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Framework and rethink of the Environmental Compensation Fund for the international seabed area

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The present article addresses the system of the Environmental Compensation Fund proposed in the "Draft Regulations on Exploitation of Mineral Resources" by the International Seabed Authority (ISA). According to the documents released by the ISA, the fund aims to fill the liability gap in environmental pollution events resulting from activities in the international seabed area (the Area). Previous research has discussed the liability gap and proposed some approaches as solutions, but study of the fund is still an unexplored territory because of the absence of empirical evidence. Based on an analysis of the present regulations for the Area, this work identifies the function of the fund in covering the liability gap for environmental damage caused by the exploitation of the Area and the possible defects of this system in practice, paying particular attention to the financial regulations of ISA. The following viewpoints are put forward by this study: (1) the purpose of the fund should be limited to the scope of covering the liability gap; (2) the sources of the fund should be clarified, and sources that might increase the burden of ISA administration on the member states should be excluded; and (3) the payment procedures of the fund should be refined to meet requirements, such as speedy disbursement and full damage coverage.

KEYWORDS

ISA, international seabed, damages to the exploitation of mineral resources, Environmental Compensation Fund, "Draft Regulations on Exploitation of Mineral Resources"

1 Introduction

As resource consumption rises dramatically and terrestrial resources face depletion, marine resource development is becoming an important direction for human exploration and exploitation of natural resources. Ocean resources that have been proven to be useful to humanity include minerals such as polymetallic nodules, cobalt-rich ferromanganese crusts, and polymetallic sulfides. Countries are not only vigorously developing mineral resources in their own continental shelf seabeds, but also showing a strong interest in the mineral deposits of the international seabed area (the Area), which constitutes

approximately 65% of the total ocean area on Earth. In 2022, the International Seabed Authority (ISA) signed contracts with countries including China for the exploration of polymetallic nodules, polymetallic sulfides, and cobalt-rich ferromanganese crusts (ISA, 2022). With the rapid development of deep-sea mining technology in recent years, interest has gradually shifted from the exploration of mineral resources to the development of resources in the Area. However, marine environmental protection is as important as marine resource development.

According to the United Nations Convention on the Law of the Sea (UNCLOS), the Area is considered the common heritage of humanity, making it a kind of public zone or commons. Therefore, the exploitation of mineral resources in the international seabed area needs to satisfy the commercial requirements of individuals without acting against international public interest. Marine environmental protection is closely related to international public interest. It is necessary to limit individual resource exploitation activities through environmental protection in order to avoid the situation described as the tragedy of the commons, in which all stakeholders bear the consequences of individual overexploitation of the commons due to lack of restrictions (Hardin, 1968). Provisions for the protection and preservation of the marine environment were prominent in UNCLOS III (Nordquist et al., 1991). During the United Nations Ocean Conference held in 2017, the participating countries, regions, and intergovernmental organizations made 1,400 voluntary commitments and adopted multiple documents, more than half of which contained marine environmental governance-related material (Chui, 2020). It is clear that commercial mineral exploitation in the Area cannot be at the expense of the marine environment.

Although UNCLOS defines liability for pollution caused by activities in the Area, specific protocols require detailed regulations made by the ISA. The ISA has established specific regulations for the protection and preservation of the marine environment in its "Regulations on Prospecting and Exploration for Polymetallic Nodules" (2000), "Regulations on Prospecting and Exploration for Polymetallic Sulfides in the Area" (2010), and "Regulations on Prospecting and Exploration for Cobalt-rich Ferromanganese Crusts in the Area" (2012), all of which emphasize the protection of the marine environment in terms of prospecting, applications for approval of plans for exploration in the form of contracts, contracts for exploration, and dispute resolution. The Legal and Technical Commission (LTC), a subsidiary of the ISA, has also adopted regulations named "Recommendations for the Guidance of Contractors for the Assessment of the Possible Environmental Impacts Arising from Exploration for Marine Minerals in the Area" to provide guidance to contractors on environmental baseline surveys, environmental impact assessments, and environmental data collection and reporting procedures. It is worth noting that all the foregoing regulations are aimed at the exploration of mineral resources in the Area, and that the provisions for environmental protection concerning the exploitation of mineral resources in the Area have not been specified.

Precaution first is a fundamental principle of environmental protection. It has been practiced in the regulations on exploration activities in the Area (Wang, 2016). Institutions such as the licensing system, production control, and environmental assessment, which have been adopted in the regulations already mentioned, can all be recognized as preventive methodologies (Fu and Zou, 2012). *Ex post* actions are also worth taking into account, because timely control of the spread of pollution and ecological restoration are equally important. The "polluter pays" principle is an important factor, and since the 1980s has been considered by the Organisation for Economic Co-operation and Development (OECD) and the European Community (Gaines, 1991) as a common way to assign liability for environmental pollution events. However, it is possible that the liability of polluters would not fully cover the financial needs of ecological restoration and tort compensation. This is because the polluter may have reasonable exemptions or may not be available to pay damages. Therefore, UNCLOS, to provide incentives for member states to regulate contractors and facilitate *ex post* compensation for pollution events, requires that the Area contract must be guaranteed by member states. However, the scope of liabilities of the sponsoring states is limited. According to an advisory opinion made by the International Tribunal for the Law of the Sea (ITLOS), the primary responsibilities of sponsoring states are to adopt a precautionary approach and to carry out the environmental impact assessment required by ISA regulations (ITLOS, 2011a). In other words, the sponsoring states are not liable for compensation if the statutory obligations have been fulfilled. Furthermore, an environmental pollution responsibility gap will likely occur, owing to the polluter's exemption or inability to act in the event that the sponsoring states are unable to shoulder the responsibility.

