First Report of the CODE PROJECT

Developing ISA Environmental Regulations

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and Contributing Authors

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Code Project Issue Papers

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First Report of the Code Project

An Introduction

The Law of the Sea and Environmental Protection. The United Nations Convention on the Law of the Sea (UNCLOS) directs the International Seabed Authority (ISA) "to ensure effective protection for the marine environment." Environmental obligations are mentioned in various portions of the treaty, but the general mandate is enunciated in Article 145:

Necessary measures shall be taken… with respect to activities in the Area to ensure effective protection for the marine environment from harmful effects which may arise from such activities. To this end the Authority shall adopt appropriate rules, regulations, and procedures for *inter alia*:

(a) the prevention, reduction, and control of pollution and other hazards to the marine environment, including the coastline, and of interference with the ecological balance of the marine environment, particular attention being paid to the need for protection from harmful events of such activities as drilling, dredging, excavation, disposal of waste, construction and operation or maintenance of installations, pipelines and other devices related to such activities;

(b) the protection and conservation of natural resources of the Area and the prevention of damage to the flora and fauna of the marine environment.

The analyses and commentaries contained in this First Report of the Code Project are offered to the ISA as contributions to its work of translating the environmental obligations described in Article 145 into the "rules, regulations, and procedures" that will routinize their enforcement.

Background of the Code Project: On 17 January 2017, the ISA released a "Discussion Paper" on environmental regulations to govern exploitation contracts. The Discussion Paper consisted of a review of key regulatory terms followed by a "Tentative Working Draft" of the regulations themselves. Comments were invited.

Soon after the release of the ISA Discussion Paper, an ad-hoc committee drawn from ISA Observer organizations agreed to recruit an international team of scientists and legal scholars to review the Discussion Paper and, where appropriate, suggest edits to the section-by-section draft language.

By early March, fourteen contributors from nine nations had signed on to contribute to what became known as the Code Project. At an initial workshop in London, Code Project participants identified key terms – among them "serious harm"; "adaptive management"; and "environmental baselines"– and two-person teams were assigned to draft analyses of each. Those two-person drafts were then reviewed by the other Code Project participants. Time constraints precluded a group consensus on the particulars of every paper, and it should not be assumed that the authors of Paper A endorse all the recommendations of Paper B. That caveat aside, the overall result is a series of issue papers that speak in the voices of the co-authors at the same time as they reflect the contributions of an informal peer-review process. These issue papers constitute the first section of this report.

A parallel procedure guided the paragraph-by-paragraph annotation of the "Tentative Working Draft" of specific environmental regulations that comprised the bulk of the ISA Discussion Paper. Code Project participants with special interest or expertise in a relevant subject matter or process proposed comments on a particular paragraph or section, and their peers weighed in with suggested edits. The annotated draft regulations of the Discussion Paper form the second part of this report.

Thanks are due to the Pew Charitable Trusts for financial and logistical support of this enterprise. The biggest debts, however, are owed to the Contributors themselves. Their diligence was exemplary, as was their willingness to seek common ground. Many donated hours of research, writing, and discussion well beyond the time pledged. Much credit goes to the members of this singular international team.

First Report of the Code Project:

Overview

The First Report of the Code Project includes: 1) a set of thirteen **Issue Papers** pertinent to ISA environmental rulemaking; and 2) detailed **Annotations** of the ISA's "Tentative Working Draft" of regulations. This work identified a number of **Key Questions** for the ISA to consider as it continues the process of developing and implementing environmental regulations for exploitation of the Area. Additional Code Project Reports on environmental protection will be issued throughout the development of the overall ISA Mining Code.

1. Annotated Regulations:

One of the distinguishing characteristics of the Code Project First Report is its paragraph-by-paragraph annotation of the *Tentative working draft of the "Environmental Regulations"* (61 pages, 78 proposed regulations). Many of these draft regulations won Code Project support for their incorporation of environmental concerns and standards. In those cases Code Project recommendations generally suggest ways to clarify and further specify the environmental obligations. In other instances, Code Project analysts find that that the ISA's "tentative" regulations could use new or different language to denote higher standards of precaution or remedy and clearer thresholds for regulator intervention.

Code Project analyses of the ISA's working draft regulations are generally framed as examinations of the proposed language within the context of overall compliance with the environmental obligations contained in the United Nations Convention on the Law of the Sea (UNCLOS). The basic litmus test is whether the proposed language helps the ISA and its contractors meet the UNCLOS Article 145 requirement that the Authority "ensure effective protection for the marine environment from harmful effects" occasioned by operations in the Area.

2. Issue Papers:

Code Project contributors divided into two-person-led teams to consider some of the major environmental issues that inform development of an overall ISA Mining Code.

- Issue Paper #1: Effective Protection of the Marine Environment. Kristina Gjerde and Aline Jaeckel consider ways for the ISA to operationalize Article 145's requirement of "measures necessary to ensure effective protection … from harmful effects." They recommend the ISA specify the objectives, targets, and thresholds that must be met under this standard.

- Issue Paper #2: Serious Harm. Duncan Currie and Telmo Morato review the UNCLOS standard of "serious harm" as a trigger for regulator intervention. They recommend that the ISA establish clear thresholds. They also argue that addressing "serious harm" (defined as "significant adverse changes") should not limit the ISA's overall duty to provide "effective protection… from harmful effects."

- Issue Paper #3: Adaptive Management (AM). Aline Jaeckel and Telmo Morato set forth the legal and institutional prerequisites for AM in the Area: adequate environmental baselines; measurable thresholds; performance standards; transparent procedures; and an ISA capacity to closely monitor mining operations and, if necessary, require changes in exploitation procedures.

- Issue Paper #4: Strategic Environmental Assessment. Daniel Jones and Phil Weaver describe a tiered approach to ISA environmental management under which a Strategic Environmental Management Plan (SEMP) informs Regional Environmental Management Plans (REMPs), which in turn guide site-specific Environmental Impact Assessments (EIAs). Under such an approach, REMPs should be approved before exploitation begins in a region.

- Issue Paper #5: Environmental Baseline Studies and Scoping Reports. Daniel Jones and David Billett emphasize the importance of baseline data in determining if and when "harmful effects" and "serious harm" have been caused. ISA regulations should ensure that adequate scoping data is collected before any exploitation contract is awarded for the area in question.

- Issue Paper #6: Significance of Environmental Impact. Andrey Gebruk and Steve Roady examine ways to determine whether an activity is likely to cause adverse effects. They also call for criteria for determining "significance"; establishment of near-term impact thresholds; and a process by which the criteria and thresholds can inform project-level Environmental Impact Assessments.

- Issue Paper #7: Good Industry Practice; Best Environmental Practice. Leon Gerber and Renee Grogan note that the draft regulations reference "good industry practice" fifteen times. To ensure this term is both clear and enforceable, they recommend the ISA survey existing standards then endorse specific standards that can be applied uniformly to all contractors.

- Issue Paper #8: Public Consultation. Duncan Currie and Leon Gerber argue that the draft regulations fall short of international standards of transparency and public participation. Key issues are the proposed term "Interested Person" as an overly restrictive definition of who is entitled to comment on ISA affairs; an overly broad definition of proprietary information; and the need for opportunities for stakeholders to engage meaningfully in ISA processes.

- Issue Paper #9: Plans of Work – Timelines. Laleta Davis Mattis and Lily Xiangxin Xu note that the draft regulations recommend specific timetables for submission and review of Plans of Work. They suggest adjusting these timelines to shift the focus from speed to quality in submissions. They also call for overall capacity-building for the ISA Legal & Technical Commission.

- Issue Paper #10: Modification and Periodic Review of EMMPs and Closure Plans. Steve Roady and Lily Xiangxin Xu balance the equities between a contractor's ability to make changes in operation that appear to induce minimal harm and the ISA's responsibility to require revisions of

the contract when proposed changes or new circumstances "materially" affect the marine environment.

- Issue Paper #11: Vulnerable Marine Ecosystems and Wider Environmental Management Aims. David Billett and Andrey Gebruk weigh the pros and cons of VME designations in the context of deep sea conservation. They recommend a workshop be convened to consider VMEs, EBSAs (Ecologically or Biologically Significant Areas), and protected areas and which designation, or combination of designations, provides optimal protection.

- Issue Paper #12: Recommendations for Further Research. Phil Weaver, David Billett, Andrey Gebruk, Daniel Jones, and Telmo Morato offer priority research needs to better inform an ISA Mining Code. Matters in need of more investigation include: A) extent, duration, and ecological impacts of plumes; B) ecotoxicology; C) impacts on species connectivity, particularly in vent zones; and D) ecosystem functioning and recovery.

- Issue Paper #13: CCZ Environmental Management Plan (EMP). Phil Weaver traces the history of the creation in 2012 of an EMP for the Clarion-Clipperton Zone. He describes both the EMP's positive innovations (giant protected rectangles most of all) and its lack of adequate follow-up. He proposes specific questions that need to be addressed and contexts for doing so.

3. Key Questions Going Forward:

- How will the ISA meet its UNCLOS obligation to assure **"effective protection"** of the marine environment? If effective protection is the standard, what is the threshold of environmental harm that the ISA will tolerate?

- Through what process will the ISA finalize **Regional Environmental Management Plans** (REMPs) and incorporate their guidance into Plans of Work? Will the ISA require REMPs to be approved as a prerequisite for exploitation in that region?

- How, where, and under what criteria does the ISA plan to establish both **Large No-Mining Areas** and special protected zones for particularly **Vulnerable Marine Ecosystems** and ecosystem features?

- What will the ISA require of contractors for **Baseline Reporting** and **Environmental Scoping**? How can the data be used to monitor operations and minimize harm?

- What procedures will the ISA oversee for the approval of, and subsequent adjustments to, **Plans of Work** and **Environmental Management and Monitoring Plans**?

- What steps will the ISA take to assure greater **Transparency** in its deliberations and more opportunities for **Stakeholder Consultation**?

Code Project Issue Paper #1

Effective Protection of the Marine Environment

Code Project Issue Paper #1
Effective Protection of the Marine Environment

Lead Authors: Kristina Gjerde and Aline Jaeckel

1. Introduction

Regulations for the environmental aspects of deep seabed mining in the Area beyond national jurisdiction pose many unique challenges due to the special legal requirements of the UN Convention on the Law of the Sea (UNCLOS)[1], significant gaps in our understanding of deep sea ecosystems[2] and the predominant ecological conditions of low productivity, slow growth and slow recovery.[3] All this is compounded by the increasing stresses stemming from climate change.[4]

Article 145 of UNCLOS requires the adoption of measures necessary to ensure the "effective protection of the marine environment from harmful effects which may arise" from mining-related activities in the Area. Achievement of this aim will entail a comprehensive approach that integrates environmental protection into all mining-related activities by the Authority, Member States, Sponsoring States, and contractors, with expert input from scientists and participation from civil society.

