

Navigating the Path to Legal Enhancements in China's Deep-Sea Mining Environmental Governance

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Abstract: As deep seabed mining technology matures and global demand for key minerals grows, new requirements are being posed to environmental governance systems. However, given the urgent need to formulate the Regulations on Exploitation of Mineral Resources in the Area, China's existing legal provisions on environmental governance of deep-sea mining are too principled to meet the needs of practice, thus hindering the goal of marine environmental protection. In response to the above dilemma, this paper proposes improvement suggestions from three perspectives: the licensing system of deep-sea mining, the environmental regulatory system for deep-sea mining, and the financial system of deep-sea mining. These suggestions aim to enhance the adaptability and effectiveness of China's deep-sea mining environmental governance system.

1. Introduction

Deep-sea mining presents a unique opportunity for the international community to address the climate crisis. The supply of critical minerals found in deep seabed is important for clean energy technologies and transitioning from fossil fuels to new energy batteries[1]. Coastal states can conduct deep-sea mining within their exclusive economic zones or in the Areas Beyond National Jurisdiction (Area). Among these, the Area covers approximately half of the Earth's surface and is the most inaccessible area on Earth[2].

The United Nations Convention on the Law of the Sea (UNCLOS) stipulates that the Area and its resources are the common heritage of mankind. Mining activities in the Area must be conducted for the benefit of mankind as a whole.¹ Therefore, the international legal regime for deep seabed mining must take into account the interests of developing countries and promote their effective participation. Article 156 of UNCLOS establishes the International Seabed Authority (ISA), which is responsible for supervising and managing deep-sea mining activities.²

Currently, ISA has established regulations for the exploration of the three main types of minerals to be explored in the Area, but it lacks a general framework to regulate the mining exploitation activities in the Area. In order to better regulate the exploration and exploitation practices of contractors, the international Regulations for the Exploitation of the Mineral Resources in the Area

(Regulations) should be finalized as soon as possible. In 2013, the ISA Secretariat issued a regulatory framework for polymetallic nodule mining activities in the Area; from 2017 to 2019, three versions of the Draft Regulations were successively issued. However, due to the COVID-19 pandemic in 2020, the review of the Regulations was postponed[3]. Today, ISA has resumed offline meetings to deliberate on financial guarantees, environmental protection, supervision, and inspection issues related to seabed area exploration and exploitation. Substantial progress has been made in the negotiations on the main content of the Regulations, but consensus has not yet been reached on specific issues. In July 2023, ISA released a roadmap, aiming to deliberate and adopt the Regulations during the thirtieth session, signaling the final stages of its formulation[4].

In the context of pressing needs for the formulation of Regulations, China, as one of the largest developing countries, has always advocated the concept of sustainable development and actively participated in international rule-making and cooperation in international deep-sea mining. Currently, China has signed five deep-sea mineral exploration contracts with the ISA, covering all three categories of deep-sea minerals. This makes China the state with the largest number of seabed exploration contracts issued by the ISA. Additionally, China has made significant strides in deep-sea exploration technology. The successful launch of the "Three Dragons" equipment system not only marked a breakthrough in China's environmental protection efforts in deep-sea exploration

¹ UNCLOS, Article 136, Article 140(1).

² UNCLOS, Article 156.

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but also showcased China's ambitious endeavors in fully harnessing the potential of the Area[5].

In terms of legal regulation, China has formulated and adopted a law specifically regulating deep-sea mining, namely the Law of the People's Republic of China on Exploration and Exploitation of Resources in the Deep Seabed Area (Deep Sea Law), providing the fundamental legal framework for China's involvement in deep-sea mining activities. Concurrently, to effectively implement the Deep Sea Law, the former State Oceanic Administration devised and enacted three specific administrative measures,³ thus gradually forming a legal system to regulate the exploration and exploitation activities related to deep-sea resources. Moreover, in 2023, China amended the Marine Environmental Protection Law of the People's Republic of China. In line with contemporary developments, it introduced the principle of "prevention and control at the source, and integration of land and sea" as a cornerstone of marine environmental protection, and for the first time, it explicitly mentioned the concept of "marine biodiversity", emphasizing the importance of safeguarding and restoring critical marine ecological corridors.