In practice, the ISA has taken this gap into account. The "Draft Regulation on Exploitation of Mineral Resources", in an attempt to settle the problem (ISA, 2019), proposed a project called the Environmental Compensation Fund. At present, there are two main solutions. The first is changing the principle of liability for polluters and guarantors from with-fault to no-fault. This idea is based on the fact that environmental protection is a common obligation of states and a widespread practice (Wei, 2018). The second solution is increasing the number of subjects who are responsible for damages, to cover the gap. The Technical Cooperation Trust Fund under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal provides just such a mechanism for dealing with emergency situations (Basel Convention, 1999). The ISA appears to have chosen the latter solution. However, the Technical Cooperation Trust Fund aims not to bridge the liability gap but to control pollution before the imputation of responsibility is complete. In other words, there is little precedent for environmental compensation funds.

The Environmental Compensation Fund in the Draft Regulation of the ISA comprises three items: establishment, purpose, and funding (ISA, 2019). The result is a lack of precision and the ineffective operation of the fund. Therefore, the reasons for the creation of the Environmental Compensation Fund and its institutional purpose are analyzed in this paper *via* a normative study. The rules of the Draft Regulation are then discussed in terms of their strengths and shortcomings from the perspective of the

design of the Environmental Compensation Fund in the Draft Regulation. Finally, this paper explores feasible ways to improve the Environmental Compensation Fund by combining the relevant UNCLOS provisions and the existing ISA regulatory documents.

2 Why is the Environmental Compensation Fund necessary?

2.1 The gap in liability for pollution caused by activities in the area

The Environmental Compensation Fund addresses the gaps in liability for damage to the marine environment. Article 194 of UNCLOS, titled "Measures to Prevent, Reduce, and Control Pollution of the Marine Environment", sets out two main directions for approaching marine protection: (1) *ex ante* prevention, which tries to avoid irreversible damage to the marine environment; and (2) *ex post* control, which comprises remediation of existing marine pollution, as well as holding the responsible parties accountable. Preventing the expansion of pollution and controlling the damage caused by pollution are aspects of both *ex ante* prevention and *ex post* control. However, in the process of using the ocean and developing marine resources, it is impossible to completely prevent the occurrence of marine pollution. Therefore, it is of more practical significance to restore the marine environment and offset or compensate for the losses caused. The topic of *ex post* control of environmental pollution has long received attention. As far back as the United Nations Conference on the Human Environment in 1972, the participating countries reached a consensus on promoting cooperation among countries on environmental protection. It is clearly suggested in the Declaration of the Conference that consideration should be given to the development of international laws on liability and compensation for environmental pollution and other environmental damage beyond the sovereign jurisdiction of states (1976). Article 192 of the 1982 UNCLOS also specifies the responsibility of states in "protecting and preserving the marine environment," and Article 229 clarifies the right of interested parties to bring civil actions for loss or damage caused by pollution of the marine environment.

Environmental damage caused by activities in the Area is a special issue in the fields of maritime environmental protection. However, UNCLOS does not have specific and detailed provisions on the issue of environmental damage caused by mineral resource exploration and exploitation in the Area. Articles 209 and 215 of UNCLOS specify only that international rules, regulations, and procedures should be established in accordance with Part XI of UNCLOS as well as the domestic law of each country to determine liability for damages by environmental pollution from activities in the Area. At the same time, the ISA's regulations on activities in the Area under UNCLOS are oriented toward exploration and do not concern exploitation. Moreover, the main marine environmental protection measures included in these regulations remain based on precautionary measures. For example, Regulation 31 of the "Regulations on Prospecting and Exploration for Polymetallic Nodules" essentially requires prospectors and sponsoring states to adopt a precautionary approach and best practices in the performance of exploration contracts and the development of environmental protection programs with the ISA. Under this rule, prospectors are primarily obliged to provide written notifications when marine pollution has occurred (ISA, 1999). It is probably because of the limited impact of exploration on the ecosystem in the Area that ISA regulations do not impose more stringent obligations on contractors. However, with the development of deep-sea mining technology, the development of mineral resources in the Area has become a prominent issue. According to Article 235 of UNCLOS, the scope of marine environmental protection obligations will be expanded, but the increase in the number of parties does not mean that the liability for damage to the marine environment will be fully covered.

For a contractor, even if it is not necessary to consider whether or not the relevant domestic law complies with UNCLOS Paragraph 2 of Article 209, thereby requiring the contractor to bear full responsibility for marine pollution in the Area, the relevant pollution damage may not be fully covered. In addition, when the home country of the contractor is not a member state, judgments obtained under domestic law and civil proceedings need to be recognized and enforced in order to be effective in the contractor's home country. In the absence of a national treaty and reciprocity between the member states and the contractor's home country regarding the recognition and enforcement of judgments, the contractor may not pay damages promptly. In the case of a contracting state, according to Paragraph 2 of Article 139 of UNCLOS, a state is liable for damage to the marine environment when, as a sponsoring state, it has failed in its obligation to ensure and monitor the contractor's compliance with rules regarding environmental protection. Such liability is not capped at actual damage and is also mitigated where the ISA and the state with jurisdiction or control over the activity in question have potential liability. It can be argued that the obligation of the sponsoring states in the performance of the contract is an "obligation of conduct" rather than an "obligation of result". In addition, the liability of the sponsoring states is not only a joint and several liability but also a supplementary one. According to Article 139 of UNCLOS, if the sponsoring states have fulfilled their obligation to carry out due diligence, they are not liable for supplementary compensation even if the marine environment is polluted owing to a breach on the part of the contractor (Gao, 2013). In short, these reasons mean that environmental pollution caused by activities in the Area is very likely to create a liability gap, thereby preventing the timely remediation of the marine environment.