The objective of the Environmental Regulations, as stated in the *Tentative Working Draft of the Environmental Regulations* (Draft Environmental Regulations) is "to provide for the effective protection for the Marine Environment from the harmful effects of Exploitation Activities in the Area".[5] The Preamble to the draft Environmental Regulations sets forth a comprehensive list of areas to be addressed by the environmental regulations to achieve that aim.

This Issue Paper aims to shed light on the questions: Does the term/standard "effective protection from harmful effects" need to be defined or fleshed out through ISA guidance? If so, what should be included in this definition or guidance? In addition, it seeks to highlight areas where the 2016 draft Exploitation Regulations and draft Environmental Regulations could be strengthened to incorporate the aims of Article 145.

This Issue Paper analyses the need for a definition for effective protection; explores the implications of the requirement to ensure effective protection; and introduces some of the key concepts involved in ensuring effective protection. It also suggests some key elements that could inform a definition of and

[1] Jaeckel, A., Gjerde, K. and Ardron, J., 2017. Conserving the Common Heritage of Humankind – Options for the Deep Seabed Mining Regime, *Marine Policy* 78, 150-157; http://dx.doi.org/10.1016/j.marpol.2017.01.019
[2] See Code Project Issue Paper #12 on Recommendations for Further Research
[3] See Code Project Issue Paper #11 on Vulnerable Marine Ecosystems
[4] Levin, Lisa A. and Nadine Le Bris. Deep Oceans Under Climate Change, *Science* 350: 766-768. (2015);
Sweetman, A.K. et al., 2017. Major Impacts of Climate Change on Deep-Sea Benthic Ecosystems, *Elem Sci Anth*, 5:4, DOI: https://doi.org/10.1525/elementa.203
[5] International Seabed Authority, 2017. A Discussion Paper on the Development and Drafting of Regulations on Exploitation for Mineral Resources in the Area (Environmental Matters), Kingston, Jamaica. Preamble.

guidance for "effective protection" and suggests some procedural mechanisms. Recommendations for the draft Exploitation Regulations and draft Environmental Regulations are highlighted throughout the paper.

2. The need for a definition for effective protection

The term 'effective protection' is explicitly incorporated into ten of the *Draft Environmental Regulations* and the definition of Strategic Environmental Management Plan (Regional) in Schedule 1.

Draft Regulation 2: The Authority's environmental duties and objectives for the Area

Draft Regulation 4: General: Guiding principles

Draft Regulation 8: Best Environmental Practices

Draft Regulation 19: Environmental Baseline study

Draft Regulation 28: Requirements for Environmental Management System

Draft Regulation 41: Matters to be taken into account by the Commission (in the process and procedure for recommendations relating to evaluation of Environmental Plans)

Draft Regulation 42: Amendments and modifications of the Environmental Plans

Draft Regulation 45: Factors to be considered by the Commission (in its evaluation of the Environmental Plans and conditions)

Draft Regulation 49: Substantive review of Environmental Performance

Draft Regulation 71: General (Compliance, Supervision, Enforcement [and Penalties)

Schedule 1: Use of terms and scope – definition of Strategic Environmental Management Plan

The need to "ensure effective protection" is a core feature in the 2016 draft Exploitation Regulations.[6] Under these overarching provisions, of which the developing Environmental Regulations will be part, proposed Plans of Work are to be reviewed by the Authority's Legal and Technical Commission (Commission) to ensure they "provide for effective protection of the Marine Environment…"[7] In

[6] International Seabed Authority, 2016. Developing a Regulatory Framework for Mineral Exploitation in the Area. Report to members of the Authority and all stakeholders. ISA, Legal and Technical Commission, Kingston, Jamaica.

[7] Draft Regulation 8: Assessment of Applicants
4. The Commission shall determine if the proposed Plan of Work:
(c) Provides for effective protection of the Marine Environment through the application of best environmental practices and a precautionary approach [including, but not restricted to, the impact on biodiversity, the protection and conservation of the Natural Resources of the Area, the protection of vulnerable marine ecosystems and cumulative effects of the Exploitation Activities through an Environmental Management and Monitoring Plan and Environmental Management Systems and Closure Plan];
Under DR 11, the Commission is to satisfy itself that the Applicant meets the criteria in DR 8.4 before approving a proposed Plan of Work.

addition, the draft Standard Clauses for Exploitation Contracts require the Contractor to "[e]nsure the effective protection of the Marine Environment from harmful activities and monitor the impact of the Exploitation Activities and ensure that they do not cause serious harm to the Marine Environment". [8]

Given that the objective of "effective protection" will need to inform and pervade the workings of the Authority in its development and implementation of the Exploitation Regulations, including the approval of Plans of Work for mineral exploitation, we suggest this term be defined in the Exploitation Regulations as well as fleshed out throughout the Exploitation Regulations and associated guidance.

3. What does "to ensure effective protection from harmful effects" mean?

3.1. Relevant provisions of UNCLOS

Article 145 of UNCLOS provides that:

> *Necessary measures shall be taken in accordance with this Convention with respect to activities in the Area to ensure effective protection for the marine environment from harmful effects which may arise from such activities. To this end the Authority shall adopt appropriate rules, regulations and procedures for inter alia:*
>
> *(a) the prevention, reduction and control of pollution and other hazards to the marine environment, including the coastline, and of interference with the ecological balance of the marine environment, particular attention being paid to the need for protection from harmful effects of such activities as drilling, dredging, excavation, disposal of waste, construction and operation or maintenance of installations, pipelines and other devices related to such activities;*
>
> (b) *the protection and conservation of the natural resources of the Area and the prevention of damage to the flora and fauna of the marine environment."* (emphasis added)

The term "protection" echoes UNCLOS Article 192, which obliges States to "protect and preserve the marine environment." Under UNCLOS, the Area and its mineral resources are the "common heritage of mankind" (Article 136) and the Authority is charged with managing the Area on behalf of mankind as a whole (Article 137). The concept of "effective protection" thus needs to be viewed in the context of the Authority's obligation to act on behalf of mankind as a whole and the full range of UNCLOS' environmental obligations. In addition to Article 192, this includes Articles 194(5) (protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life), 197 (cooperation in developing international rules, standards and recommended practices and procedures for environmental protection), and 206 (environmental impact

[8] Annex VII, Section 6 (e) Standard Clauses for Exploitation Contract; Section 6 Diligent operation
The Contractor shall, in accordance with this Contract: …
(e) Ensure the effective protection of the Marine Environment from harmful activities and monitor the impact of the Exploitation Activities and ensure that they do not cause serious harm to the Marine Environment;

assessment). Importantly, the obligation to protect and preserve the marine environment goes beyond avoiding harm and entails the active enhancement of the state of the marine environment.[9]

3.2. Due diligence

Deep seabed mining in the Area will require a high level of due diligence to ensure effective protection. The Advisory Opinion of the Seabed Disputes Chamber of the International Tribunal for the Law of the Sea ('ITLOS')[10] defined "to ensure" as an "*obligation to deploy adequate means, to exercise best possible efforts, to do the utmost, to obtain this result*."[11] The Seabed Disputes Chamber noted that "*The standard of due diligence has to be more severe for the riskier activities*"[12] and emphasized the need for the "*uniform application of the highest standards of protection of the marine environment*."[13] The Chamber also recognized that the precautionary principle helps ensure protection of the marine environment[14] and therefore forms "an integral part of the 'due diligence' obligation."[15]

The significance of this obligation cannot be overstated. As recognized in Draft Regulation (DR) 22, the burden of proof should rest on the Applicant to demonstrate that the risk of environmental effects and consequential mitigation and management will meet the environmental objectives of the Authority and that the Plan of Work is environmentally acceptable. It similarly means that pursuant to its mandate under the Convention to ensure compliance by the contractors, the Authority should not permit Exploitation Activities until such time as it has the capacity to effectively monitor compliance with its regulations and related environmental effects.[16] For this reason, a holistic, proactive, and precautionary approach, operationalized through guiding principles as well as substantive and procedural safeguards, will be needed. Compliance by contractors and enforcement by sponsoring States will need to be consistent with this aim.

4. What are some of the legal components of "ensuring effective protection from harmful effects"?

4.1. Legal standards for harmful effects

Drawing on the language from UNCLOS and the Seabed Disputes Chamber above, the environmental regulations will need to enable the *uniform application of the highest standards of protection of the marine environment*, which would entail:

- the capacity to measure, monitor and respond to a "harmful effects";

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[9] M.H. Nordquist, S. Rosenne, A. Yankov and N.R. Grandy, *United Nations Convention on the Law of the Sea, 1982: A Commentary*, Volume IV (Martinus Nijhoff Publishers, Dordrecht, 1991), pages 40-41.

[10] Seabed Disputes Chamber, 2011. *Advisory Opinion on Responsibilities and Obligations of States Sponsoring Persons and Entities With Respect to Activities in the Area*) (2011 Advisory Opinion), available at: www.itlos.org/fileadmin/itlos/documents/cases/case_no_17/adv_op_010211.pdf.

[11] 2011 Advisory Opinion, para 110.

[12] *Id.*, at para 117.

[13] 2011 Advisory Opinion, para 159.

[14] 2011 Advisory Opinion, para 131, paras 122–23.

[15] *Id.*, at para 131.

[16] See CP Annotated Regs for suggested additions to Draft Regulation 2, The Authority's environmental duties and objectives for the Area.

- prevention, reduction, and control of pollution and other hazards;
- prevention of interference with the ecological balance;
- protection and conservation of the natural resources;
- prevention of damage to the flora and fauna (currently more commonly referred to as "biodiversity");
- operationalization of the precautionary approach; and
- mechanisms to secure uniform application and effective compliance.

UNCLOS does not define the term "harmful effects", so many of these terms will need to be further refined including through the setting of objectives, targets, and measurable indicators. This will further entail an understanding of ecological thresholds and elaboration of precautionary triggers for responsive action.

4.2. Distinguishing between "harmful effects" and obligation to prevent "serious harm"

As definitions for "effective protection" and "harmful effects" also depend on what they are not, this section addresses the obligation to avoid serious harm.

The term "serious harm" appears in UNCLOS in only three respects: the ISA Council can issue emergency orders to prevent serious harm to the marine environment arising out of activities in the Area,[17] the Council can disapprove areas for exploitation by contractors or the Enterprise in cases where substantial evidence indicates a risk of serious harm to the marine environment,[18] and a court or tribunal may prescribe provisional measures, *inter alia*, to prevent serious harm to the marine environment.[19] These three provisions have in common that risk of "serious harm" is a threshold for triggering an intervention that effectively halts, prohibits, or suspends mining operations to prevent serious harm.

