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Implications for China of National Legislation and Policies on the Deep Seabed in Asia—Japan, Korea and India as Examples

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Abstract: The international seabed area is rich in mineral resources and contains unlimited potential for exploitation, thus becoming a new focus of international competition. However, as deep seabed activities face great challenges due to the extreme difficulty, high risks and costs, and unpredictable impacts on the deep seabed, how to go about preventing and controlling the negative impacts caused by deep seabed development has become a major challenge. Among a series of solutions, institution-building is clearly superior to other measures, and should be emphasized by the State as it can prevent and control risks from the root. China, as the leading country in the field of international deep seabed development and a developing country with the strongest strength, has developed deep seabed technology but lags behind in the construction of institutions, so it is necessary for it to keep abreast of the times and pay attention to the construction of institutions in the development of science and technology at the same time. This paper describes the current situation of China's legislation and policy on deep seabed exploration and development, provides relevant information about its neighboring countries Japan, South Korea and India, and puts forward suggestions on the relevant institutional contents of Japan, South Korea and India that China can consider taking reference from by examining the institutional characteristics of the three countries and the problems existing in China, and combining the main theme of the United Nations Convention on the Law of the Sea with the relevant provisions.

1. Introduction

The oceans and seas have historically served two important functions: as a medium of communication and as a vast reservoir of living and non-living resources.[1] The so-called international seabed area refers to the seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction, and is the maritime area that constitutes the common heritage of mankind.[2] At the end of the 1990s, with the advancement of mining technology, especially the emergence of remotely operated vehicles (ROVs) and deep seabed mining equipment, the exploitation of seabed mineral resources became more feasible. However, the intensification of deep seabed mining

activities has been accompanied by growing controversy over issues such as their environmental impact. With regard to deep seabed mining, mining in the international seabed area has not yet reached the stage of large-scale commercial exploitation. 2023 The ISA approved the first deep seabed mining project, involving polymetallic nodule deposits at the bottom of the Pacific Ocean, which triggered widespread controversy and opposition from developed countries such as Germany and France, and Pacific Island countries such as Fiji and Kiribati, and environmental organizations such as the International Union for Conservation of Nature (IUCN). IUCN and other environmental organizations. In the end, ISA announced at the end of 2023 that it was temporarily postponing the actual implementation of the project. It can be seen that the protection of the deep seabed and the exploitation of technology are still in a state of confrontation, and the future development of the deep seabed still faces challenges in environmental protection, technological innovation and international cooperation.

China, as an initiator and a State party to UNCLOS, has been active in the development of the international seabed area since the 1980s. Practically, in 1990, it became the fifth pioneer investor country in this area, following France, Japan, India and the former Soviet Union. In terms of legislation and policy, China passed the Law of the People's Republic of China on Exploration and Exploitation of Resources in deep seabed Areas (deep seabed Law) in 2016, and has subsequently enacted normative documents related to exploitation information, exploitation samples and exploitation licenses, initially forming the country's deep seabed legal framework. Despite China's increasing presence in deep seabed mining activities, some of the provisions are lacking in content and are relatively slipshod due to China's participation in the formulation of domestic legislation on deep seabed mineral activities at a later stage than that of many other countries, and due to China's leading participation in the United Nations Decade of Marine Science for Sustainable Development and its initiative to launch the "deep seabed Habitat Discovery Program". "As China has taken the lead in the UN Decade of Marine Science for Sustainable Development and initiated the deep seabed Habitat Discovery Program, China should further improve its legislation and policies to contribute Chinese wisdom to the building of a community of destiny for the oceans.

In order to make the article more targeted and to explore more substantive content, this paper takes Japan, South Korea and India as the research object, through introducing the current deep seabed legislation and policy overview of China and the above countries, extracting the focuses and advantages of the three countries, analyzing China's deficiencies in the two aspects, and then putting forward targeted recommendations. This paper analyzes China's shortcomings in the two aspects by extracting the focuses and advantages of the three countries, and finally puts forward targeted recommendations.