However, China's existing systems and laws for environmental governance of deep-sea mining are mostly framework provisions, and the legal provisions are rather general, making it difficult to effectively balance the contradictions between development and environmental protection. In view of this, this paper proposes a pathway to enhance China's legislation regarding deep-sea mining from three aspects: the licensing system of deep-sea mining, the environmental regulatory system of deep-sea mining, and the financial system of deep-sea mining. So as to achieve a harmonious alignment between domestic laws and international standards, thereby contributing Chinese wisdom to realize rational, organized, and sustainable exploitation of marine resources.

2. The Path to Enhancing the Deep-Sea Mining Licensing System

The legal regulation of deep-sea mining encompasses both international legislation and corresponding domestic legislation[6]. According to Article 139 of the Convention, sponsoring States must take necessary measures, such as enhancing domestic legislation and administrative enforcement procedures, to ensure the exploitation adhere to the Convention's relevant provisions[7].

Regarding China, the country formulated and adopted the Deep Sea Law on February 26, 2016, specifically to regulate deep-sea mining activities, playing a crucial role in developing China's legal framework for the deep seabed. Among its provisions, the Deep Sea Law includes a licensing system designed to ensure that contractors fulfill their responsibilities to protect the marine

environment, in line with the Convention's requirements. Under this system, the competent authority assesses information provided by contractors seeking exploration or exploitation permits, such as the type of minerals to be extracted, technical capabilities, exploitation plans, environmental impact assessments, and contingency plans for environmental damage. Within sixty working days, the authority grants a license if the application aligns with national interests. Obtaining a license from the competent authority is a prerequisite for contractors to engage with the ISA through contracts. The authority holds the power to revoke licenses if contractors breach their contractual obligations or make significant changes to exploration and exploitation plans without proper consent. Through this licensing system, the State can proactively review contractors' plans, assess environmental impacts, and ensure effective control over marine environmental impacts caused by their activities.

However, the Deep Sea Law contains only general principles, lacking specific and clear conditions for contractors to obtain permits from the sponsoring State. The permit criteria are vague and do not differentiate between different types of deep-sea activities, such as exploration and exploitation. This oversight hinders the law's effectiveness in maximizing marine environmental protection through legislative means. Therefore, improvements are needed in China's Deep Sea Law and the Administrative Measures for the Licensing of Exploration and Exploitation of Resources in the Deep Seabed Area.

2.1. Distinguishing Between Types of Licenses Applied for by Contractors

Activities in the Area encompass three distinct phases: prospecting, exploration, and extraction of minerals. Among these, exploration involves the assessment and evaluation of resources to ascertain their type, distribution, and quantity, providing fundamental data and a foundation for subsequent exploitation. Conversely, exploitation involves selecting suitable areas for resource collection and exploitation based on exploration findings, encompassing the extraction, processing, and transportation of mineral resources. The impact of these two phases on the marine environment varies significantly.

During the exploration stage, the focus is primarily on investigating the geological structure of the seabed and resource distribution using various exploration methods such as sonar and detectors. Consequently, the impact on the marine ecosystem is relatively minimal, primarily involving localized disturbances possibly caused by equipment usage and operations. In contrast, the exploitation phase entails large-scale extraction and processing of seabed resources, potentially resulting in more substantial and enduring impacts on the seabed ecosystem. These impacts may include wastewater

³ Namely the Measures for Management of Samples in the Exploration and Exploitation of Resources in the Deep Seabed Area, the Measures for Management of Data in the Exploration and Exploitation of Resources in the Deep Seabed Area, and the

Measures for the Management of Permits for the Exploration and Exploitation of Resources of the Deep Seabed Area (Permit Measures).

discharge and the destruction of benthic habitats.