In sum, while *serious harm* is a threshold or trigger for far-reaching interventions, UNCLOS' overarching environmental aim is to ensure *effective protection from harmful effects*. This aim should be integrated throughout the Authority's rules, regulations, and policies and other management actions. Management actions should be aimed at avoiding harmful effects. The likelihood of serious harm should automatically trigger a regulatory and a management response.

[17] UNCLOS article 162.2(w).
[18] UNCLOS article 162.2(x). Corresponding provisions allow the Legal and Technical Commission (LTC) to make recommendations to Council: UNCLOS articles 165.2 (k) and (l).
[19] UNCLOS article 290(1).

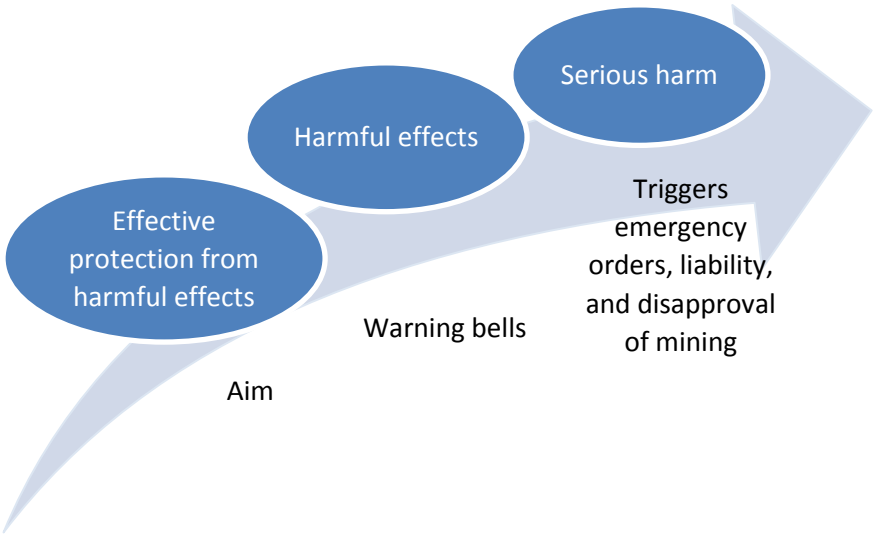

Figure 1: Environmental aims reflected in UNCLOS. The aim of effective protection must be given effect through ISA rules, regulations, and policies. Management actions should aim to avoid harmful effects. Serious harm must trigger a regulatory and management response.

The articulation of environmental objectives will be vital, as is already envisaged in Draft Environmental Regulation 2. In addition to the generic aim of "effective protection," more specifically tailored objectives, thresholds, and measurable indicators will be needed at the regional and site-specific scales for monitoring the potential for "harmful effects" and "serious harm". Ongoing observations can then be used to trigger warning bells when there is a likelihood that harmful effects may occur as well as to ensure direct action to preempt serious harm.

4.3. The role of the Authority in "ensuring effective protection"

As part of its obligation to ensure effective protection, DR 2(1) (*The Authority's environmental duties and objectives for the Area*) correctly reflects that the Authority will need to "establish and keep under periodic review environmental rules, regulations and procedures, including its guidelines and recommendations, to ensure effective protection for the marine environment from harmful effects which may arise from activities in the Area."

Importantly, DR 2(2) also envisages the Authority's additional role of undertaking the *necessary strategic assessment and management planning* and the need to develop *Environmental Objectives for the effective protection of Marine Environment* (emphasis added). Provisions for a high level strategic assessment and regional scale management planning will be a vital component of the Authority's ability to ensure effective protection from harmful effects. Accordingly, specific provisions should be included as part of the Environmental Regulations. Such provisions could address the setting of regional scale

objectives and safeguarding representative, distinctive, and vulnerable areas from the impacts of seabed mining through networks of Areas of Particular Environmental Interest and site-specific Preservation Reference Zones. The Authority will have an important role in ensuring that the regional-scale environmental objectives and plans are translated into Contractor's Plans of Work.[20]

Two other important roles for the Authority could be more clearly spelled out. First, DR 12 lays out the considerations for developing Environmental Objectives. However there is no comparable process for setting of Environmental Targets; this appears to be left in the hands of the Applicants (see DR 32, *Information requirements for the Environmental Impact Statement*). This transfer of responsibility to the Applicant/Contractor may be inconsistent with the Authority's responsibilities as it may not adequately ensure that the Environmental Targets reflect the Authority's global and regional environmental objectives. "Appropriately Qualified Experts" as defined in the draft Exploitation Regulations and stakeholders should be involved in setting and reviewing Environmental Objectives and Targets.[21]

Second, the Authority's responsibility for securing compliance with all aspects of its environmental management regime should be recognized. A fully equipped, staffed, and empowered regulator will be a necessary prerequisite for an effective environmental management regime. Thus, the list of the Authority's environmental duties in DR 2 should also include the authority (and access to resources) to secure compliance by the contractors, to monitor compliance and environmental effects in the Area, and the obligation to not permit Exploitation Activities until it has such capacity.[22]

5. Key elements to inform the Authority's work in ensuring "effective protection"

5.1. Definitions and guidelines for "effective protection" and "harmful effects"

A definition for "effective protection" will need to reflect, at minimum, the basic requirements set forth in UNCLOS Article 145 of

i) preventing interference with the ecological balance of the marine environment,
ii) the protection and conservation of the natural resources of the Area and
iii) the prevention of damage to the flora and fauna of the marine environment (or more commonly referred to as biodiversity). It should be built on
iv) the best available scientific information and reflect
v) the ecosystem-based approach,
vi) the precautionary approach, and
vii) best environmental practices.

"Harmful effects" and "serious harm" will need clear criteria to distinguish these two separate effects, underscoring the need to have the tools in place to measure, monitor and respond to a "harmful effects" before mining permits are granted and before "serious harm" occurs.

[20] See Code Project Issue Paper 4 on Strategic Environmental Assessment and CP Annotated Regs for suggested additions, including to the Preamble and a new Section 3bis on Regional Environmental Assessment and Management.
[21] See Code Project Issue Paper 8 on Public Consultation.
[22] See Section 7 below and the CP Annotated Regulations for suggested additions to the Preamble.

Guidelines for assessing whether the aim of "effective protection" has been addressed will play a key role in enabling the Authority to implement many of its core activities. For example, scientifically based guidelines may better equip the Commission to review the full range of documents associated with Plans of Work to assess whether they are sufficient to ensure effective protection as envisaged in DR 8(4) of the 2016 draft Exploitation Regulations.

In this regard, DR 8(4) of the 2016 draft Exploitation Regulations currently focuses on whether the proposed Plan of Work "[p]rovides for effective protection of the Marine Environment through the *application of best environmental practices and a precautionary approach*." As is recognized in the draft Environmental Regulations, at times the "best environmental practices" may not be sufficient for ensuring effective protection. In such cases, the application of a precautionary approach would only suffice to ensure effective protection if it acted to preclude approval of the proposed Plan of Work.

DR 8(4) of the 2016 draft Exploitation Regulations also posits some additional criteria in brackets that could be included to inform a definition of "effective protection". These currently state: "[*including, but not restricted to, the impact on biodiversity, the protection and conservation of the Natural Resources of the Area, the protection of vulnerable marine ecosystems and cumulative effects of the Exploitation Activities through an Environmental Management and Monitoring Plan and Environmental Management Systems and Closure Plan*]". This paragraph provides a useful beginning, but may be insufficient.

It is suggested that an assessment of the Applicant's proposed Plan of Work (DR 8(4) of the 2016 draft Exploitation Regulations) should 1) recognize that whether the proposed Plan of Work applies best environmental practices and a precautionary approach is just part of the assessment package; and 2) include a more encompassing definition of "effective protection" which includes, but is not restricted to, the impact on protection of biodiversity, the prevention of interference with the ecological balance of the marine environment, the protection and conservation of the Natural Resources of the Area, the protection of representative, distinctive, and vulnerable marine ecosystems, and controlling and limiting cumulative effects of the Exploitation Activities through an Environmental Management and Monitoring Plan and Environmental Management Systems and Closure Plan.

Contractors, as part of their duty of diligent operations, are appropriately required under the draft Standard Clauses for Exploitation Contract, Annex VII, Section 6) to, among other things, "Ensure the effective protection of the Marine Environment from harmful activities and monitor the impact of the Exploitation Activities and ensure that they do not cause serious harm to the Marine Environment." This obligation could be further clarified by including an obligation to ensure that all thresholds, indicators, and parameters in the Environmental Management and Monitoring Plan are fully complied with. This could be done by adding it to the Standard Clauses for Exploitation Contract, Annex VII Section 6(e).

Similarly, Environmental Objectives in DR 12 should include a working definition of "ecosystem integrity" to reflect the core importance of preserving ecosystem structure, functions, and processes. This draft regulation could be amended by adding the following language: "ecosystem integrity involves maintaining the diversity and quality of ecosystems, including their functioning, structure, connectivity, resilience and ability to provide ecosystem services".

Similarly, the Commission's considerations as to the sufficiency of proposed Plans of Work as currently expressed in DR 41 could reflect the need to protect all components of the marine environment, by emphasizing the importance of protecting species richness, biological diversity and marine ecosystems, including community structure, genetic connectivity among populations, ecosystem functioning, and ecosystem services on the seabed, at the sea surface, in midwater, and in the Benthic Boundary layer; the importance of avoiding Serious Harm to the Marine Environment; and the importance of protecting Vulnerable Marine Ecosystems and habitats and protecting and preserving rare or fragile ecosystems as well as the habitat of depleted, threatened, or endangered species and other forms of marine life.

These definitions, criteria, and guidelines should be developed in a transparent and participatory manner, drawing on expertise in the scientific and policy communities.

5.2. The role of guiding principles

As with any set of regulations, the Preamble and the Guiding Principles provide an important mechanism for achieving specified aims. The Preamble sets the tone and the Guiding Principles provide the operating manual for both substantive and procedural decision-making. To make this clear, the draft Environmental Regulations should make the application of the Guiding Principles obligatory by all actors when designing and implementing ISA rules, regulations, procedures, and associated recommendations and guidelines, and when preparing and implementing Plans of Work.

As such, it is recommended that the Preamble and DR 4 (Guiding Principles) be amended to reflect the following:

1. **Promoting vs. providing:** The Preamble to the draft Environmental Regulations states that their objective is to (a) "promote guiding principles to the development, management and regulation of activities…" (emphasis added). It would be more explicit to "provide" guiding principles…."
2. **Giving full effect:** DR 4(1) only suggests that the objective of the Environmental Regulation is "having regard" to the principles set out in Section 2. However, it would be clearer and more precise to stress the requirement for "giving full effect to" the principles set forth in Section 2.
3. **Broad applicability:** DR 4(2) states that "All persons engaged in or connected with activities in the Area ….shall consider the guiding principles in this Section 2…." Given the need for the uniform application of the Regulations, including the applicable principles, all persons engaged or connected with activities in the Area should be required to "apply" the guiding principles. An obligation to "apply" the principles would be consistent with the obligation of "due diligence" rather than the unquantifiable injunction "to consider."