2. Overview of China’s deep seabed legislation and policies

2.1. Overview of China’s deep seabed legislation

2.1.1. Deep seabed law

The deep seabed Law consists of 7 chapters and 29 articles. Chapter 1 summarizes the entire law and provides for the purpose of the deep seabed Law, the object of its application, and its basic principles. Chapter 7 provides for certain terms, tax-related matters and the time of implementation. Chapters 2 to 6 contain provisions on exploration and development, environmental protection, science and technology and resource investigation, supervision and inspection, and legal responsibility. Among them, Chapter 2 on exploration and development is the core content of the deep seabed Law, stipulating the application, acceptance, examination, licensing, filing, notification and other procedures that must be fulfilled in order to carry out exploration and development activities for resources in the deep seabed area, as well as the rights and obligations of the

contractors, and the regulatory requirements on the handling of emergency situations during the exploration and development activities for resources in the deep seabed area.[3] The provisions on environmental protection in Chapter 3 are not only an important part of China's fulfillment of its international commitments and safeguarding of global common interests, but also clarify China's obligations to contractors in the exploration and exploitation of resources in the deep seabed area. The provisions on scientific and technological research and resource investigation in Chapter 4 reflect the core objective of the deep seabed Law to promote scientific and technological research and resource investigation, and cover State support for scientific and technological research in the deep seabed, the construction and operation of deep seabed public platforms, incentives for the popularization of science in the deep seabed, as well as the management and utilization of information and samples obtained in the course of resource investigations, exploration and exploitation in the deep seabed area. The provisions on supervision and inspection in chapter 5 and the provisions on legal liability in chapter 6 constitute key guarantees of the effectiveness of the implementation of the deep seabed Law, reflecting the relevant requirements of international law and effectively regulating the conduct of the main parties to deep seabed exploration and exploitation activities under China's sponsorship.

2.1.2. Development permit regulations

The Measures for the Administration of Development Licenses consists of 6 chapters and 29 articles, and the normative document focuses on chapters 2, 3 and 5, which provide for the license application process and supervision and inspection. Chapter 2 and Chapter 3 contain provisions on the content of the project application to be submitted by the applicant, the examination of the application materials by the licensing authority, and the issuance of exploration and development licenses after passing the examination. Chapter 5 stipulates that the State Oceanic Administration shall carry out supervision and inspection of exploration and development activities for deep seabed resources, and may revoke the licensing documents if it finds that false materials have been submitted, or if it fails to fulfill the obligations under the exploration and development contract. In addition, the State Oceanic Administration shall cancel the licensing procedures if it finds that the license has not been renewed upon expiration of its validity period, or if the licensee no longer possesses the capacity to explore and develop deep seabed resources.

2.1.3. Interim measures for the management of development

The Interim Measures on the Management of Development Samples consists of 6 chapters and 41 articles, which aim to regulate the collection, transportation, storage and application of samples and the management of related data in the process of exploration and development of deep seabed resources. Chapter 2 provides for the management of the classification of deep seabed samples, the contents of the samples, the time limit for the samples, and the requirements for ensuring the safety of the samples. Chapter 3 is about sample management, stipulating that all sample collection should follow the requirements of scientific research and resource protection, and the collection unit needs to record detailed collection information and ensure that the specimen management of samples is in compliance. Chapter 4 deals with the application and use of deep seabed samples, reflecting the importance the state attaches to deep seabed scientific research activities. Chapter 5 stipulates that legal responsibility shall be borne by the remitter who loses, unlawfully discards, transfers, exchanges, sells or discloses the confidentiality of the surrendered samples.