Therefore, considering the distinct phases of activities in the deep seabed area, it is logical to establish stricter conditions for applying for a deep-sea exploitation license compared to those for deep-sea exploration[8], as ISA also imposes varying regulatory requirements for these segments of activities[9]. However, China's Deep Sea Law uniformly addresses the application and licensing procedures for both exploration and exploitation activities in the deep seabed area. This approach overlooks the varying environmental impacts of different phases of activities and does not align with the evolving trends of international legislation and practical requirements. Hence, it is recommended that in formulating relevant laws and regulations, China should delineate distinct conditions and criteria for permit applications for deep-sea exploration and exploitation. Strengthening environmental protection management and promoting sustainable utilization of deep-sea resources are essential to facilitate rational exploitation and utilization of deep-sea resources.

2.2. Clarify Specific Requirements for Reviewing Contractors' Financial and Technical Capabilities

China's Deep Sea Law mandates that competent authorities review the financial and technical capabilities of contractors but lacks specific requirements, leading to uncertainties in implementing the deep-sea mining licensing system.

Regarding contractors' financial status, the three Chinese contractors are all state-owned enterprises. This would seem to imply that there is no need to worry too much about the financial capacity of the contractors, but the law should anticipate broader scenarios. Besides state-owned enterprises, citizens of the China can also apply for marine activities in the Area. Therefore, it is recommended that competent authorities, besides evaluating applicants' financial status per the Permit Measures,⁴ also consider additional financial responsibility proofs, such as creditworthiness, based on the Chinese context, following Japan's Mining Act. Additionally, to monitor contractors' financial status post-license issuance, regular or irregular inspections should be conducted, reviewing their audit reports to ensure ongoing financial capacity for mining activities[9].

When considering the technical capabilities of contractors, China can benefit from the legislative experiences of other nations to enhance its legislative framework. For instance, the Czech Republic has established detailed provisions regarding technical qualifications, outlining specific requirements for technicians' expertise to assess their technical competency. For instance, technicians must hold a university degree in geology or mining. Additionally, they must demonstrate proficiency in English or French and have at least one year of experience in marine activities, including a minimum of one month in marine activities.⁵ This approach showcases the Czech Republic's diligence in assessing the

expertise of individuals by setting clear criteria. It is recommended that China adopt a similar approach to reviewing the professional qualifications of technicians, specifying specific criteria such as their experience in exploration and exploitation, technical qualifications, and specialized equipment handling, among others. This alignment with international best practices will enhance the effectiveness and reliability of China's evaluation processes concerning contractors' technical capabilities.

3. Paths to Improving the Environmental Regulatory System for Deep-Sea Mining

3.1. Clarify the Supervisory and Management Body for Deep-Sea Mining

Chapter 5 of Deep Sea Law mandates that the competent marine department of the State Council oversees and inspects contractors' marine activities. However, the law does not explicitly assign a specific agency responsible for this review task. This absence may lead to two problems: firstly, a lack of a designated agency for reviewing contractors' activities may result in inadequate supervision, potentially leading to wasted resources or environmental harm. Secondly, involving too many agencies in the review process could create a cumbersome approval process with unclear roles and responsibilities, impacting the effectiveness and transparency of the regulatory system. Therefore, it is recommended to clarify this aspect explicitly in the law.

3.2. Specify the Procedures for Handling Environmental Emergencies

The law only requires contractors to regularly report to competent authorities on matters related to exploration and exploitation activities, without specifying reporting procedures and requirements for emergencies. This lack of clear legal guidance and procedural requirements for emergencies could lead to delays or improper handling of emergency response measures, potentially causing more significant damage to the marine environment and resources. Hence, there is a need for further legal clarity and regulation of emergency reporting procedures.

To address marine environmental pollution emergencies, China should establish an emergency management system for common ocean emergencies. In the risk management stage, identify potential marine environmental emergency factors to prevent or reduce occurrences. In the risk early warning stage, promptly release early warning information through the early warning system. During the emergency response stage, integrate response resources, coordinate relevant departments, utilize marine databases for data identification, and engage consulting experts for decision-making support. Facilitate information sharing among

⁴ Permit Measures, Article 8(3).