5.3. Objectives, goals, targets, and measurable indicators

As noted above and in DR 2, the articulation of environmental objectives will be vital. In addition to the generic aim of "effective protection," more specifically tailored goals, objectives, thresholds and measurable indicators are required for the:

- assessment of whether a Plan of Work provides for effective protection of the marine environment;

- development of management and monitoring measures to assess the effectiveness of any mitigation measures and to detect environmental effects (see DR 32);
- development of regional environmental management plans;
- periodic assessment of whether a contractor's environmental performance is satisfactory; and
- determining the significance of environmental impacts.

6. Procedural Mechanisms

A crucial component of ensuring effective environmental protection is for the Authority to fully integrate environmental considerations into its decision-making procedures. As such, it is recommended the Authority enshrine the following procedural measures in its Mining Code:

(1) In an overall environmental management strategy for the entire Area, the Authority could set out a **procedural timeline** that clarifies that ecological objectives, goals, targets, and indicators will be adopted before any applications for exploitation will be assessed.

(2) This environmental management strategy could also outline how the Authority will acquire the **institutional capacity to effectively monitor, review, and supervise** the environmental effects of activities in the Area. This could be a prerequisite for approving mineral exploitation and should include expeditions to the mined areas to make independent assessments of the impacts and check whether these are compatible with the EMMP. Impacts could be assessed against precise thresholds and criteria.

(3) The Exploitation Regulations could specify that **regional environmental management plans are a compulsory prerequisite** for mining operations in any given area to ensure effective environmental protection at a regional level.

(4) The Exploration Regulations could be updated to specify procedural safeguards and consequences for contractors not supplying adequate **environmental baseline and monitoring data**.

(5) The Exploitation Regulations should specify what types of actions the Authority should take and is authorized to take if **monitoring shows that activities in the Area have caused *harmful effects*** but not *serious harm* (Figure 1).

(6) The Exploitation Regulations should ensure that the ISA retains the **power to amend substantive environmental requirements** placed on contractors once a contract is in force, not least to enable more rigorous standards to be put in place to avoid and minimize harmful effects as new information and technologies become available.

(7) The Exploitation and Environmental Regulations should incorporate **transparency provisions**, including access to information; public participation, including public review of environmental documents and the ability to bring independent scientific evidence; and access to review procedures.

(8) **Mechanisms for consideration of future generations** to ensure that mining does not preclude access to seafloor mineral and biological resources, including genetic resources, for future generations would help the Authority to act on behalf of all mankind, including those yet to come. This could also take the form of setting aside mineable areas for future generations, in line with the aim of sustainable development.

(9) Procedures for **ongoing scientific review and consideration of cumulative effects** could provide an avenue for incorporating information on cumulative and other effects including climate change, ocean acidification, hypoxia, and fishing.

(10) Elaboration of procedures for **Interagency Coordination** could clarify how coordination, consultation, and consistency with other international, regional, and national organizations will be achieved.

7. RECOMMENDATIONS

Potential amendments to the draft Environmental Regulations are proposed in the Annotated Draft Environmental Regulations (Annex 1). Potential amendments to the draft Exploitation Regulations are provided below (additions in **[bold]**; deletions in ~~strikethrough~~):

Draft Exploitation Regulation 8
Assessment of Applicants

4. The Commission shall determine if the proposed Plan of Work:

(c) Provides for effective protection of the Marine Environment, **[including]** through the application of best environmental practices and a precautionary approach. ~~including but~~ **[Effective protection includes, but is]** not restricted to, the ~~impact on~~ protection of biodiversity, **[the prevention of interference with the ecological balance of the marine environment]**, the protection and conservation of the Natural Resources of the Area, the protection of **[representative, distinctive and]** vulnerable marine ecosystems and **[controlling and limiting]** cumulative effects of the Exploitation Activities through an Environmental Management and Monitoring Plan and Environmental Management Systems and Closure Plan;

Annex VII Standard Clauses for Exploitation Contract
Section 6
Diligent operations

The Applicant shall, in accordance with this Contract:

…

(e) Ensure **[their activities and Plan of Work support]** the effective protection of the Marine Environment from harmful activities and monitor the impact of the Exploitation Activities and ensure that they do not cause serious harm to the Marine Environment **[and that all thresholds, indicators, and parameters in the Environmental Management and Monitoring Plan are fully complied with]**;

Code Project Issue Paper #2

Serious Harm

Code Project Issue Paper #2
Serious Harm

Lead Authors: Duncan Currie and Telmo Morato

Introduction

Three criteria for judging environmental harm are provided for in UNCLOS: protection from harmful effects, prevention of serious harm, and measures to prevent significant and harmful changes to the marine environment. These will be discussed in turn, and then a scheme which could be applicable for the Exploitation Regulations is discussed, including a process for determinations in the Regulations.

UNCLOS and ISA Terms and Definitions

1. Prevention of Harmful Effects

Article 145 of UNCLOS, which provides the mandate for the Exploitation Regulations, provides that "[n]ecessary measures shall be taken in accordance with this Convention with respect to activities in the Area to ensure effective protection for the marine environment from harmful effects which may arise from such activities."[23] The term "protection" echoes Article 192, under which States have an obligation to "protect" and preserve the marine environment. Article 145 goes on to provide that "to this end" "the Authority shall adopt appropriate rules, regulations and procedures for *inter alia*:

> (a) the prevention, reduction and control of pollution and other hazards to the marine environment, including the coastline, and of interference with the ecological balance of the marine environment, particular attention being paid to the need for protection from harmful effects of such activities as drilling, dredging, excavation, disposal of waste, construction and operation or maintenance of installations, pipelines and other devices related to such activities;

[23] Likewise, article 17 of Annex III of UNCLOS provides that rules, regulations and procedures shall be drawn up in order to secure effective protection of the marine environment from harmful effects directly resulting from activities in the Area.
UNCLOS Annex III Art 17
Article 17 Rules, regulations and procedures of the Authority
2. Rules, regulations and procedures on the following items shall fully reflect the objective criteria set out below:
(f) Protection of the marine environment:
Rules, regulations and procedures shall be drawn up in order to secure effective protection of the marine environment from harmful effects directly resulting from activities in the Area or from shipboard processing immediately above a mine site of minerals derived from that mine site, taking into account the extent to which such harmful effects may directly result from drilling, dredging, coring and excavation and from disposal, dumping and discharge into the marine environment of sediment, wastes or other effluents.

(b) the protection and conservation of the natural resources of the Area and the prevention of damage to the flora and fauna of the marine environment."

Article 145's requirement to adopt rules, regulations and procedures that prevent interference with the ecological balance of the marine environment and protect and conserve natural resources suggests a holistic and broad approach is required.

2. "Serious Harm"

The term "serious harm" appears in UNCLOS in only three respects: 1) the ISA Council can issue emergency orders to prevent serious harm to the marine environment arising out of activities in the Area,[24] 2) the Council can disapprove areas for exploitation by contractors or the Enterprise in cases where substantial evidence indicates the risk of serious harm to the marine environment,[25] and 3) a court or tribunal may prescribe provisional measures, *inter alia*, to prevent serious harm to the marine environment.[26] These three provisions have in common a risk of "serious harm" as a threshold for intervening to protect the marine environment: "serious harm" is a threshold for triggering an intervention that effectively halts, prohibits, or suspends mining operations to prevent serious harm.

In the ISA Exploration Regulations, "serious harm" incorporates a significance threshold. "Serious harm to the marine environment" is defined as "any effect from activities in the Area on the marine environment which represents a *significant adverse change* in the marine environment determined according to the rules, regulations and procedures adopted by the Authority on the basis of internationally recognized standards and practices" (emphasis added). "Significant adverse change" is left undefined.

It is clear from the Convention that "serious harm" is the level for intervention by the regulator and a level of harm which must be not only addressed, but avoided: emergency orders for suspension and adjustment, disapproval, and liability turn on serious harm.

3. "Significant and Harmful Changes"

UNCLOS uses the term "significant and harmful changes" in several instances. For example, the UNCLOS threshold for triggering an environmental impact assessment is that States have "reasonable grounds for believing that planned activities under their jurisdiction or control may cause substantial pollution of or significant and harmful changes to the marine environment".[27] The term "significant and harmful" also appears in the context of the use of technologies or introduction of alien species as the threshold at which States need to take measures.[28] Similarly, the International Law Commission[29] in its Draft Articles

[24] UNCLOS art. 162.2(w).
[25] UNCLOS art. 162.2(x). Corresponding provisions allow the Legal and Technical Commission (LTC) to make recommendations to Council: UNCLOS art 165.2 (k) and (l).
[26] UNCLOS art. 290.1.
[27] UNCLOS art. 206.
[28] UNCLOS art. 196.1.
[29] International Law Commission, Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, with Commentaries. 2001. At http://legal.un.org/ilc/texts/instruments/english/commentaries/9_7_2001.pdf.

on the Prevention of Transboundary Harm from Hazardous Activities [30] said that the combined effect of risk and harm should be considered in determining significance.[31]

The Discussion Paper observes that Article 206 draws a conceptual distinction between "effect" and "change," such that an "effect" may be possible without a "change."

Recommendations

1. Distinguishing Between Impact, Change, and Effect

The Discussion Paper notes that wording in UNCLOS and the ISA regulations sometimes varies between "change", "impact" and "effect." The use of similar and unclearly defined terms may lead to unnecessary confusion. It would be useful to rationalize the use of these terms and apply them in a manner consistent with their meanings under UNCLOS.

Firstly, as noted in the Discussion Paper, UNCLOS does not use the word 'impact.' While that term is deployed in the exploration regulations (and left undefined), it is best avoided going forward in the interest of consistency. Exceptions may include terms such as "Environmental *Impact* Statement" and "*Impact* Reference Zone" which have developed a common understanding and appreciation through their consistent usage. Such terms should be left unaltered, but their proposed definitions should be updated to conform with other changes in terminology.

Second, if "effects" and "change" are distinct concepts, this distinction can be most readily incorporated by treating "effects" as the direct or indirect byproducts of mining activities, independent of any consequent alternations in marine life or human health. These could include changes in temperature, turbidity, noise, and the like. Effects may be benign or "harmful," the latter triggering the need for "effective protection" under Article 145. A "change" can then be understood separately as an alternation in the marine environment or human health resulting from these "effects." These changes may rise to the level of "significant", resulting in "serious harm", and triggering a duty to intervene as described above. Under the Exploration Regulations, an "effect" can "represent a significant adverse change," but a clearer and more consistent formulation for the Exploitation Regulations would be that an "effect" can "*result* in significant adverse change."