2.1.4. Interim measures for the management of development information

The Interim Measures for the Management of Development Information consist of 6 chapters and 32 articles, and the main purpose of this normative legal document is to regulate the collection,

preservation, sharing and use of various types of information, such as exploration reports, technical documents and monitoring data, in the course of deep seabed resource exploration and development activities, so as to safeguard the management of information and the scientific nature of the process of deep seabed resource exploration and development. Chapter 2 stipulates the classification of information and the requirements for the content, time limit and procedures for the remittance of different types of information. Chapter 3 and Chapter 4 provide for the custody of information and the application and use of information, reflecting the confidentiality and openness of information. Exploration and development units shall comply with the relevant provisions on confidentiality of information, and shall not disclose the relevant information without authorization; at the same time, part of the information with scientific research value can be made public under the corresponding conditions to promote scientific and technological exchanges and knowledge sharing. Chapter 5 stipulates that in the event of problems with the remittance of information that are not resolved, loss of information, leakage of confidential information, etc., the remitter shall bear the corresponding legal responsibility.

2.2. Overview of China’s deep seabed policy

To summarize, China's deep seabed policy is "to vigorously research and develop deep seabed science and technology, and to emphasize the international promotion of deep seabed science and technology and maritime safety". First of all, although China's marine scientific research started late and has the advantage of being a latecomer, there are still problems such as insufficient innovative concepts, insufficient management capabilities and low international standards, which have caused the overall level of deep seabed science and technology to lag behind that of developed countries in the West and other deep seabed science and technology powerhouses.[4] For this reason, China established a deep seabed strategy in 2000, which is "to continuously carry out deep seabed exploration, vigorously develop deep seabed technology, and establish deep seabed industry at an appropriate time", and has been implemented since then. As of December 2024, China has completed 87 oceanic survey missions,[5] and relies on three domestic deep seabed technology companies to carry out deep seabed exploration activities. For example, COMRA relies on the “Jiaolong” manned submersible, the “Qianlong” series of autonomous submersibles, and the “Hailong” series of remotely operated vehicles, “Yilong” deep seabed resource exploration technology and equipment system. These equipment have strongly supported the development of deep seabed resource exploration activities;[6] CMC has developed the deep seabed polymetallic nodule collecting machine "Kunlong 500" in response to the polymetallic nodule resource exploration area in the East Pacific Ocean for which it has applied and completed the sea trials. "Beijing Pioneer Hi-Tech mainly develops four categories of deep seabed equipment: deep seabed intelligent underwater robots, deep seabed geological sampling equipment, deep seabed geophysical exploration equipment and deep seabed environmental investigation and monitoring equipment, such as the Manta in-situ ore collecting technology verification platform (the first of its kind in the world). Manta" in-situ ore collection technology verification platform (the first international in-situ ore collection technology verification platform for deep seabed polymetallic nodules that adopts the floating mode of travel), and "Insight" AUV unmanned equipment. Secondly, with regard to the international promotion of deep seabed science and technology, China has actively cooperated with the Korea Advanced Institute of Marine Science and Technology (KAIST), the Woods Hole Oceanographic Institution (WHOI) of the United States of America, the Indonesian National Research Institute (INRI) and other countries and their scientific research institutes, and has followed the provisions of Article 266 of the United Nations Convention on Contracts for the International Carriage of Goods by Sea (UNCITRAL), which stipulates that China should "Actively

promote the development and actively promote the development and transfer of marine science and marine technology on fair and reasonable terms and conditions."