2.2 The Environmental Compensation Fund as a way to fill the gap

Ecological compensation is a payment for damage to ecological functions and quality caused by development that is used to improve the environmental quality of the damaged areas or to create new areas with similar ecological functions and of similar environmental quality (Cuperus et al., 1999). It is essentially a

widely valued socialized remedy for environmental tort (Han, 2012). For instance, some researchers have studied the economic incentives of environmental compensation (Murray and Abt, 2001). Johst et al. (2002) were the first to devise an ecological–economic model of compensation payment that includes species protection measures.

Because of the mobility of the oceans, the damage caused by marine pollution may have insidious widespread adverse effects in the future (Han et al., 2007). In such cases, punitive measures are not feasible because it is difficult to determine normatively whether or not there is a significant causal relationship between a particular act and the results of the act many years later. First, we need to consider how to restore the marine environment. Therefore, compensatory measures become even more important. As early as UNCLOS III in 1979, proposals were made that emphasize the timeliness of compensation for damage caused by marine pollution. Among the proposals, measures such as compulsory insurance and compensation funds were also mentioned (Rosenne and Yankov, 1991).

These proposals have also been embedded in the 1982 UNCLOS, of which Paragraph 3 of Article 235 explicitly requires that "States shall cooperate in the implementation of existing international law and the further development of international law relating to responsibility and liability for the assessment of and compensation for damage and the settlement of related disputes." Under this rule, compulsory insurance and compensation funds are also the chosen methods for the payment of compensation. These compulsory insurance and compensation funds are essentially institutional arrangements for ecological compensation.

Regarding the Area, the adoption of ecological compensation by ISA regulations on exploitation activities is more in line with the UNCLOS regime design for the Area.

First, it may not be reasonable to regard the contractor as a full tortfeasor in the case of pollution of the marine environment caused by activities in the Area. When mineral exploration and exploitation are carried out through a contract with the ISA, the contractor satisfies not only a private interest but also a public interest under the principle of the common heritage of humanity. It would therefore be unfair to attribute full liability for environmental damage to the contractor when his obligation to comply has been met and the consequences were not foreseeable.

Second, the latent and lagging nature of pollution in the marine environment may lead to adverse effects as a result of hidden pollution. Where technical conditions make it difficult to trace the source of pollution, it is also difficult to attribute to contractors and the sponsoring states some of the impacts caused by the contractors.

Finally, because of the uncertainty of the risk of environmental pollution from activities in the Area (in terms both of the extent and the degree of pollution), potential contractors, particularly those in developing countries, will be discouraged from exploiting the common heritage of humanity through the ISA if the risks are far higher than the expected benefits (Li and Lv, 2018). In view of this, the ITLOS published an advisory opinion on 1 February 2011. In this document, the ITLOS makes the following statement:

> As already indicated, if the sponsoring State has not failed to meet its obligations, there is no room for its liability under Paragraph 2 Article 139 of the Convention, even if activities of the sponsored contractor have resulted in damage. A gap in liability which might occur in such a situation cannot be closed by having recourse to the liability of the sponsoring State under customary international law.
>
> Hence,
>
> The Chamber draws the attention of the Authority to the option of establishing a trust fund to cover such damages not covered otherwise (ITLOS, 2011b).

The ISA followed the recommendations of the ITLOS in drafting regulations regarding the development of mineral resources in the Area. The ISA first proposed an institution called the Environmental Liability Trust Fund as an implementation of the ITLOS recommendations in the "Draft Framework and Action Plan" (ISA, 2015b). In the 2017 "Discussion Paper", the ISA once again proposed discussing the institution. Although the ISA acknowledges that "the rationale for such a fund, its objectives, and funding options will be a matter for further discussion," the purposes and the funding sources of the trust fund have already been considered in Regulations 68 and 69 (ISA, 2017). The institution mentioned above was retained in the subsequent revisions of the "Draft Regulations on Exploitation of Mineral Resources" and renamed the Environmental Compensation Fund in 2018 (ISA, 2018). Despite this fact, the basic structure of the Compensation Fund has remained substantially the same (ISA, 2019).

3 How does the Environmental Compensation Fund work?

3.1 The purposes of the Environmental Compensation Fund

Ever since the ISA officially published its Draft Regulations in 2017, the purposes of the Environmental Compensation Fund have always been as follows, except for a few non-substantive changes in wording:

a. The funding of the implementation of any necessary measures designed to prevent, limit, or remediate any damages to the Area arising from activities in the Area, the costs of which cannot be recovered from contractors or sponsoring States, as the cases may be;
b. The promotion of research into methods of marine mining engineering and practice by which environmental damages or impairments resulting from exploitation activities in the Area may be reduced;
c. Education and training programs in relation to the protection of the marine environment;

d. The funding of research into the best available techniques for the restoration and rehabilitation of the Area;
e. The restoration and rehabilitation of the Area when technically and economically feasible and supported by the best available scientific evidence.

