

Integrating Environmental Costs into the Payment Mechanism

I. Background

The deep ocean provides important ecosystem services that are vital to life on Earth¹, from key regulating and supporting services to providing us with seafood and other resources. Economists have made progress in developing methodologies to value this critical form of capital², including how to deal with remote locations and complex marine value chains³.

Human activities can cause ecosystem disservices, including biodiversity loss, chemical contamination and sedimentation, poisoning of non-target organisms, and emissions of greenhouse gases and pollutants, which need to be quantified in order to prioritise management approaches. As noted by the High Level Expert Group on Sustainable Finance⁴, there is a risk of overexploitation.

Potential future deep-sea mining is likely to cause ecosystem disservices. The areas expected to be affected⁵ are at least:

1. the seabed, where the minerals will be separated from the associated substrate by scooping or drilling, resulting in changes to the structure of the seabed, its shape and the physical nature of the sediments,⁶ resuspension and redistribution of debris in the bottom water along the path of the collection device and in the vicinity of the mining tracks;
2. the surface and the water column due to particles discharged (accidentally or otherwise) during lifting, offshore processing and transportation;
3. the land from metal extraction and tailings disposal.⁷

The ISA is responsible for the international seabed beyond the limits of national jurisdiction. Mineral resources are the common heritage of humankind on whose behalf the ISA shall act.⁸ If the ISA decides to grant access for the exploitation of these mineral resources, mining operators would be required to make payments to the ISA in accordance with rules, regulations and procedures to be developed by the ISA.⁹ Work in the ISA to develop the payment mechanism has been ongoing since early 2019 in an Open-Ended Working Group (OEWG) of the Council, with the discussion primarily informed by models developed by the Massachusetts Institute of Technology (MIT).¹⁰ So far, the OEWG has focused on the financial terms for the exploitation of manganese nodules.

¹ Jobstvogt, N., Hanley, N., Hynes, S., Kenter, J., Witte, U. (2014) Twenty thousand sterling under the sea: Estimating the value of protecting deep-sea biodiversity. *Ecological Economics*, 97: 10-19.

² Parks, S.& Gowdy, J., (2013). What have economists learned about valuing nature? A review essay. *Ecosyst. Serv.* 3, e1–e10.

³ Drakou, E.G., Pendleton, L., Effron, M., Ingram, C., Teneva, L. (2017) When ecosystems and their services are not co-located: oceans and coasts, *ICES Journal of Marine Science* EPRS (2015). Deep-Seabed exploitation – tackling economic, environmental and societal challenges. European parliamentary research service scientific foresight unit (Stoa) PE 547.401, 92 pages.

⁴ HLEG (2018) Final Report 2018 by the High-Level Expert Group on Sustainable Finance. European Commission.

⁵ Sharma, R. (2011). Deep-sea mining: Economic, technical, technological and environmental considerations for sustainable mining. *Marine Technology Society Journal*, 45, 28–41.

⁶ <https://smartexccz.org/>.

⁷ Thiele, T. (2019). Deep-Sea Natural Capital: Putting Deep-Sea Economic Activities into an Environmental Context. In: Sharma, R. (eds) *Environmental Issues of Deep-Sea Mining*. Springer, Cham. https://doi.org/10.1007/978-3-030-12696-4_18.

⁸ Articles 136 and 137 of UNCLOS.

⁹ Article 13 of Annex III to UNCLOS read together with Section 8 of the Annex to the 1994 Agreement Relating to the Implementation of Part XI of UNCLOS.

¹⁰ For an overview, see <https://www.isa.org.jm/the-mining-code/working-groups/>.

II. The ISA-commissioned Studies on the Valuation of Environmental Externalities

At the end of 2022, the Council decided to commission a specific study on environmental externalities to enable the Council to deliberate further and make an informed decision on their incorporation into the payment regime.¹¹ An initial study by Brander and Guisado Goñi was published in June 2023 (hereinafter “the study”)¹² followed by a guidance in October 2023¹³ (hereinafter “the guidance note”).