In summary, the term "effects" is best used to denote the direct or indirect result of an activity, whereas "change" is best used to denote the environmental and human health consequences of those effects, to be evaluated in light of their significance.

The following tests address whether a change constitutes "harm" or "serious harm."

[30] See Alan Boyle, Globalising Environmental Liability: The Interplay of National and International Law. 17 Journal of Environmental Law. 2005; J. Van Dyke, Liability and Compensation for Harm Caused by Nuclear Activities. 35 Denver Journal of International Law and Policy. 2006.

[31] Commentary on Article 2: (a) "Risk of causing significant transboundary harm" includes risks taking the form of a high probability of causing significant transboundary harm and a low probability of causing disastrous transboundary harm; (b) "Harm" means harm caused to persons, property or the environment.

2. Defining "Serious Harm" and Evaluating "Significant Adverse Change"

A definition of serious harm is required. The ISA Exploration Regulations use the term "significant adverse change" in the context of defining serious harm, as noted above, but do not define it further. The ISA Discussion Paper proposes defining "Serious Harm" in the same way, but adds that "Significant Adverse Change" be defined as "important harmful changes in ecosystem diversity and integrity, the productivity of the biological communities within the Marine Environment; or the threat to human health through direct exposure to pollutants, or through consumption of exposed aquatic organisms; or important loss of aesthetic, recreational, scientific, or economic values".

These definitions may benefit from a different approach. Rather than define 'significant adverse change' in terms of various criteria, complicating the definition, it would be better to have a clear definition of "Serious Harm" coupled with criteria in the Exploitation Regulations for assessing compliance with the provisions that incorporate this standard.

Nevertheless, the definition of "Serious Harm" can be improved. Suggested is: "'Serious harm to the marine environment' for the purposes of these Exploitation Regulations means any effect, including an indirect effect, from activities in the Area on the Marine Environment that, taking into account any Cumulative Effect, represents a significant adverse change in the Marine Environment, to be determined according to the rules, regulations and procedures adopted by the Authority on the basis of any internationally agreed or recognized rules, standards and recommended practices and procedures."

As for "significant adverse change," the text proposed in the ISA Discussion Paper requires that such a change be determined according to the rules, regulations and procedures adopted by the Authority on the basis of internationally recognized standards and practices. While it may not be desirable to define the term according to standards and practices, it is appropriate to develop criteria according to internationally recognized standards and practices. So what are those standards and practices?

A. Sources and Examples re: Significant Adverse Change

The most significant body of standards and practices on "significant adverse effects" has been developed in the context of bottom fishing. UNGA resolution 61/105 (2006)[32] called on States and RFMOs to assess whether bottom fishing activities would have significant adverse "impacts" (here the term is used in a manner similar to "change" as defined above) on vulnerable marine ecosystems, and to ensure that if it is assessed that these activities would have significant adverse impacts, they are managed to prevent such impacts, or not authorized to proceed. Three years later, UNGA resolution 64/72 (2009)[33] called on States to adopt conservation and management measures to prevent significant

[32] UNGA 61/105 (2006). Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments. http://www.un.org/depts/los/general_assembly/general_assembly_resolutions.htm.

[33] UNGA 64/72 (2009). Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments. http://www.un.org/depts/los/general_assembly/general_assembly_resolutions.htm.

adverse impacts on vulnerable marine ecosystems consistent with the FAO Guidelines. These were reiterated in UNGA resolution 66/68 (2011).[34]

In turn, an expert consultation at the FAO developed criteria for significant adverse impacts, resulting in the International Guidelines for the Management of Deep Sea Fisheries.[35] Those Guidelines in paragraph 17 said that "Significant adverse impacts are those that compromise ecosystem integrity (i.e. ecosystem structure or function) in a manner that: (i) impairs the ability of affected populations to replace themselves; (ii) degrades the long-term natural productivity of habitats; or (iii) causes, on more than a temporary basis, significant loss of species richness, habitat or community types. Impacts should be evaluated individually, in combination and cumulatively." The Guidelines go on to list six factors to consider when determining the scale and significance of an impact.[36]

The Kuala Lumpur Nagoya Protocol, which addresses damage from living modified organisms, concluded in 2010, is the last instrument to be concluded on liability and redress for environmental damage. Its test for a "significant" adverse effect (again, used in a manner similar to "change" above) employs factors such as: (a) The long-term nature or permanence of the change, to be understood as change that will not be redressed through natural recovery within a reasonable period of time; (b) The extent of the qualitative or quantitative changes that adversely affect the components of biological diversity; (c) The reduction of the ability of components of biological diversity to provide goods and services; (d) The extent of any adverse effects on human health in the context of the Protocol. As is seen from a number of multilateral environmental agreements, the test of "significance" for damage is well established in international convention law.

B. Scientific Criteria for Significant Adverse Change

A recent paper by Lisa Levin *et al.*[37] discussed scientific criteria for significant adverse change in the context of seabed mining. Examples of significant change are:

- For manganese nodule mining: extensive resuspension and deposition of sediments over large spatial scales [note that this may be more readily classified as an "effect" based on the definitions above].

[34] UNGA 66/68 (2011). Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments. http://www.un.org/depts/los/general_assembly/general_assembly_resolutions.htm.

[35] The FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas. Rome. Updated 30 April 2013. At http://www.fao.org/fishery/topic/166308/en.

[36] International Deep Sea Guidelines para. 18. When determining the scale and significance of an impact, the following six factors should be considered: i. the intensity or severity of the impact at the specific site being affected; ii. the spatial extent of the impact relative to the availability of the habitat type affected; iii. the sensitivity/vulnerability of the ecosystem to the impact; iv. the ability of an ecosystem to recover from harm, and the rate of such recovery; v. the extent to which ecosystem functions may be altered by the impact; and vi. the timing and duration of the impact relative to the period in which a species needs the habitat during one or more of its life-history stages.

[37] Lisa A. Levin, Kathryn Mengerink, Kristina M. Gjerde, Ashley A. Rowden, Cindy Lee Van Dover, Malcolm R. Clark, Eva Ramirez-Llodra, Bronwen Currie, Craig R. Smith, Kirk N. Sato, Natalya Gallo, Andrew K. Sweetman, Hannah Lily, Claire W. Armstrong, Joseph Brider. Defining "serious harm" to the marine environment in the context of deep-seabed mining. In print.

- For sulphide mining: active vents: loss of multiple and/or critical habitats. Inactive vents: impacts to the sediment-dwelling biota from single mining activities.
- For cobalt crust mining: loss of the main components of many cobalt-rich crust benthic communities, effects on long-lived seamount species; and loss of certain endemic species.

This suggests two results. Firstly, the Exploitation Regulations should be drafted to avoid these changes occurring, taking into account scientific criteria such as spatial and temporal scale, connectivity, and endemism. Secondly, for example with nodule mining, if mining operations or operations, once commenced, cause or threaten to cause extensive resuspension and deposition of sediments over spatial scales which scientific advice suggests may cause significant change, emergency orders should be initiated in the context of Adaptive Management.

C. The 1990 Draft Definition

The Discussion Paper notes that in 1990, the Preparatory Commission for the ISA considered the following definition for "serious harm":[38]

> "Serious harm to the marine environment" means any effect from activities in the Area on the living or non-living components of the marine environment and associated ecosystems beyond that which is negligible or which has been assessed and judged to be acceptable by the Authority pursuant to these regulations and the relevant rules and regulations adopted by the Authority and which represent:
>
> (a) significant adverse changes in the living and non-living components of the marine and atmospheric environment;
>
> (b) significant adverse changes in the ecosystem diversity, productivity and stability of the biological communities within the environment; or
>
> (c) loss of scientific or economic values which is unreasonable in relation to the benefit derived from the activity in question."

This definition is helpful in specifying ecosystem diversity, productivity and stability, as well as loss of scientific or economic values, but the latter criterion has an additional test of reasonableness, in relation to the benefit derived. This gives rise to the question of whether it is appropriate to balance loss of scientific or economic values with the apprehended benefit, as well as how to measure the benefit – is the benefit economic only, does it extend to employment, and does it extend to apprehended benefits

[38] Article 2(2) Draft Regulations on Prospecting, Exploration and Exploitation of Polymetallic Nodules in the Area, Addendum, Part VIII, Protection and Preservation of the Marine Environment from Activities in the Area, Working Paper by the Secretariat, LOS/PCN/SCN.3/WP.6/Add.5, 8 February 1990. But the Discussion Paper also notes that in 1991, a redraft by the Chairman of Special Commission 3 used the concept of "unacceptable changes" to the marine environment meaning changes to the marine environment which will result or are resulting from activities in the Area and which are judged unacceptable according to the environmental standards recommended by the Legal and Technical Commission and adopted by the Council (see LOS/PCN/SCN.3/WP.6/Add.5/Rev.1)).
The 1991 definition fails to provide guidance: unacceptable is what the LTC and Council consider are unacceptable. It also fails to apply the criterion of 'significant' harm. However, it should also be noted that the 1990 definition was not accepted, although its use of scientific or economic values bears consideration.

to the sponsoring State or the common heritage of mankind? In addition, are other changes relevant or only those listed in (a)-(c)? Moreover, the draft has subjective or even self-referential element of the criterion being that which has been assessed and judged to be acceptable by the Authority, and as such may inject uncertainty. In summary, it seems helpful to look at some of the concepts in this definition, but as a definition it may suffer from over complexity.

3. Addressing "Harmful Effects"

The objective of the Exploitation Regulations is protection for the marine environment from "harmful effects," as reflected in Article 145.

D. Suggested Definitions and Procedures

Adapting the FAO Deep Sea Definition

Adapting the FAO Deep Sea Guidelines, the Regulations could define significant adverse change as those changes that either compromise ecosystem structure or function or affect species or the marine environment, such that:

(i) a change is of a kind that is not likely to be redressed through natural recovery within a reasonable period of time;[39] or
(ii) the ability of affected populations to replace themselves is impaired; or
(iii) the long-term natural productivity of habitats or ecosystems is degraded; or
(iv) a significant loss of species richness, habitat or community types is caused, on more than a temporary basis.

Changes should be evaluated individually, in combination and cumulatively, taking into account the scale, intensity, duration, and frequency of effects collectively.