3. Overview of deep seabed legislation and policy in Japan, the Republic of Korea and India

3.1. Overview of Japan’s deep seabed legislation and policy

3.1.1. Japan’s deep seabed legislation

Japan regulates its deep seabed development activities mainly through the Interim Measures for deep seabed Mining of 1982, which focuses on the regulation of exploration and development activities.[7] There are three representative provisions: first, the qualifications of subjects engaged in deep seabed activities. Article 3 of the Provisional Measures on deep seabed Mining sets out the requirements for criminal records, making it clear that natural or legal persons who have been sentenced to imprisonment for an intentional crime and have not yet completed two years of imprisonment, as well as legal persons or organizations that have been convicted of a major violation of the law in a criminal case or have committed a serious offence that has seriously jeopardized the social order, are not eligible to apply to engage in deep seabed mining activities. Secondly, types of licenses and conditions for approval of licenses. Article 5 of the Interim Measures on deep seabed Mining categorizes the types of permits into general permits and special permits, which are applicable to standard mining activities and mining activities in special areas, respectively, while article 6 lists in detail the conditions for obtaining approval of mining permits, such as the need for the applicant to provide an environmental impact report, the applicant's possession of effective technological means and the avoidance of pollution, and the applicant's more than adequate financial capacity. Thirdly, revocation and variation of licenses. Articles 8 to 9 of the Interim Measures on deep seabed Mining provide for the revocation and variation of permits in cases where, for example, activities are not carried out in a designated area, or the area, location or size of the activity is changed without authorization, and article 10 sets out the relevant procedures.

3.1.2. Japan’s deep seabed policy

The Japanese government's deep seabed policy can be summarized as "vigorously developing new technologies while focusing on maritime security and international cooperation". 2007 saw the adoption of the Basic Law for the Ocean, which encompasses ocean policy, and the Japanese government established the "Comprehensive Ocean Policy Headquarters" (CMPH) under the Prime Minister's chairmanship. Based on this law, the Japanese government established the "Comprehensive Ocean Policy Headquarters" under the Prime Minister's chairmanship, and formulated the first Ocean Basic Plan in 2008.[8] The Plan, as a top-level marine strategy document, is a guideline for Japan's future marine policy in the medium and long term.[9] The Plan is revised every five years, and covers Japan's marine policy, development of marine resources, marine environmental protection, and research and development of marine science and technology. According to the latest edition of the plan, the Japanese government still focuses mainly on S&T development, maritime security and international cooperation.

3.2. Overview of Korea’s deep seabed legislation and policy

3.2.1. Korea’s deep seabed legislation

Korea's 2012 Marine Resources Development Act aims to promote sustainable development by regulating and managing the development, utilization and conservation of marine resources. The

most notable features of the Act can be summarized in three points: strengthened environmental protection requirements, government regulation and policy support, and public participation and transparency. Regarding environmental protection, for example, Article 5 highlights the need for environmental impact assessment, requiring all development activities to be subject to an independent environmental assessment to ensure that potential impacts of development on the environment can be identified and countermeasures taken. The openness of the assessment report and the solicitation of public views enhance transparency and public participation in project implementation. Regarding government regulation and policy support, for example, Article 13 emphasizes that development activities not only need to be reviewed at the initiation stage, but also require continuous monitoring and reporting of environmental impacts at the later stages of implementation. Transparency in public participation, for example, Article 19, which requires the government to disclose information about the development project and allow the public to comment within a specified period of time to ensure that the development project is monitored by the community, and that public participation in decision-making ensures that the project does not deviate from the public interest.

3.2.2. Korea’s deep seabed policy

The Korean Government's deep seabed policy can be summarized as "encouraging the development and conservation of deep seabed resources and emphasizing international cooperation and technological innovation". 1999 saw the establishment of the direction of the 21st Century Ocean Development Strategy, which is committed to promoting the development of marine cultivated fisheries, marine transportation, marine technology and marine environmental protection. In order to be more targeted, the country formulated the Basic Plan for Marine Development in 2000 as a guiding document for marine development. 2021, the Ministry of Fisheries issued the Fifth (2021-2030) Comprehensive Plan for the Marine Environment, which set out to "protect", "utilize In 2021, the Ministry of Fisheries released the Fifth (2021-2030) Comprehensive Plan for the Marine Environment, which sets the goals of "protection," "utilization," and "growth," and realizes the protection of the marine environment through six promotional strategies. The Korean government has also been very active in international cooperation. On the one hand, Korea has made efforts to promote international cooperation in marine science and technology and expand investment in the field of marine science and technology, and on the other hand, it has actively strengthened its influence in the international community, while at the same time, it has carried out close exchanges in research and cooperation in marine development in a number of countries and regions.[10] Typical examples include the Korea-China Joint Research Center for Science, which is responsible for the collection, production and distribution of marine information, the launching of cooperative projects in marine science, the co-organization of seminars, training courses and educational programmes in the field of marine science and technology and management, and the publication and exchange of academic papers and research results.

