between the government and enterprises, as well as between the government and the public. In terms of education, China's water sports program started quite late

and developed at a slow pace. Water sports in schools are constrained by facilities and equipment, lack of teaching methods, and lack of marine environmental education [38]. In the process of governance, the public regulatory system is not sound; environmental NGOs are limited in scope and influence, and lack the right to participate, making it difficult for them to promote ocean awareness and coordinate between the government and the public. Stakeholders lack legal system support, and participants lack enthusiasm, resulting in a lack of participation of social subjects in policy, as well as poor supervision and implementation [39].

### **3.5 Legal Issues**

Under the ecological compensation mechanism, we allow maintainers to use the resources legally, but they should pay a fee based on the related ecological protection costs. However, there are several difficulties associated with the establishment of a legal relief mechanism in China to compensate for marine ecological environmental damages. For instance, the recognition of the claimed subject, the public interest litigation procedure pertaining to the marine environment, the legislative provisions pertaining to marine ecological compensation, the legal connection between land and sea ecological environment protection, and the adjustment of governance subjects' functions, are all lack of detailed legal basis. To provide judicial escort, a solid legal damage relief mechanism is urgently required [40].

## **4 Future Outlook for Marine Environmental Protection in China**

### **4.1 Improve the Administrative Efficiency**

The Chinese government should seek to improve both external and internal administrative efficiency in marine management. Firstly, the government should simplify and standardize the application process for marine scientific research expedition. Updating online guidelines and providing clear instructions will increase the efficiency of marine research. Providing a digital online application platform can be of great help. Secondly, when supervising, the government should try to eliminate management redundancy and duplication of supervision. It is also essential to clarify and provide administrative staff and law enforcement personnel with interdepartmental responsibilities with straightforward and understandable instructions. Thirdly, efforts should be put into encouraging joint law enforcement and building more collaboration cases. Developing those cases into guiding policies will significantly improve the efficiency of interdepartmental cooperation.

### **4.2 Ecotourism and Related Sports Industry**

As economic activities gradually resume in most areas, the Chinese government should learn from the successful experience of island ecotourism development around the world and build its own special coastal tourism mode. Emphasizing marine resources as an essential part of domestic ecotourism and integrating China's marine ecotourism



resources, vigorously Chinese special island tourism will be developed. It is essential to put people at the core of environmental protection and pay attention to spreading the ocean protection concept among the general public. Firstly, ensure that the ecotourism area is distinctive rather than a generic urban decoration, avoid artificial landscaping, and focus on the unique coastal zone, islands, coastal wetlands, marine wildlife, and plants. Further, strengthen the development of marine culture creativity and enhance the income of related qualified talents. Take advantage of China's quality construction capability and build quality infrastructure on islands. Secondly, enhance the quality of the tourist experience of marine ecotourism; encourage marine tourism activities to connect the environment with residents, and bring the concept of environmental protection to the public. Thirdly, develop the water sports industry in order to strengthen the mass base of marine culture from the level of physical education. Combining water sports with eco-tourism industry would be of great value to the buildment of Chinese special ecotourism. Establish a water sports industry system, strengthen policy guidance and law enforcement, ensure the quality of related water sports experience, and actively support water sports promotion.

### **4.3 Waste Management**

Create industry standards for reusable medical masks, speed up the development of biodegradable masks, and promote proper disinfection procedures. Clarify the duties of production and management units, public place managers, and relevant government departments, and improve the implementation and supervision of independent centralized recycling of waste medical masks. Conduct publicity campaigns and train community employees. Improve the placement of community medical waste bins. Clearly define residents' obligations for recycling waste masks. Limit overprotection. Furthermore, given that the severity of the pandemic varies among the regions, the face-covering policy can be adjusted by region.

### **4.4 Raise the Awareness of People**

First and foremost, the government should promote marine environmental management more widely and disseminate professional knowledge to the general public. They should also work with marine universities and research organizations to raise awareness of marine protection among youths and adults through education, foster the development of more qualified marine technical and management talent, and support marine innovation. Second, encourage public participation in marine environmental management, utilize new online media technologies effectively, engage the public in social organization activities, boost the influence of businesses and nonprofits, and enhance the capability of marine environmental management. Lastly, we should strengthen the ability of social organizations to manage the maritime environment, and encourage enterprises in updating and optimizing their sewage systems through preferential policies to reduce pollutant emissions.

#### 4.5 The Legal Relief Mechanism

Improve the legal relief mechanism for damage to China's marine ecology and environment by leveraging foreign marine governance experience. Firstly, clarify the legal issues surrounding claims for marine ecological damage relief. Secondly, enhance the process for pursuing marine environmental public interest litigation. Thirdly, revise the legal guidelines for marine ecological compensation. Fourthly, encourage the effective integration of land and sea environmental legal systems; enhance the marine ecological environment management system.

### 5 Conclusion

The ocean is taking center stage in the global strategy and is getting more and more attention. The issue of marine environmental governance is crucial to China's modern governance. It is an important governance topic in the ecological civilization, the current construction of a modern society, and the construction of a strong ocean nation, as well as one of the United Nations Sustainable Development Goals. The COVID-19 outbreak will continue to have an influence on the marine environment, and this cannot be ignored. Resolving the marine ecological and environmental crises while maintaining the sustainable development of the ocean is a challenging issue that faces all nations around the globe.

This paper presents a comprehensive review of China's marine environmental governance achievements in recent years, analyzes the current problems, and constructs a "people-centered" marine environmental governance model to provide theoretical references to provide solutions to China's marine environmental governance issues.

The development and protection of China's oceans will require efforts from different parties and continuous improvement of measures in practice to achieve sustainable development of the oceans, to become a stronger ocean power, and to improve the country's comprehensive strength and international status.

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