The study identifies key ecosystem services provided by seabed habitats in the Area, and reviews the existing literature on the economic value of these services. Three exemplary specific ecosystem services that, based on the limited information currently available, appear to have potentially high economic value and face high impacts from deep-sea mining are

1. future value of genetic material for use in pharmaceutical and biotechnological applications;
2. existence and bequest values for preservation of remote and largely unknown biodiversity in the Area, and potential monetary values globally;
3. the impact of mining activities on carbon sequestration by phytoplankton and other processes in the water column.

The study summarises the wide range of non-market valuation methods that have been developed to measure the importance of ecosystem services for human well-being and to inform the use and management of marine ecosystems. The study finds that research in EEZs provides estimates for four ecosystem services: food provisioning, genetic resources, carbon sequestration, and existence and bequest values. It suggests the development of a common reporting framework for further research into the economic value of ecosystem services in the Area, extending beyond the seabed to the water column.

The guidance note aims to provide an understanding of the available methodologies for valuing the impacts of resource exploitation on ecosystem services. It suggests the following steps: description of investment activity, identification of impacts (e.g. through an Environmental Impact Assessment), biophysical assessment, economic valuation, investment evaluation, mitigation and/or compensation. The guidance note discusses the advantages and shortcomings of different methodologies and provides an outline for guidance, noting that value transfer methodologies have been widely used in national contexts.

III. Why environmental externalities should be taken into account?

The ISA payment structure should account of environmental externalities for two reasons:

1. The true cost to humanity of potential exploitation activities can only be assessed if the extent of the environmental harm they cause to the marine ecosystems and their services is captured financially and priced adequately (i.e. internalisation of externalities).
2. A level playing field between operators and over time can only be achieved, if contractors whose exploitation activities cause different levels of environmental externalities pay different levels of compensation to the common heritage.

¹¹ See ISBA/27/C/43: ‘Decision of the Council of the International Seabed Authority relating to the commissioning by the secretariat of a study on the internalization of environmental costs of exploitation activities the Area into the production costs of minerals from the Area’.

¹² L. Brander and V. Guisado Goni, Report on the value of ecosystem services and natural capital of the Area (May 2023), <https://www.isa.org.jm/wp-content/uploads/2023/06/Report-on-Valuation-of-ecosystem-services.pdf>.

¹³ Brander, L: Guidance on the economic valuation of ecosystem services and natural capital of the Area (October 2023), <https://www.isa.org.jm/wp-content/uploads/2023/11/Guidance-on-economic-valuation-Part-II-of-the-report.pdf>.

IV. How environmental externalities can be taken into account?

Environmental externalities could be taken into account in the form of an equalisation measure. The concept of equalisation has recently been taken up by the OEWG in relation to potential differences in taxation. It is suggested here that it should also be considered in relation to potential differences in environmental costs.

To implement such an equalisation measure, it is not necessary to carry out a full cost assessment of environmental impacts. It is sufficient to address the more limited question of how to incorporate certain measurable environmental costs into the financial mechanism.

As a first step, and open to review, it is proposed that contractors should be required to assess the three ecosystem services identified in the study as having potentially high economic value and facing high impacts from deep-sea mining, using distinct valuation methodologies that can be delivered in a reasonable time and cost, as outlined in the guidance note. These could be:

1. An opportunity cost assessment of the ecosystem services provided by a preserved seabed habitat that might be the foregone value of mineral extraction in a particular zone, taking into account the potential future value of genetic material for use in pharmaceutical and biotechnological applications;
2. A contingent valuation exercise, such as a willingness-to-pay survey, examining the existence and bequest values for preservation of remote and largely unknown biodiversity in the mining concession;
3. A full assessment of the proposed mining activities in terms of carbon emissions and sequestration throughout the production value chain, valued at the social cost of carbon, compared to a net zero baseline.

Based on the data provided by the contractor, the ISA can financially reflect differences in expected environmental impacts when assessing Plans of Work by levying additional royalty payments from those contractors that do not deliver net zero and nature positive outcomes overall.