Measures under Article 145 are not restricted to effective protection from serious harm: they are to "ensure effective protection" for the marine environment from *any* "harmful effects." But unlike "serious harm," which must be avoided entirely, "harmful effects" can be addressed through "effective protection," implying a broader suite of potential responses. These may include precautionary measures, technical steps, protected areas, and other forms of mitigation, for example. The ITLOS Seabed Disputes Chamber has described this obligation "to ensure" as an "obligation to deploy adequate means, to exercise best possible efforts, to do the utmost, to obtain this result."[40]

Although "harmful effects" may result in environmental damage that does not rise to the level of "serious harm," the two form part of an integrated spectrum. As the Discussion Paper observes, "effects" can occur without a "change." Similarly, "harmful Effects" can occur without causing a "significant adverse change" or "serious Harm." However, "harmful effects" contribute to and may ultimately produce, a "significant adverse change." It is, in fact, the potential to cause adverse change that renders these effects "harmful." These concepts can be linked through their respective definitions as suggested in the proposed amendments below.

[39] Following the Kuala-Lumpur definition.
[40] Advisory Opinion. Para. 110.

4. Recommendations

1. Wording in the regulations should be consistent to use “effect” when addressing the direct or indirect byproducts of mining activities, independent of any consequent alternations in marine life or human health, and “change” when evaluating the significance of the effect.
2. The regulations should set standards or criteria for the regulation of mining that ensure “effective protection for the marine environment from harmful effects that may arise” in accordance with Article 145. It should not be limited to addressing “significant adverse change.”
3. The term “serious harm” is only to be used in the context of intervention to prevent serious harm in cases where substantial evidence indicates the risk of serious harm to the marine environment, including emergency orders, provisional measures, and the disapproval of areas for exploitation by contractors or the Enterprise.
4. The test for serious harm should be significant adverse change.
5. A test needs to be used to assess significance against scientific criteria.

Potential amendments to the draft Environmental Regulations are proposed in the Annotated Draft Environmental Regulations (Annex 1).

Code Project Issue Paper #3

Adaptive Management

Code Project Issue Paper #3
Adaptive Management

Lead Authors: Aline Jaeckel and Telmo Morato

Introduction

Adaptive management (AM) is a structured process to address and reduce risk and uncertainty about the impacts of an activity and to help achieve certain management objectives. However, it is only used in situations where the regulator is confident that adverse changes could be adequately managed. As discussed at the Berlin Workshop,[41] AM has been applied to fisheries management albeit without great success,[42] mainly for four reasons: unsuitable regulations, lack of institutional capacity, lack of regulatory capacity, and failure to follow the procedural steps.

If AM is to be applied to specific exploitation contracts, (a decision that rests with the ISA), it will be important for the ISA to follow proper AM structured and iterative procedures and requirements, as outlined in this paper. It would be beneficial for the ISA to be mindful of the role of AM as well as the common misunderstandings about AM. These are summarised by Preston CJ in the Australian case *Newcastle & Hunter Valley Speleological Society Inc. v Upper Hunter Shire Council*:

> 'Adaptive management is a concept which is frequently invoked but less often implemented in practice. Adaptive management is not a "suck it and see", trial and error approach to management, but it is an iterative approach involving explicit testing of the achievement of defined goals. Through feedback to the management process, the management procedures are changed in steps until monitoring shows that the desired outcome is obtained. The monitoring program has to be designed so that there is statistical confidence in the outcome. In adaptive management the goal to be achieved is set, so there is no uncertainty as to the outcome and conditions requiring adaptive management do not lack certainty, but rather they establish a regime which would permit changes, within defined parameters, to the way the outcome is achieved.'[43]

[41] '*Towards an ISA Environmental Strategy for the Area*,' workshop organised by the German Environment Agency, German Federal Institute of Geosciences and Natural Resources, and the International Seabed Authority, Berlin, Germany (20-25 March 2017).

[42] CJ Walters, 'Is Adaptive Management Helping to Solve Fisheries Problems?' (2007) 36 *Ambio: A Journal of the Human Environment* 304-307 http://www.ncbi.nlm.nih.gov/pubmed/17626467; C Holley and D Sinclair, 'Collaborative Governance and Adaptive Management: (Mis)applications to Groundwater, Salinity and Run-Off' (2011) 14 *The Australasian Journal of Natural Resources Law and Policy* 37-69; PJ Auster, et al., 'Definition and Detection of Vulnerable Marine Ecosystems on the High Seas: Problems With the "Move-On" Rule.' (2010) *ICES Journal of Marine Science* (2010): fsq074.

[43] *Newcastle & Hunter Valley Speleological Society Inc. v Upper Hunter Shire Council* [2010] NSWLEC 48 (emphasis added).

As this statement highlights, a key consideration for AM is the focus on a set goal, in this case effective protection of the marine environment from harmful effects of deep seabed mining, in line with Article 145 of the UN Convention on the Law of the Sea (UNCLOS). AM may be applied to achieve this goal and to protect the interests of humankind as the resource owners under UNCLOS Article 136. However, adaptive management, by its nature, carries financial risks for the operator as changes to the operation (scale, timing, etc.) may be required. This aspect should be considered, but not used to prevent full implementation of AM.

Recommendations

- Adaptive management should only be used if it is capable of reducing risk and uncertainty within reasonable time scales and before serious harm has occurred.
- To enable AM, a step-by-step approach could include establishment of (a) environmental baselines; (b) precautionary thresholds; (c) robust monitoring; (d) periodic reviews; (e) procedural safeguards including transparency and reporting; and (f) automatic response from the regulator (see Figure 1).
- Environmental baselines and monitoring capacity are both essential prerequisites for adaptive management.
- Measurable and binding indicators and thresholds would need to be specified in the Environmental Management and Monitoring Plan (EMMP) and periodically reviewed.
- If the prerequisites for AM are not met for a particular Plan of Work and AM would not be capable of reducing the risks and uncertainties of that particular operation, then it is suggested that the ISA not approve the Plan of Work.
- It would be beneficial for exploration and exploitation contracts to specifically provide for adaptive management, if implemented, and to set out the ISA's powers to *unilaterally* require adjustments to activities and, if needed, to require contractors to pause or cease operations.
- It is recommended that any material adjustments be subject to the same procedural and transparency requirements, including stakeholder involvement and appeal processes, as for initial approval.
- Outcome-focused requirements and thresholds (performance standards rather than technology standards) are recommended to leave the contractors flexibility to innovate.

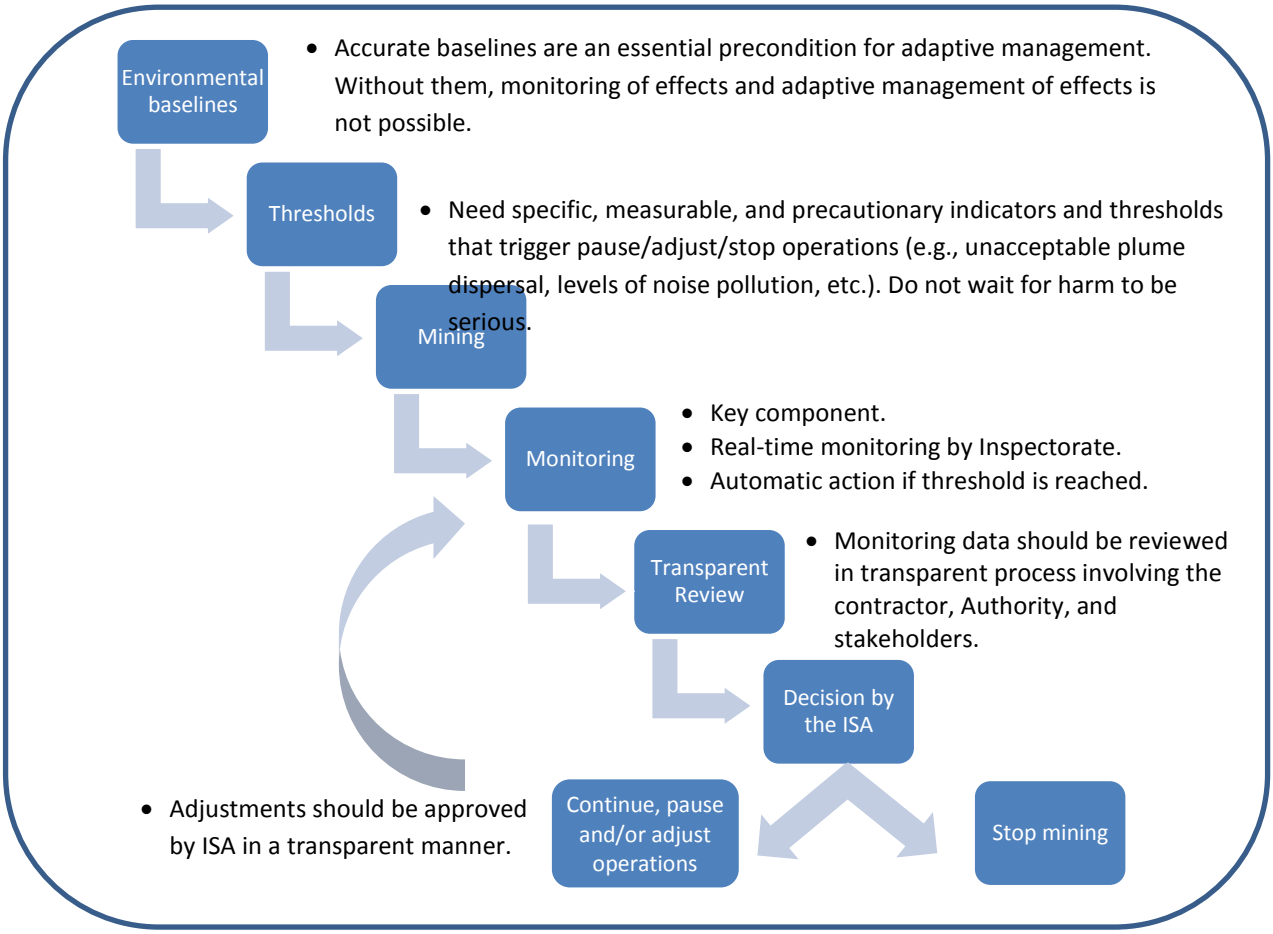

Figure 1: Steps involved in operationalising adaptive management in the mining context.

Suitability of adaptive management

The ISA Environmental Discussion Paper mentions AM as 'one generally accepted implementation of the precautionary approach and sound, good environmental management.'[44] Unfortunately, this statement would appear to be an oversimplification. AM can only be in line with precaution if a number of conditions are met, as discussed in the following paragraphs.

[44] ISA, 'Developing a Regulatory Framework for Mineral Exploitation in the Area: A discussion paper on the development and drafting of regulations on exploitation for mineral resources in the Area (Environmental Matters)' (2017) http://www.isa.org.jm/sites/default/files/isa-ssurvey.pdf, page 62. See also page 13.