3.3. Overview of India’s deep seabed legislation and policy

3.3.1. India’s deep seabed legislation

India has put in place a number of legal frameworks for the development of deep seabed resources aimed at ensuring the sustainable development of deep seabed resources while protecting the marine environment. These laws cover, inter alia, the management of exploration and exploitation of marine areas, exploration and exploitation of deep seabed mineral resources, and the protection of the marine ecosystem. The Indian legislative system also emphasizes harmonization with international laws, particularly in the development and management of deep seabed mineral

resources following international agreements such as UNCLOS. In order to effectively regulate the development of deep seabed mineral resources, India passed the Seabed Mineral Resources Act in 1990. The Act stipulates the procedures for exploration and licensing of deep seabed minerals, as well as the environmental protection requirements to be observed during the development process, and aims to ensure that the development of mineral resources does not damage the marine environment through standardized management. The Marine Scientific Research Act of 2001 is a law enacted to promote deep seabed scientific research and technological innovations in the development of resources, in particular the exploration of deep seabed minerals and hydrate resources. The Act also supports research and development of related technologies and emphasizes the need for scientific research to follow environmental standards.

3.3.2. India’s deep seabed policy

Taking into account the information provided by the Ministry of Ocean and Fisheries (MOES) of India, India's policy on the development of deep seabed resources can be categorized into five areas: development of deep seabed mineral resources, development of deep seabed natural gas hydrates, conservation and development of marine biological resources, environmental protection and sustainability, and international cooperation and technical exchanges. For example, in 2021, India launched the deep seabed Mission initiative, which aims to promote the development and utilization of marine resources, focusing on the development of deep seabed mining technology, manned submersible technology, deep seabed biodiversity exploration and conservation technology, and the establishment of marine stations for deep seabed surveys and marine biology.[11] In the future, India will continue to enhance the development of deep seabed resources, particularly the utilization of hydrates, deep seabed minerals and renewable ocean energy. The Government expects to promote the sustainable development of deep seabed energy and mineral resources through technological innovation and international cooperation. At the same time, India will continue to strengthen marine ecological protection to ensure that development activities do not adversely affect the marine environment and biodiversity.

4. Implications for China of the deep seabed legislation and policies of Japan, Korean and India

4.1. Improving national deep seabed legislation and policies

4.1.1. Clarify the requirements for the qualifications of applicants

Article 7 of the deep seabed Act, which describes the materials that must be submitted by an applicant to engage in deep seabed exploration, summarizes the sloppy listing of materials, with many important or critical materials not listed, which does not provide adequate and effective protection for the deep seabed. Since damage to the oceans is irreversible and will result in permanent harm, it is necessary for the law to strictly regulate the qualifications for exploration and exploitation of the deep seabed, which will already have an adverse impact on the oceans. The legislation should specify the standards that the applicant needs to meet in terms of finance and technology, and provide for the licensing of eligible participants by the relevant authorities, as well as the applicant's financial, technical and other qualifications and standards for the protection of the marine environment. In this regard, consideration could be given to drawing on the requirements for applicants set out in articles 3 and 5 of Japan's Provisional Measures for deep seabed Mining, which are not limited to general information, a description of the relevant information on the area to be explored, financial capacity, technical level, etc., but should also be submitted as well as

information on whether or not the applicant has a criminal record, and on the precautions to be taken against any adverse impacts on the deep seabed.