The relevant additional royalty scale would be agreed in advance and set to reflect differences in mining efficiency, technology and delivery, as well as regulatory aspects. In line with other equalisation efforts different levels could be set, with the maximum rate as a doubling of the underlying maximum royalty rate, providing certainty for contractors and a workable implementation for the ISA.

As a second step, additional ecosystem services should be assessed and a broader approach to project accounting should be taken.

This approach would be compatible with the current state of discussions on the Nodule Financial Payment System Report¹⁴. If adopted, it would provide additional royalties that reflect the true cost to humanity of exploitation activities and create a level playing field. Once the payment mechanism incorporates realistic environmental externalities, it will automatically account for differences between contractors with regard to the environmental externalities of their exploitation operations.

V. Proposed Draft Regulations

Only limited additions to the draft regulations are required to implement this approach:

Proposed Draft Regulation 64 bis: *Environmental costs*

The financial terms of a contract shall reflect the environmental externalities of the exploitation activities permitted under the contract and throughout the value chain. To this end, the Authority shall levy a further

¹⁴ Kirchain, R et al. Update: Report to the International Seabed Authority on the development of an economic model and system of payments for the exploitation of polymetallic nodules in the Area based on stakeholder feedback (2022), Nodule-Financial-Payment-System-Report-October-2020-V3.pdf (isa.org.jm).

royalty reflecting environmental externalities in accordance with Regulation 64 ter. The further royalty shall complement the royalty provided for in Regulation 64.

This DR would establish the principle that environmental externalities shall be taken into account throughout the value chain through a further royalty.

Proposed Draft Regulation 64 ter: *Further royalty reflecting environmental costs*

1. Environmental externalities to be taken into account under Regulation 64 bis shall initially encompass at least the following aspects:

- a. Future value of genetic material for use in pharmaceutical and biotechnological applications;*
- b. Existence and bequest values for preservation of remote and largely unknown biodiversity in the Area, and potential monetary values globally;*
- c. Carbon emissions and the impact of mining activities on carbon sequestration by benthic and pelagic ecosystems.*

2. Further environmental externalities shall be taken into account in accordance with the relevant standard.

3. Environmental externalities shall be calculated using best available science and natural capital economics in accordance with the relevant standard.

4. The Council shall set an applicable further royalty rate which shall reflect the environmental externalities as calculated in accordance with the relevant Standard.

This DR would set out three areas for which environmental externalities shall be calculated as a starting point and provide for further areas to be identified in a relevant standard. Para. 3 refers to a standard on acceptable methodologies for the calculation of externalities. This standard could reflect the results of the guidance note. Finally, the DR provides that the environmental externalities shall be reflected in a further royalty rate to be determined by the Council.

Other relevant parts of the Regulations, such as the provisions relating to the documents and information to be submitted with an application for approval of a plan of work for exploitation, the criteria for assessing applications, significant changes before and during commercial production, inspection and compliance, among others, would also require revision to give effect to the specific textual proposals outlined above.

VI. Conclusion

The above approach would echo recent discussions in the OEWG on tax equalisation, which is understood to reflect differences in the contractor's arrangements with the sponsoring state. The approach provides the ISA with a first step towards incorporating environmental externalities into the payment regime, with a view to further refinement and adaptation over time, based on emerging science. It is based on considering at this stage only those environmental costs that can be practically assessed and accounted for. Costs associated with other ecosystem services identified by Brander et al., will need to be considered in a second step. This could help the ISA to fully capture all relevant financial flows and to set its rates, both as royalties and on assessed profits, in a way that achieves a meaningful and realistic contribution to the common heritage from each contractor and creates a level playing field between contractors.

It is essential for the ISA to ensure that environmental externalities are – based on best available science – reflected in the system. If the payment mechanism does not properly internalise the environmental costs of exploitation activities, the regime would end up being defective in practice as it fails to account for the burdens that humankind will have to bear. In order for the ISA to fulfil its precautionary and equitable sharing responsibilities under UNCLOS, Member States are invited to consider this further in the Council.