However, as stated previously, the Environmental Compensation Fund inclusion in the ITLOS advisory recommendation exists to fill the liability gap for the environmental pollution caused by activities in the Area. In the "Draft Framework and Action Plan 2015", the ISA limited the purposes of the Fund to the scope of the ITLOS recommendations (ISA, 2015b). The ISA also envisioned the establishment of the Seabed Mining Sustainability Fund. This would work in parallel with the Compensation Fund and be dedicated to supporting research on marine ecological protection in the Area, as well as the development of institutions related to marine conservation (ISA, 2017). Although the Sustainability Fund never progressed beyond a framework and plan, since 2017, the ISA has integrated the Sustainability Fund into the Compensation Fund. Most functionalities of the Sustainability Fund were absorbed into the Compensation Fund, and the uses of the Compensation Fund have a broader scope.

3.2 The funding of the Environmental Compensation Fund

In the institutional design of the ISA, the Environmental Compensation Fund consists of the following five parts:

a. The prescribed percentage or amount of fees paid to the authority;
b. The prescribed percentage of any penalties paid to the authority;
c. The prescribed percentage of any amounts recovered by the authority by negotiation or as a result of legal proceedings in respect of a violation of the terms of an exploitation contract;
d. Any monies paid into the fund at the direction of the Council, based on recommendations of the Finance Committee;
e. Any income received by the fund from the investment of monies belonging to the fund. (ISA, 2019)

The Draft Regulations do not provide a more granular breakdown of the various sources of funding. However, it can be intuitively recognized that the sources of funding, other than those under item (a), are neither long term nor stable. In particular, the sources of funding under items (b) and (c) would need to rely on those responsible in the event of unspecified marine pollution damages. According to the current financial revenue of the ISA, the source of funds under item (a) of the Draft Regulations are mainly the fees charged by the ISA to member states. Pursuant to Article 160 (2) (e) of UNCLOS and Article 12 (i) of the Agreement on Part XI, the administrative expenses of the ISA before obtaining sufficient financial support for the administrative expenses from other sources shall be "to assess the contributions of members to the administrative budget of the authority in accordance with an agreed scale of assessment based upon the scale used for the regular budget of the United Nations." The other sources include funds obtained by the ISA from commercial activities or donations. In addition, the ISA published a report in 2020 entitled "The Cost Recovery Fund of the International Seabed Authority". In this report, the ISA seeks to establish a Cost Recovery Fund to receive extra-budgetary and voluntary contributions to ensure the fair reimbursement of both indirect and direct costs it has incurred (ISA, 2020). If the content of Article 56(a) of the Draft Regulations is expanded and explained, the funds mentioned above can also provide financial support to the Compensation Fund.

It should be noted that the funds of the Compensation Fund should not include the special funds paid by contractors and sponsoring states to the ISA. From the perspective of the current Draft Regulations, the ISA will undoubtedly increase the obligations for contractors and sponsoring states in this regard. However, this does not mean that contractors and sponsoring states will not generate indirect payment responsibilities to the Environmental Compensation Fund. Based on the Draft Regulations of 2019, the ISA can collect various fees, including royalties (Regulation 64), annual reporting fees (Regulation 84), annual fixed fees (Regulation 85), and application fees (Regulation 86), from contractors and sponsoring states for the development of mineral resources in the Area. Fees other than the annual reporting fee and application fee, especially the royalty fee and annual fixed fee, are of a commercial nature and can be recognized as commercial income of ISA. Therefore, it is perfectly acceptable to use royalties and annual fixed fees as a source of funds for the Compensation Fund. In line with the Chinese government's opinion on the Draft Regulations in 2018, the funding of the Compensation Fund is derived from the proceeds of resource development in the Area, which fully embodies the close connection between benefit sharing and environmental protection (Government of PRC, 2018).

3.3 Payments from Environmental Compensation Fund

The payment procedure is an important part of the Compensation Fund. However, the Draft Regulations do not specify a payment procedure. The relevant regulations state only that "the rules and procedures of the Fund will be established by the Council on the recommendation of the Finance Committee" (ISA, 2019).

It is not difficult to argue that the payment of funds from the Compensation Fund should include both general expenditures and specific expenditures, with the expenditures for scientific research, technical support, and results dissemination being general in nature because the realization of the associated purposes is a long-term process. However, the expenditures used to fill the liability gap are specific expenditures, because environmental pollution caused by activities in the Area involves uncertainty, which is a kind of risk. Therefore, the real cost burden will arise only when the relevant risk is confirmed to have occurred. Risk management may also generate

corresponding costs, but the burden of this cost is not within the scope of payments from the Environmental Compensation Fund. Therefore, the management costs should be absorbed by the administrative costs of the ISA, the "environmental performance bond" paid by contractors, and the daily management costs incurred by contractors and sponsoring states in fulfilling their environmental protection obligations.

The Compensation Fund is a part of the ISA's financial system, and its payment procedures should obey the ISA's basic financial rules, the relevant regulations in the "Financial Regulations of the International Seabed Authority", and the "Financial Rules of the International Seabed Authority". According to these regulations, ISA spending generally needs to satisfy the internal rules for controlling spending. That is, all kinds of fiscal expenditure must be authorized by the general secretary, examined, and approved by the certifying officers, and verified by the approving officers. Appropriation from the Compensation Fund may in the same way be governed by the framework of "Financial Regulations and Financial Rules". It should be clear that the Compensation Fund has some differences from the Compensation Fund. The Compensation Fund usually acquires subrogation rights after paying for the compensation and may recover the compensation from the actual person responsible. Therefore, the payment of a fund project owing to the creation of tort damage usually occurs after the tort–liability relationship has been relatively clearly defined. However, funds with function of compensation, such as the Environmental Compensation Fund, do not need to clearly differentiate responsibilities. When damage has occurred, the Compensation Fund should be considered for the repair and control of the related damages. Therefore, the Compensation Fund, needs an exclusive payment program that can meet the emergency needs of environmental damage repairs. However, the issue of the payment program needs to be clarified by ISA further before a normative analysis on it.