4.1.2. Improving risk and emergency management mechanisms for deep seabed development

The threats to China's maritime security at this stage are diversified, coming from both State and non-State actors, and from both traditional and non-traditional security threats. In the face of advancing deep seabed development activities, China should pay attention to the construction of risk and emergency management mechanisms for deep seabed development. In this regard, China can learn from the global coordination law in the policy of Japan's Basic Law of the Sea and the Korean government's risk classification system for deep seabed development. Drawing on Japan, Chinese legislation could specify mandatory disaster contingency planning requirements to ensure that all development companies have the ability to respond quickly to potential risks when carrying out deep seabed activities. Drawing on South Korea, Chinese legislation could categorize risk warning and response into different levels to enhance flexibility and efficiency. At the same time, legal prosecution of those responsible for accidents should be strengthened to ensure that the risk of potential damage in development activities is minimized.

4.2. Improving of local institutional structures

4.2.1. Harmonization of central and local deep seabed legislation

Local legislation in China often suffers from a lack of harmonization with the laws and regulations of the central Government. For example, in the area of deep seabed resource development and environmental protection, there may be differences in the content of the legislation of different localities, leading to inconsistencies in the implementation of standards in some localities in actual operation, and even the possibility of neglecting the protection of the deep seabed due to the excessive pressure on local economic development, which may pose a risk to the deep seabed ecosystem. In this regard, China can refer to the provisions of Japanese legislation on the coordination mechanism between local governments and the central government. China could clarify the roles and responsibilities of local governments in environmental monitoring, technical support and emergency response to accidents during deep seabed development activities, as well as adopt legislation that requires the central Government to formulate plans for deep seabed development in conjunction with coastal local governments, and to coordinate the allocation of resources at all levels of government.

4.2.2. Strengthening the relevance of local legislation to guide deep seabed development activities

After addressing the issue of the distribution of deep seabed legislation between the central and local levels, States should also address the relevance of local legislation to guide deep seabed development activities. Only when the content of local deep seabed legislation is put into practice can the so-called constructed system be considered to have been implemented in the true sense of the word, rather than being shelved. Article 12 of Korea's Marine Resources Development Act and articles 10 and 13 of India's Marine Minerals Development and Management Act have comparative reference value for China. The former provides that local governments are responsible for establishing regional marine resource management centers to monitor the environmental impacts of development activities and provide support. The latter provides that local governments can set up specialized training centers and scientific research centers for deep seabed development, which can be used to enhance local capacity in the field of deep seabed development. China can learn from the above two countries' model of flexible local implementation of legislation by strengthening the

establishment of regulatory bodies responsible for supervising and managing development activities within the local area, clarifying the authority of local governments to supervise and enforce deep seabed development activities in the region to ensure that they have sufficient capacity to intervene in projects that do not comply with the requirements of environmental protection, and encouraging innovation in local policies by allowing local governments to supplement the centralized policy framework by taking into account the actual needs of the region. In addition, local policy innovation is encouraged, allowing local governments to take into account the actual needs of the region and to make complementary innovations under the centralized policy framework, such as proposing differentiated development restrictions to address the environmental sensitivities of different marine areas.

5. Conclusion

As the only country with five area-based mining contracts in ISA-designated areas, China has a significant position in the world of deep seabed development. However, even though China's deep seabed technology is at the cutting edge of the international arena, its domestic legislation and policies have not remained among the world's most advanced, and the mismatch between the two may result in some of the contractors' exploration and development activities adversely affecting the country's marine environment, maritime safety, and the rights and interests of its coastal people, and hindering its further progress towards becoming a maritime power. China's legislative and administrative systems are very complex and different from those of any other country, so the relevant contents of Japan, South Korea and India can only serve as a reference. In the face of the upcoming Fifteenth Five-Year Plan period, the construction of a deep seabed system should remain a key research topic for China, and with further research and exploration of deep seabed development, the Chinese government will continue to focus on the development of a deep seabed system, which will be a key issue for China. There are also many new elements that could be added to improve the construction of a deep seabed regime.

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