⁵ Czech Republic Act, Article 6.

departments and the public for timely, rapid, and effective responses to marine environmental emergencies, reducing associated losses and restoring damaged marine environments through continuous monitoring and appropriate remedial measures[10].

3.3. Clarify the Procedures for Collecting Environmental Baseline Data

The system should be structured to fulfill the sponsoring State's obligation to ensure. Apart from the general obligation of contractors to take necessary measures to protect the environment, China's Deep Sea Law also stipulates that the contractors should do the environmental impact assessment of marine activities and establish environmental baselines in accordance with the agreements and requirements of the exploitation contract. However, the law lacks clear and specific procedures, such as how to determine the environmental baseline, what information needs to be collected to establish it, and what domestic agencies should monitor during the environmental monitoring process[11]. Specific procedures regarding environmental baselines should be refined based on three regulatory administrations that establish the precautionary principle.

An environmental baseline serves as the starting point for measuring changes in variables and can predict potential environmental risks[12]. Additionally, it plays a significant role in marine environmental protection during the exploration and exploitation process. In practice, environmental baseline data may be inadequate due to constant changes in the marine environment. Therefore, procedures for collecting environmental baseline data should be clarified at the national legislative level. Contractors can refer to data requirements on baseline measurements issued by ISA when conducting environmental data collection and determining baseline standards. For collecting baseline data, contractors should utilize state-of-the-art technology such as geographic information systems (GIS) and employ rigorous statistical methods to develop sampling strategies ensuring accurate determination of baseline levels for physical, chemical, biological, and other parameters[13].

3.4. Elaborate on Contractor Reporting Requirements

Contractors should be mandated to provide comprehensive reports to the competent marine authorities regarding their exploration and exploitation contracts. This reporting should include disclosure of their environmental impact assessment reports, environmental data collected during later stages of exploration and exploitation, as well as other pertinent environment-related information. Given that the exploration and exploitation of international seabed resources concern the global community's interests, environmental considerations hold the utmost importance in deep-sea

mining activities. Consequently, data related to environmental protection should not be withheld under the pretext of confidentiality. This requirement aligns with Article 89 of the current draft Regulations and conforms to the prevailing trends in international legal frameworks.

4. Paths to Improving the Financial System for Deep-Sea Mining

Concerning the financial system linked to environmental protection, the draft Regulations in Article 26 specify that contractors must deposit an environmental performance bond with the ISA before commencing mining activities[12]. Given that the ISA has already outlined detailed provisions on environmental bonds, there is no need to duplicate bond payments at the national legislative level. Doing so would unnecessarily burden contractors and detract from their interests. However, China can offer further clarification on the purpose of the bond payment. While Article 26 of the draft Regulations mentions payment to the ISA, positioning the environmental bond as a financial guarantee may be more effective when placed with the sponsoring State[14]. This approach ensures the contractor's performance, as the ISA can inform the sponsoring State of bond deductions in case of contract breaches. However, the sponsoring State cannot directly notify the ISA of such deductions. By allocating a portion of the security deposit to the sponsoring State, effective monitoring of the contractor's conduct throughout the entire process can be achieved, warranting further discussion in subsequent Regulations negotiations.

Additionally, the insurance system stands to benefit both developers and sponsoring States. Article 235 of UNCLOS outlines the need for cooperation among States to establish criteria and procedures for adequate compensation in cases of marine environmental damage, including mechanisms like compulsory insurance or compensation funds.⁶ This setup allows for the transfer of liability risk to a third party, namely the insurer, in the event of emergencies leading to marine environmental harm. Simultaneously, while assuming this risk, the insurer evaluates the contractor's exploitation practices to ensure adherence to duty of care standards. The inclusion of a compulsory insurance system can greatly enhance confidence in promptly addressing environmental damages. However, China's Deep Sea Law currently lacks provisions for compulsory insurance. Although mineral exploitation hasn't commenced in the Area, given the rapid advancements in science and technology, mineral extraction is on the horizon. China should emphasize the importance of incorporating compulsory insurance in its legislation and, taking into account its national conditions, conduct an in-depth study of the compulsory insurance system and make it one of the conditions for the issuance of the license.