4 What are the deficiencies in the Environmental Compensation Fund?

4.1 The purpose of the Environmental Compensation Fund is too broad

Too broad an institutional purpose is not conducive to the effective operation of the institution. This is because functionalities that deviate from the main purposes may dilute the importance of the core functions of the institution. In the case of the Compensation Fund, investing too much money in other matters may cause it to lose sufficient financial support to fill the environmental damage liability gap. Stakeholders generally believe that the purpose of the Environmental Compensation Fund should be limited to that given by the ITLOS in the 2011 Advisory Opinion, namely filling the liability gap (Council of ISA, 2019). For example, the Australian government, while acknowledging the importance of the Compensation Fund, stated that its functions and purposes should be limited and that other matters not significantly related to filling the liability gap should be attributed to other fiscal arrangements (Government of Australia, 2018). The Deep-Ocean Stewardship Initiative also states that the system should be dedicated to covering those environmental losses from activities in the Area that cannot be recovered from contractors and sponsoring states (DSI, 2018). The Jamaican government also believes that making the criteria for use of the Compensation Fund too broad could undermine the its effectiveness in achieving consensus goals (Government of Jamaica, 2018).

Items (b) and (d) of the Compensation Fund's purpose essentially widen its scope to include the funding of scientific research. However, as early as 2006, the Assembly of the ISA established the Endowment Fund for Marine Scientific Research in the Area. The goals of this fund include promoting and encouraging marine scientific research in the Area for the benefit of all humanity, while also emphasizing inclusive support for developing countries (Assembly of ISA, 2006). Based on the ISA's financial reporting, as of 22 May 2019, the Endowment Fund held capital of US$3,503,567, an accrued interest income of US$702,463, a total disbursement of US $582,617, and available funds (interest less expenditure) of US $119,845 (Finance Committee of ISA, 2019a). It is not difficult to argue that the budget for marine scientific research related to the Area is still largely sufficient and that there is not a fiscal gap that needs to be made up through the Environmental Compensation Fund.

Item (c) of the Compensation Fund's purpose is not particularly clear and has nothing to do with the original intention of the Compensation Fund. We certainly need to recognize the strong public nature of exploring and developing resources in the Area. However, if the Compensation Fund's commercial orientation is entirely set aside, and education and training under item (c) are regarded as the full responsibility of the ISA, not only will the Compensation Fund be inefficient, but the related costs will not be stably covered. Researchers reviewed the practice of ecological service compensation in developed countries and concluded that the market mechanism is the most effective means of internalizing environmental costs or benefits (Gouyon, 2003). Therefore, in the Draft Regulations in 2019, the ISA considered having contractors share the responsibilities for education and training. Article 37 of the Draft Regulations stipulates that contractors are obliged to develop training programs and to train personnel from the ISA and developing countries. This stipulation is essentially a combination of market demand and public interest. The costs of meeting this stipulation are mainly absorbed into the operating expenses of market entities and do not need to seek the support of the Compensation Fund.

Although item (d) of the purpose of the Compensation Fund has a strong connection with the main purpose of filling the liability gaps, according to the design of the Draft Regulations, contractors should make their commitments to environmental restoration in the Area in their closure plans. However, pollution from activities in the Area may also arise even if contractors fulfill their compliance obligations. If contractors strictly abide by their promises, the aforementioned pollution cannot be attributed to them. The problem that arises in such situations is exactly that of the liability gap. There is no need for a separate provision, as it can be fully absorbed in the purpose of item (a).

4.2 The funding of the Environmental Compensation Fund is not feasible

As mentioned earlier, the funding of the Environmental Compensation Fund mainly comprises fees, fines, and compensation and indemnities collected by the ISA, various fees paid by contractors and sponsoring states, donations received, and investment income. However, the funding from fines, the receipt of compensation and indemnities, and the receipt of donations and investments are unstable sources. As a stable source of funds, the various types of fees collected by the administration of ISA may not be able to fully meet the actual expenditure needs of the Environmental Compensation Fund, and the system of collecting fees from contractors and sponsoring states has not yet been perfected.

According to the ISA financial report, as of the first half of 2019, 56 member states of the ISA had been in arrears with their related fees for more than 2 years. Among them, the amount of unpaid fee was on a par with the monthly expenditure fund according to the annual budget of the ISA (Finance Committee of ISA, 2019b). In addition, as a funding supplement in the event that the money from member states cannot meet the daily administrative expenses of the ISA, the Working Capital Fund provides financial support to the Environmental Compensation Fund. According to Article 5.3 of the Financial Regulations, "advances made from the working capital fund to finance budgetary appropriations shall be reimbursed to the fund as soon as income is available for that purpose." The expenditure of the Working Capital Fund is an advance and needs to be reimbursed. Therefore, the Environmental Compensation Fund cannot withdraw funds from it. However, the financial report of the ISA shows that the capital held by the Working Capital Fund can no longer fully meet the purpose of the system. The Finance Committee has pointed out that there is a funding gap of at least US$100,000 in the Working Capital Fund (Finance Committee of ISA, 2019c). It may be more feasible to develop a dedicated funding source from the fees paid by contractors and sponsoring states rather than intercepting fees from the administrative expenses of the ISA. The payment method and specific amounts for the royalties and annual fixed fees are still under discussion, and it is currently impossible to calculate the cost of the other funded projects that these two fees could finance.