Guidance may be drawn from the New Zealand government's submission to the ISA regarding AM,[45] which refers to a decision by the New Zealand Supreme Court in which the Court specifically considered the link between precaution and AM. The Court noted that for adaptive management to be an option

> 'there must be an adequate evidential foundation to have reasonable assurance that the adaptive management approach will achieve its goals of sufficiently reducing uncertainty and adequately managing any remaining risk. The threshold question is an important step and must always be considered.'[46]

The Court developed the following test to identify whether instead of AM the precautionary approach requires an activity to be prohibited until further information is available:

(a) 'the extent of the environmental risk (including the gravity of the consequences if the risk is realised);
(b) the importance of the activity (which could in some circumstances be an activity it is hoped will protect the environment);
(c) the degree of uncertainty; and
(d) the extent to which an adaptive management approach will sufficiently diminish the risk and the uncertainty.'[47]

This test is also useful in the context of seabed mining in the Area. It suggests that an assessment needs to be made of the extent of the risk of potential mining, the degree of certainty involved, and, most importantly, the extent to which an adaptive management approach would sufficiently diminish the risk and the uncertainty. If AM would not sufficiently diminish either the risk or the uncertainty – such as because of the magnitude of the risk or the insufficiency of information – AM would not be suitable and the Plan of Work should not be approved.

In addition, where environmental *baseline* information indicates a risk of serious harm (e.g., extinction of endemic species), adaptive management would not be suitable. This concept could be linked to an updated draft regulation 16(a). Moreover, adaptive management is only suitable in cases where the environmental effects of an activity can be measured within reasonable timeframes. If the time lag to measure the environmental effects of mining activities is too big, adaptive management is not able to reduce uncertainties within useful time scales.

Whether AM can adequately deal with the risk and uncertainty at hand can be assessed using the following factors, identified by the NZ Supreme Court:

(a) 'there will be good baseline information about the receiving environment;

[45] New Zealand Ministry for the Environment, 'New Zealand's Experiences with Adaptive Management for Seabed Mining Projects: A Submission to the International Seabed Authority to Support the Development of a Regulatory Framework for the Exploitation of Seabed Minerals' (2016), http://www.mfe.govt.nz/publications/marine/new-zealand%E2%80%99s-experiences-adaptive-management-seabed-mining-projects.

[46] NZ Supreme Court case of *Sustain Our Sounds v King Salmon* [2014] NZSC 40, paragraphs 124-125.

[47] NZ Supreme Court case of *Sustain Our Sounds v King Salmon* [2014] NZSC 40, paragraph 129.

(b) the conditions provide for effective monitoring of adverse effects using appropriate indicators;

(c) thresholds are set to trigger remedial action before the effects become overly damaging; and

(d) effects that might arise can be remedied before they become irreversible.'[48]

In the case of deep seabed mining, the risk profile will differ for nodules, sulphides, and crusts as well as for the particular region/site in which mining might occur. The key differences are likely to be about the spatial and temporal scale of the risks. However, the risks will always include significant species-level changes, community-level impacts, and impairment of important ecosystem-level functions.[49]

Practical prerequisites for adaptive management

In addition to the legal considerations outlined below, it is suggested that adaptive management can only be operationalised if four key requirements are fulfilled: (1) Adequate environmental baselines are available before granting an exploitation contract; (2) clear and measurable thresholds have been set; (3) the ISA has the capacity to closely and effectively monitor the relevant effects of mining activities; and (4) the ISA has established transparent procedures for review and deciding upon consequential action (continue/stop/pause/adjust).

1. Environmental baselines

Adequate environmental baselines are a necessary *precondition* for AM, as they form the basis for determining the effects of mining operations on the environment and, thus, reducing uncertainties.[50] Importantly, because baselines are a prerequisite for AM, baselines would need to be established *before* an exploitation contract is granted. As noted by the Supreme Court of New Zealand: '[…] normally one would expect there to be sufficient baseline information before any adaptive management approach could be embarked on'.[51] It is suggested for draft regulations 17 and 19 to be changed to clearly require the submission of baseline data before or at the time of application for an exploitation contract, i.e., *before* mining activities can be authorised (see suggested wording in Annex I).

2. Thresholds

The next essential prerequisite for AM is the setting of thresholds that trigger consequential action. The ISA would need to establish measurable indicators, thresholds, and their

[48] NZ Supreme Court case of *Sustain Our Sounds v King Salmon* [2014] NZSC 40, paragraph 133.

[49] Levin, Lisa A., et al, 'Defining "Serious Harm" to the Marine Environment in the Context of Deep-Seabed Mining,' *Marine Policy* 74 (2016) 245-259.

[50] New Zealand Ministry for the Environment, 'New Zealand's Experiences with Adaptive Management for Seabed Mining Projects: A Submission to the International Seabed Authority to Support the Development of a Regulatory Framework for the Exploitation of Seabed Minerals' (2016), http://www.mfe.govt.nz/publications/marine/new-zealand%E2%80%99s-experiences-adaptive-management-seabed-mining-projects, paragraph 48.

[51] NZ Supreme Court case of *Sustain Our Sounds v King Salmon* [2014] NZSC 40, paragraph 135.

consequences. Some thresholds should trigger immediate notification and management/regulatory action, as envisioned under draft regulation 64.

- Indicators and respective thresholds should be measurable and specific to the harm (e.g., the thickness of settled sediments must not exceed xx mm at a distance of xx km radius from any mining activity; particle size in the plume must not exceed x microns and not exceed a certain sharpness level; temperature, salinity, and toxicity of plumes must be limited to xx; plume dispersal of concentrations above a certain threshold may not disperse over xx km; noise pollution must not exceed xx decibel at a distance of xx km from any mining; and vertical transport or ship related activity, megafauna abundance, biodiversity, or other indicators must not be reduced by more than x% beyond xx km from the mine site as measured against baseline figures and averaged over an area of xx km^2 using photo mosaics from an AUV survey – then specify other parameters such as resolution flying height for similar habitat, etc.).
- Thresholds may be structured in a series, but should incorporate timely consequential action *to prevent* harm before it becomes serious (UNCLOS uses 'serious harm' as the threshold for emergency orders).[52]
- No serious harm should occur.
- Given the potential for seabed mining to quickly cause unanticipated, irreversible, or long-term harm, it is suggested that these thresholds will have to be high at the start. In other words, the ISA will need to err on the side of caution, in line with the precautionary approach.

3. Monitoring

The capacity to monitor "pollution and other hazards" generated during mining operations and their relevant environmental effects is another key prerequisite for AM. Without adequate and effective monitoring, it is impossible to determine whether thresholds are reached and operations should be adapted and whether uncertainties have actually been reduced.

- It was highlighted at the Berlin workshop that the ISA's Inspectorate could carry out real-time monitoring and engage with the contractor to correct or adjust activities to ensure actions are taken when required.
- This monitoring capacity would need to be established before any AM can be implemented.
- In addition, the Authority may have to rely on some independent monitoring paid for by the Authority and levied on the contractor. Such independent monitoring could be conducted at specified intervals (e.g., after 6 months, 1, 2, 5, 10 years) to verify the models and EMMP used by the contractor.

[52] UNCLOS, articles 162(2)(w), 165(2)(k).

- It is suggested for monitoring data to be reported to the ISA Council to ensure transparency and enable expert opinions to be heard, in line with the common heritage principle.

Monitoring involves both the contractor and the Authority as the regulator. The *Exploration Regulations* require contractors to establish a programme for 'monitoring and evaluating the impacts of deep seabed mining on the marine environment.'[53] It will be important for the Legal and Technical Commission (LTC) to review and the Council to assess, before approving an exploitation contract, whether the applicant has the technological and financial capacity to effectively monitor environmental effects, as currently envisioned under draft regulation 45(g).

However, if only contractors were to conduct the monitoring, vested interests would render AM untenable. Indeed, UNCLOS requires the ISA itself to:

- exercise such control over seabed mining as is necessary to secure compliance;[54]
- monitor compliance by the contractors as well as 'observe, measure, evaluate and analyse, by recognized scientific methods, on a regular basis, the risks or effects of pollution of the marine environment resulting from activities in the Area;'[55]
- 'establish appropriate mechanisms for directing and supervising a staff of inspectors who shall inspect activities in the Area to determine' compliance.'[56]

Monitoring compliance with exploration contracts is a priority task for the ISA, to be focused on before the start of exploitation.[57] As such, it is suggested that the ISA will need to develop monitoring capacity and protocols before any AM can be implemented.

In addition to the obligations of contractors and the ISA, UNCLOS requires all states to monitor and 'keep under surveillance' the environmental effects of any activities that they permit or in which they engage in order to determine whether these activities are likely to pollute the marine environment.[58] Moreover, sponsoring States have a due diligence obligation to ensure compliance by the contractor with its obligations, including AM, if implemented.[59] In this context, the role of sponsoring States in the monitoring phase will also have to be clarified, a consideration that is beyond the scope of this paper.

4. Review

Lastly, before any AM can be conducted, the ISA would need to establish clear procedures for review and consequential action. The following are suggestions to that effect.

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[53] *Nodules Exploration Regulations*, regulations 31(6), 32; *Sulphides* and *Crusts Exploration Regulations*, regulations 33(6), 34. All *Exploration Regulations*, annex IV section 5. See also ISA, *Recommendations for the guidance of contractors for the assessment of the possible environmental impacts arising from exploration for marine minerals in the Area,* ISBA/19/LTC/8 (1 March 2013), paragraph 11.

[54] UNCLOS, article 153(4).

[55] UNCLOS, article 165(2)(h).

[56] UNCLOS, article 162(2)(z). See also article 153(5).

[57] 1994 Implementing Agreement, annex section 1(5)(c).

[58] UNCLOS, article 204.

[59] UNCLOS, articles 139, 153.

- The Authority should receive timely reports on environmental effects necessitating review of parameters or a change in operations. The Authority would need to implement a transparent process of review, involving the contractor, LTC, and stakeholders. In the event that emergency actions are required, it would be appropriate for the Authority to take immediate action prior to initiating a broader review process.
- Minor adjustments to operations should be possible in communication with the Authority. These adjustments should provide flexibility to adjust operations within the parameters set out in the EMMP and apply best environmental practices. It is suggested that the Authority reserve the right to object to any operational changes that it believes will breach agreed thresholds or parameters. Adjustments other than minor operational adjustments, such as "material changes", should require involvement of the regulator and procedural safeguards and should be subject to prior approval by the ISA as the regulator.
- It would need to be clear which organ within the ISA is responsible for this step (see recommendation below).
- It is best for procedures for consequential actions to be clear and transparent in order to create a degree of predictability for contractors and to enable Member States, scientists, NGOs, and the public to follow the decision-making.
- Part of that review may entail orders to suspend or adjust operations in order to avoid serious harm, pending the review.