⁶ UNCLOS, Article 235(3).

5. Conclusion

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The global push towards industrialization and the adoption of new technologies has led to an increasing demand for rare and critical metals, particularly copper, cobalt, and others essential for wind turbines, solar panels, and battery storage systems. This surge in demand has sparked significant interest in deep-sea mining, given the vast mineral wealth lying beneath the seabed. However, this interest also comes with significant environmental concerns, including potential harm to deep-sea ecosystems, threats to biodiversity, and the risk of pollution. It is imperative to ensure that activities in this domain are sustainable and adhere to both international regulations and environmental standards. At present, there is a lack of comprehensive international legal frameworks governing deep-sea mining. Given the inherent tension between the economic benefits of resource exploitation and the imperative of environmental protection, China, as a key player in international seabed resources, should actively engage in the development of international rules governing deep-sea mining. Concurrently, efforts should be made to standardize relevant domestic legislation to align with these international standards.

This study employs normative legal analysis to conduct a comprehensive examination of China's current laws and regulations governing the environmental aspects of deep-sea mining. While China's legal framework related to deep-sea mining is extensive, it lacks specific details necessary for guiding environmental protection practices effectively. To address this, China should refine its regulations concerning deep-sea mining based on three specific management approaches.

Firstly, China should enhance its licensing system by clearly differentiating between the conditions for obtaining exploration and exploitation licenses. This should also involve setting forth clear financial and technical auditing standards for contractors. Secondly, environmental regulatory measures need to be strengthened further. This includes clarifying the methodology for determining environmental baselines, implementing an emergency management system for marine pollution incidents, and requiring contractors to disclose environmental data during exploration and exploitation activities. Lastly, it is recommended that China clarifies in its legislation the purpose of the bond payment to ensure that contractors fulfill their environmental protection obligations. Additionally, emphasizing the importance of mandatory insurance in relevant legislation is advised.

Through these measures, China can not only promote advancements in deep-sea science and technology and foster industry development but also demonstrate its commitment as a responsible global player. By contributing Chinese wisdom and solutions to global environmental governance in deep-sea mining, China can work towards sustainable development in this sector. Moving forward, China should continue actively participating in international rule-making processes and

strengthen collaboration with other nations to drive sustainable deep-sea mining activities globally.

5.2. Theoretical contributions

Existing studies have predominantly examined the obligations of state parties to the Convention through the lens of international law. UNCLOS requires state parties to adopt a two-tier approach in their domestic legislation on deep-sea mining[6]. Furthermore, China has formulated and gradually improved the laws and regulations regulating deep-sea mining, and has made certain contributions to the practice of deep-sea mining[15]. However, Most of these studies have proposed standards for fulfilling the obligation to ensure by contracting parties in legislation at a general level, without delving into China's perspective and many studies on Chinese deep-sea mining law have primarily focused on the legal framework, even though they have highlighted the need for revisions to China's deep-sea mining law to provide more effective guidance[16], they have generally offered only broad suggestions without specific revision content. Addressing this gap, this paper aims to focus on enhancing China's legal regime for deep-sea mining, proposing three key aspects to steer deep-sea mining activities towards legal, sustainable, and environmentally friendly practices.

5.3. Research gaps and prospects

As the Regulations are yet to be formulated, some recommendations will require further refinement after the Regulations are in place to effectively align with the international legal framework. Furthermore, this paper has focused on three specific perspectives for improving China's legal system for deep-sea mining, leaving out areas such as contractor liability for environmental damages and the establishment of law enforcement agencies, which warrant further study. Additionally, given that resources in the Area are considered the common heritage of mankind, issues regarding benefit distribution and resource sharing are crucial to the international community. However, this paper does not delve into China's benefit distribution mechanism, leaving room for exploration in future research endeavors.

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