4.3 The procedure of the Environmental Compensation Fund is insufficient

As mentioned above, although the Draft Regulations do not clearly stipulate the payment procedures, the relevant payment procedures should also be subject to the arrangements of the Financial Regulations and Financial Rules. However, it is unreasonable to deduce the procedures that the Compensation Fund should apply simply from the aforementioned two documents.

According to the ISA's existing financial arrangements, little consideration is given to the fact that, in practice, the financial process of the Environmental Compensation Fund would consume a large amount of time. The scope and degree of marine pollution can very easily expand in conditions that lack technical control. The current process for the Environmental Compensation Fund comprises monitoring by the ISA or other marine environmental protection organizations, establishing the occurrence of marine environmental pollution, and carrying out the approval process for funds under the current ISA financial rules. Marine pollution may develop beyond the scope of the initial marine environmental pollution before the completion of the Compensation Fund payment process. It is very likely to be difficult to cover the actual cost of marine environmental pollution control based on the payment plan that has been approved. However, if existing technology can take into account the time for the completion of the payment process and reflect this in the budget for the actual cost of marine pollution control after the payment process is completed, it would seem that the time required would no longer need to be considered. However, we should recognize the harmfulness of marine pollution. Marine pollution is not just an economic risk, but also a human health risk. We should not place human health and the environment at risk unless it is necessary (Ticker and Raffensperger, 1999). Therefore, if the process of the Compensation Fund is paused, the purpose to close the liability gap may not be realized.

The payment process of this system also needs to consider the issue of start-up time. The main purpose of the Compensation Fund is to close liability loopholes. In other words, when no one is held responsible for the pollution of the marine environment caused by activities in the Area, the Compensation Fund will provide funds for the reduction and control of the related pollution. In doing so, the payment of compensation would need to be deferred until it can be determined, until it can subsequently be determined, whether there is a liability loophole. Normally, such a distinction of responsibilities requires judicial procedures. After a long period of evidence collection and the judicial process, even if we determine that a liability loophole does exist and start the process of paying out of the Compensation Fund, it seems that the timeliness of environmental compensation will have been lost. Moreover, from a cost analysis point of view, if the process is restarted at this time, the resulting expanded marine environmental pollution may become an additional burden on the system.

5 Suggestions for improvements to the environmental compensation fund

In our view, items (a), (c), and (d) of Article 55 of the Draft Regulations should be deleted. According to the normative intent of Section 5 of the Draft Regulations, the purpose of the Compensation Fund has been expanded to encompass two aspects, namely pre-event prevention and post-event control. Pre-event prevention also reflects the investment in relevant scientific research and the raising of awareness of the importance of protecting the marine environment among relevant personnel (through "education and training"). However, as mentioned above, other fund programs of ISA have comprehensively covered the above requirements. It is important to recognize that the

comments made by the ITLOS in 2011 were directed toward the post-event control of marine environmental pollution. The dissatisfaction of stakeholders also indicates that the system will not be appreciated by member states if it continues to retain its full existing set of purposes, thereby making it difficult for the Draft Regulations to be passed in the ISA Assembly. We believe that the Endowment Fund for Marine Scientific Research in the Area already meets existing needs and remains a trustworthy arrangement. Because it is completely independent of the Compensation Fund, even in terms of funding sources, there may exist overlap between the two funds, but in practice a situation in which spending on one fund causes operational difficulties for the other will not arise. Therefore, this system should be reinstated in subsequent Draft Regulations. As for the purposes outlined in Section 55 (e), we believe that they can be retained subject to certain conditions, in particular that the expenditure incurred in fulfilling such purposes is sufficient to control and remediate the marine pollution caused to the Area. However, if this expenditure could be covered by funds from other sources, or if the responsible subject can be identified and held accountable, the use of the Compensation Fund for such purposes should be excluded.

In terms of funding, we need to make a macro classification of the composition of funds under Article 56 of the Draft Regulations and to distinguish the five sources of funds as fixed sources or non-fixed sources. Fixed sources of funds are the basis for the stable operation of the fund, and non-fixed sources of funds are subject to a certain degree of contingency. However, we cannot completely ignore the importance of non-fixed sources for fund construction. We also need to consider the difficulty of drawing funds from other ISA financial funds. Therefore, we should consider setting a minimum value for the amount of capital held by the fund. When the amount of capital falls below the minimum value, funds can be drawn from the assessed contributions or other fees charged by the ISA to member states to compensate. When the Compensation Fund obtains funds from other sources that bring the capital amount above this minimum value, the previously drawn funds can be returned to the other financial funds or accounts of the ISA, thereby ensuring a comfortable budget for the administrative expenses and daily activities of the ISA. This is similar to the operation of the Working Capital Fund. We also need to pay attention to the composition of the capital of the Compensation Fund when it is established. This fund may, of course, also be raised in accordance with the provisions of Article 56. However, apart from the fees charged by the ISA, which can be drawn according to item (a) and provide book capital for the fund in the first place, other sources of funding will seemingly need to wait for the official operation of the system before they can provide capital for the fund. Therefore, consideration should be given to having member states pay a one-time fee for the initial book capital of the Compensation Fund. In this regard, we could consider asking countries with a large number of potential contractors to pay more than those with relatively few potential contractors to ensure the orderly operation of this system for maintaining the common property of all humanity.

In terms of procedure, we need to focus on considering the system's timeliness in making payments. This may require making the Compensation Fund system more flexible in terms of payment procedures. We could establish a fast track for approval, thereby reducing the time spent on budget plan approvals. This could undermine the accuracy of the budget; however, if the long-term supervision of fees to the fund is undertaken by ISA's Financial Committee or other specialized agencies after the payment process is completed, then the cost for the time from the approval process to the monitoring process can be allocated. This means that the control of marine environmental pollution will not be delayed because of time. We could also introduce a system of subrogation; we must never forget that the primary purpose of the Environmental Compensation Fund is to fill liability gaps. Does this mean that, when designing the system, the Compensation Fund should assume only compensatory responsibilities? Considering the original intention of the system design, the answer is obviously yes. However, subrogation is necessary for the system if we want the Compensation Fund to begin the payment process before the completion of the judicial process for environmental pollution compensation. After determining the liability of the contractors or other infringers, we can demand that they reimburse the fees already paid. However, such repayments cannot fully cover fund expenditures. We must always keep in mind the liability gap. The scope of recovery should be equal to the scope of the infringer's legal liability. Expenses outside this scope, because they are in line with the main purpose of the Compensation Fund, are not covered by the subrogation.

6 Conclusion

Although the Draft Regulations are still being continuously revised, the normative requirements for the development of mineral resources in the Area have a reasonably clear outline. In the existing institutional design, we can see the ISA's aim of marine environmental protection. In the discussions by shareholders, we can see that marine environmental issues have received widespread attention. As an *ex post facto* remedy for the marine environmental pollution caused by activities in the Area, the Environmental Compensation Fund not only meets practical needs but also has a theoretical basis. Its aims and purpose are relatively broad, which will affect the realization of the core objectives of the system. However, when examining the current ISA financial situation, its funding sources are not very reliable. Therefore, constricting the purposes of the Compensation Fund and constructing reliable sources of and payment procedures for funding are prerequisites for the smooth operation of this system. It is worth noting that the research in this paper is not intended to be the final piece of research on the improvement of the Draft Regulations, because the object of observation in this paper is the current Compensation Fund system. This criticism of the Compensation Fund is not intended to deny its value, but to help the system better implement the principle of the common heritage of humanity.

Author contributions

This article was written by JZ in collaboration with LX. JZ is responsible for designing the structure and selecting the

topic of the article. LX is responsible for collecting the literature and writing this paper. The recommendations presented in this article were made by JZ and LX. All authors contributed to the article and approved the submitted version.

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References

Assembly of ISA (2006). *Resolution establishing an endowment fund for marine scientific research in the area*. 1, ISBA/12/A/11. Available at: https://documents-dds-ny.un.org/doc/UNDOC/GEN/N06/469/96/PDF/N0646996.pdf?OpenElement (Accessed 2022.9.17).

Basel Convention (1999) in *Conference of the Parties. Report of the Fifth Meeting*. 20–59. Available at: http://www.basel.int/TheConvention/ConferenceoftheParties/Meetings/COP5/tabid/6150/Default.aspx.

Chui, Y. (2020). Global marine plastics governance: Progress, predicament and china's participation. *Pacific J.* 28 (12), 81.

Council of ISA (2019). *Comments on the draft regulations on the exploitation of mineral resources in the area*. 8, ISBA/25/C/2. Available at: https://www.isa.org.jm/wp-content/uploads/2022/06/25c_2_e_3.pdf (Accessed 2022.9.18).

Cuperus, R., Canters, K. J., de Haes, H. A. U., and Friedman, D. S. (1999). Guidelines for ecological compensation associated with highways. *Biol. Conserv.* 90 (1), 41. doi: 10.1016/S0006-3207(99)00007-5

Deep-ocean Stewardship Initiative (2018). *Commentary on "Draft regulations on exploitation of mineral resources in the area.* Available at: https://documents-dds-ny.un.org/doc/UNDOC/GEN/N18/216/50/PDF/N1821650.pdf?OpenElement (Accessed 2022.9.1).

Finance Committee of ISA (2019a). *Status of the trust funds of the international seabed authority and related matters*. 1-2, ISBA/25/FC/6. https://www.isa.org.jm/wp-content/uploads/2022/06/isba_25_fc_6-e_0.pdf (Accessed 2022.7.12).

Finance Committee of ISA (2019b). *Status of contributions and related matters*. 1, ISBA/25/FC/3. Available at: https://www.isa.org.jm/wp-content/uploads/2022/06/isba25-fc-3-e_0.pdf (Accessed 2022. 7.12)

Finance Committee of ISA (2019c). *Status of working capital fund*. 1, ISBA/25/FC/2. Available at: https://www.isa.org.jm/wp-content/uploads/2022/06/isba25-fc-2-e_0.pdf (Accessed 2022.7.12)

Fu, F., and Zou, L. (2012). An analysis of the development tendency of the regime for protection of the international marine environment. *Pacific J.* 20 (7), 74–75. doi: 10.14015/j.cnki.1004-8049.2012.07.011

Gaines, S. E. (1991). The polluter-pays principle: From economic equity to environmental ethos. *Texas Int. Law J.* 26, (3). 495.

Gao, J. (2013). The liability of states sponsoring persons and entities with respect to activities in the international seabed area. *J. Int. Secur. Stud.* 5), 49. doi: 10.14093/j.cnki.cn10-1132/d.2013.05.012

Gouyon, A. (2003) *Rewarding the upland poor for environmental services: A review of initiatives from developed countries* (World Agroforestry Centre). Available at: https://vtechworks.lib.vt.edu/bitstream/handle/10919/67019/2516_Gouyon2003_RUPES_developed_countries.pdf?sequence=1 (Accessed Sep. 17, 2022).

Government of Australia (2018). *General comments from Australia on draft regulations on exploitation of mineral resources in the area*. 10. Available at: https://ran-s3.s3.amazonaws.com/isa.org.jm/s3fs-public/documents/EN/Regs/2018/Comments/Aust.pdf (Accessed 2022. 10. 12).

Government of Jamaica (2018). *Submission of Jamaica comments on the draft regulations*. 22–23. Available at: https://ran-s3.s3.amazonaws.com/isa.org.jm/s3fs-public/documents/EN/Regs/2018/Comments/Jamaica.pdf (Accessed 2022.10.12).

Government of PRC (2018). *General comments from China on draft regulations on exploitation of mineral resources in the area*, Vol. 3. Available at: https://ran-s3.s3.amazonaws.com/isa.org.jm/s3fs-public/documents/EN/Regs/2018/Comments/China.pdf (Accessed 2022.10.12).

Han, L. (2012). Establishment and institutional framework of marine pollution damage compensation fund in China. *Soc. Sci. J.* 202 (5), 81–82.

Han, Q., Huang, X., and Shi, P. (2007). Ecological compensation and its application in marine ecological resources management. *Chin. J. Ecol.* 26 (1), 127–128. doi: 10.13292/j.1000-4890.2007.0024

Hardin, G. (1968). The tragedy of the commons. *Science* 162 (3859), 1244. doi: 10.1126/science.162.3859.1243

ISA (1999). *Regulations on prospecting and exploration for polymetallic nodules*. ISBA/5/C/4/Rev.1. regulation 39, part V.

ISA (2015a). *Developing a regulatory framework for mineral exploitation in the area*. 36. Available at: https://www.isa.org.jm/wp-content/uploads/2022/04/Report-2015.pdf (Accessed 2022.9.27).

ISA (2015b). *Developing a regulatory framework for deep Sea mineral exploitation in the area*. 36. Available at: https://www.isa.org.jm/wp-content/uploads/2022/04/Report-2015.pdf (Accessed 2022.9.27)

ISA (2017). *A discussion paper on the development and drafting of regulations on exploitation for mineral resources in the area (Environmental matters)*. 72–73.

ISA (2018). *Draft regulations on exploitation of mineral resources in the area*. 36–37, ISBA/24/LTC/WP.1. Available at: https://www.isa.org.jm/wp-content/uploads/2022/06/isba24-ltcwp1-en.pdf (Accessed 2022.9.30)

ISA (2019). *Draft regulations on exploitation of mineral resources in the area*. 40–41, ISBA/25/C/WP.1.

ISA (2020) *Cost recovery fund of the international seabed authority* (Accessed 28 January 2020). ISBA/ST/SGB/2020/2.

ISA (2022) *Exploration contracts*. Available at: https://isa.org.jm/exploration-contracts (Accessed June 16, 2022).

ITLOS (2011a). Advisory opinion on responsibilities and obligations of states sponsoring persons and entities with respect to activities in the area 127. Available at: https://www.itlos.org/fileadmin/itlos/documents/cases/case_no_17/17_adv_op_010211_en.pdf

ITLOS (2011b). Advisory opinion on responsibilities and obligations of states sponsoring persons and entities with respect to activities in the area 205, 209. Availale at: https://www.itlos.org/fileadmin/itlos/documents/cases/case_no_17/17_adv_op_010211_en.pdf (Accessed 2022.10.7).

Johst, K., Drechsler, M., and Wätzold, F. (2002). An ecological-economic modelling procedure to design compensation payments for the efficient spatio-temporal allocation of species protection measures. *Ecol. Economics* 41 (1), 37–49. doi: 10.1016/S0921-8009(02)00019-8

Li, Z., and Lv, Q. (2018). Coordination between the ideal and reality of the rules for transferring seabed mining technology. *J. Political Sci. Law* 2018 (2), 91. doi: 10.3969/j.issn.1002-6274.2018.02.009

Murray, B. C., and Abt, R. C. (2001). Estimating price compensation requirements for eco-certified forestry. *Ecol. Economics* 36 (1), 149–163. doi: 10.1016/S0921-8009(00)00224-X

Nordquist, M. H., Nandan, S. N., Rosenne, S., and Grandy, N. R. (1991). *United nations convention on the law of the Sea 1982, vol. IV* (Dordrencht, Boston & London: Martinus Nijhoff Publisher), 3.

Rosenne, S., and Yankov, S. (1991). *United nations convention on the law of the Sea 1982 a commentary (Vol. IV: Articles 192 to 278 final act, annex VI)* (Dordrecht, Boston and London: Martinus Nijhoff Publishers), 411–412.

Ticker, J., and Raffensperger, C. (1999) *The precautionary principle in action: A handbook*. Available at: http://www.pauldavidtuff.com/PDF%20Files/handbook.pdf (Accessed Aug. 12, 2022).

United Nations (1976) *Stockholm Declaration of the united nations conference on the human environment* (UN network). Available at: https://documents-dds-ny.un.org/doc/UNDOC/GEN/NL7/300/05/IMG/NL730005.pdf?OpenElement (Accessed Jul. 17, 2022).

Wang, L. (2016). Environmental protection legislation on prospecting and exploration in the international seabed area-—Overseas experience and strategy of China. *J. Soc. Sci. Hunan Normal Univ.* 45 (4), 96–97.

Wei, W. (2018). On the development of sponsoring states' liability in the regulations of the international seabed area and its enlightenment to China. *Contemp. Law Rev.* 32 (2), 38–40. doi: 10.3969/j.issn.1003-4781.2018.02.004