Following any review, it is suggested for the ISA to amend the relevant conditions, such as in the EMMP. If the review demonstrates that serious harm cannot likely be avoided, then an order for suspension may need to remain in place until such time as it can be. Otherwise, operations may be adjusted according to the review.

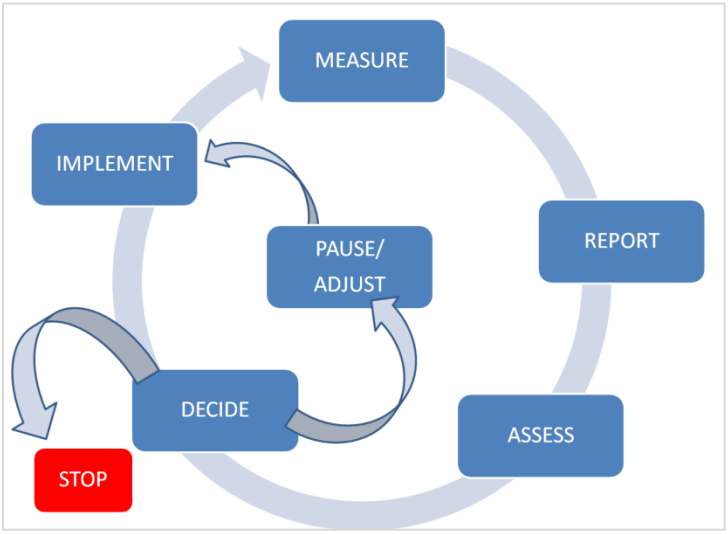

Figure 2: Steps involved in adaptive management. Source: Malcolm Clark, Richard Johnson, 'Adaptive management: environmental challenges posed by DSM', presentation given at the Griffith Law School/International Seabed Authority Workshop on "Environmental Assessment and Management for Exploitation of Deep Seabed Minerals" (Australia, 23-26 May 2016).

Legal mechanisms for adaptive management

For AM to be possible, it is recommended that the ISA establish the following requirements on contractors:

Environmental Management and Monitoring Plan (EMMP):

- The environmental parameters, thresholds, and triggers for each mining operation should be set out in the EMMP, which is annexed to an exploitation contract. Accordingly, the EMMP would need to be submitted at the time of application for a Plan of Work.
- The EMMP should be regularly reviewed in line with clear procedures to be established by the ISA and set out in the Regulations.

It is suggested that an Exploitation contract that integrates AM should:

- require the contractor to comply with the parameters, indicators, thresholds, and triggers set out in the EMMP;
- require contractors to report regularly to the ISA and to sponsoring States on the operations specifically as they apply to the thresholds set in the EMMP;
- require contractors to report immediately to the Authority or pause operations, depending on the thresholds set in the EMMP that may be reached;
- require the contractors to respond immediately to any instruction issued unilaterally by the ISA to adjust, pause, or cease operations, on the basis that a threshold contained in the EMMP has been exceeded or a likelihood of serious harm to marine environment has been identified; [60]
- list non-compliance with a decision by the Authority regarding AM as a material breach of contract;
- specify that should unforeseen situations arise that require action that the EMMP or the contract does not explicitly provide for, then the contractor must (a) inform the Authority immediately upon becoming aware of the situation, and (b) implement any instruction provided to it by the Authority;

[60] The security of tenure norm does not act as a bar to AM. See Neil Craik, Discussion Paper on "Adaptive Governance" prepared for the Berlin workshop (2017), paragraph 26.

- specifically state that in case of a dispute between the contractor and the ISA or Inspectorate in relation to the implementation of AM, the decision of the ISA or Inspectorate must be complied with until a dispute settlement body decides otherwise; and
- specify the obligation of contractors to comply with ISA rules, regulations, and procedures as adopted *or amended by the ISA from time to time* in accordance with UNCLOS Article 145.[61] This would enable the ISA to adjust environmental standards and requirements for all contractors, based on new knowledge, including that generated by early mining operations.

It is suggested for the Regulations/Recommendations to:

- require a contractor to apply AM if the prerequisites are met (this decision would be taken by the ISA based on the test discussed above) ; otherwise the application should not be approved;
- set out a clear procedure for AM, including procedural safeguards (e.g., an exploitation contract with AM can only be granted once adequate baselines have been established, thresholds have been identified, and monitoring capacity is ensured);
- establish mechanisms to ensure real-time monitoring of activities, e.g., by contractors and by, or as authorized by, the Authority, to ensure compliance and enable actions to be taken if thresholds are approached or if unexpected impacts become apparent and risks of harm exist that were not anticipated in the EMMP;
- clearly allocate the decision-making power over whether to stop, pause, or adjust operations to the Authority, in line with article 145 and 153(4) of UNCLOS;
- specify that the review of monitoring data should be undertaken by the Authority (likely through the Inspectorate) or independent experts, and that any review be reported to the LTC and Council;
- specify that the competence to object to adjustments to operations within the parameters of the EMMP rests with the Inspectorate (in order to enable the contractor to swiftly respond to new information and apply best practice);
- specify that the competence to pause operations in the case of threshold exceedances should rest with the ISA Inspectorate; such a decision should trigger a review by the Commission and Council;

[61] This is common practice for extractive industries under domestic law, especially where the state owes a duty of care to its citizens, including regarding health and safety and environmental management. Moreover, the Seabed Disputes Chamber sought to ensure that amendments to the Regulations apply equally to all sponsoring states. In its Advisory Opinion, the Chamber faced the problem that under the 2000 Nodules Exploration Regulations, sponsoring states were subject to lower standards than under the 2010 Sulphides Exploration Regulations. The Chamber noted that '[i]n the absence of a specific reason to the contrary, it may be held that the Nodules Regulations should be interpreted in light of the development of the law, as evidenced by the subsequent adoption of the Sulphides Regulations' (para 137). Thus, the Chamber clearly aimed for all sponsoring states to be subject to the same rules and standards. The same should be true for mining operators. For the ISA to act in the interest of humankind, the resources holder, it will need to update the Mining Code from time to time and require contractors to comply with such changes.

- specify that the competence to issue emergency orders and to suspend or adjust operations should rest with the ISA Council, acting upon clearly defined procedures (preliminary measures can be taken by the Secretary-General to enable a quick response to emergency situations);
- affirm the contractor's obligation to comply with any independent monitoring or compliance activities conducted or authorized by the Authority; and
- establish that any adjustments or other alterations to the EMMP should be subject to the same procedural and transparency requirements, including stakeholder involvement and appeal processes, as for initial approval.

It should be noted that while emergency orders provide the opportunity to suspend or adjust operations, these are currently triggered by 'any incident arising from activities which have caused, are causing or pose a threat of serious harm to the marine environment.'[62] AM goes beyond the avoidance of serious harm and would, ideally and if implemented correctly, decrease the risk of needing emergency orders.

Potential amendments to the draft Environmental Regulations are proposed in the Annotated Draft Environmental Regulations (Annex 1).

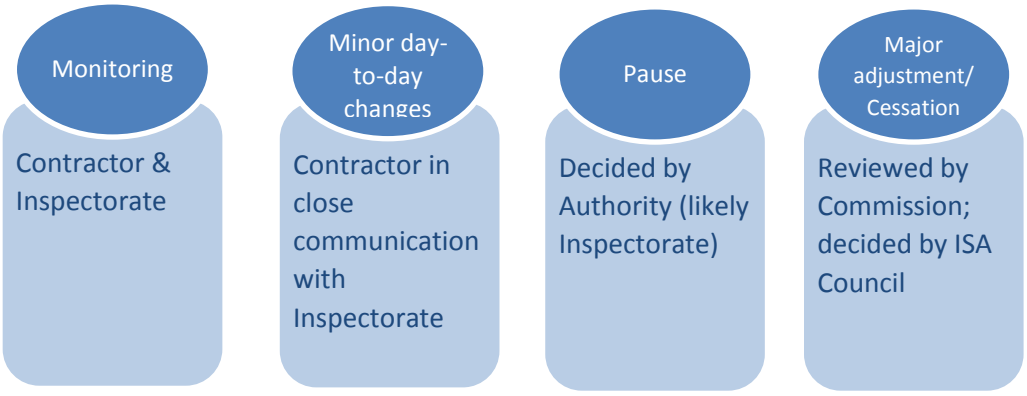

Figure 3: Institutional roles and competencies for the potential steps involved in AM.

[62] *Nodules Exploration Regulations*, regulation 33.

Code Project Issue Paper #4
Strategic Environmental Assessment

Code Project Issue Paper #4
Strategic Environmental Assessment

Lead Authors: Daniel Jones and Phil Weaver

Introduction

The ISA draft exploitation regulations[63] suggest that a high-level overarching Strategic Environmental Assessment (SEA) document could, among other things, operationalize Article 145 of the UN Convention on the Law of the Sea (UNCLOS) and present environmental objectives for the Area. Such a document could also demonstrate how activities in the Area contribute to the principle of the common heritage of mankind, sustainable development (including the UN's Sustainable Development Goals, particularly SDG 14), generally accepted biodiversity targets, and provide an insight into the trade-offs between the 3 pillars of sustainable development – economic, social, and environmental sustainability.

Section 11 of the ISA's 2017 Discussion Paper on environmental matters[64] discusses strategic environmental planning and management and notes confusion about the form an SEA may take. In order to move this discussion forward, discussion sessions on "regional governance" and "producing an overarching long-term environmental strategy for the ISA" were held during the Berlin workshop "Towards an ISA Environmental Management Strategy for the Area" in March 2017. These sessions provided considerable support for the mechanisms outlined below.

A tiered structure

Following best practice in other offshore industries, a tiered approach to strategic planning may be the best option for good environmental management.[65] We recommend a three-tier approach for the ISA within which an over-arching Strategic Environmental Management Policy (SEMP) guides the conduct and implementation of Regional Environmental Assessments (REA) and associated Regional Environmental Management Plans (REMP). Project scale Environmental Impact Assessments (EIAs) then need to take into account the guidance of the SEMP and the requirements of the relevant REMP (Figure 1).

[63] International Seabed Authority, 2016. Developing a regulatory framework for mineral exploitation in the Area. Report to members of the Authority and all stakeholders. ISA, Legal and Technical Commission, Kingston, Jamaica.
[64] International Seabed Authority, 2017. A Discussion Paper on the development and drafting of Regulations on Exploitation for Mineral Resources in the Area (Environmental Matters), Kingston, Jamaica.
[65] Gunn JH, Noble BF (2009) A conceptual basis and methodological framework for regional strategic environmental assessment (R-SEA). Impact Assessment and Project Appraisal 27:258-270

What would the SEMP involve?

The SEMP would set out high level policies for the regulation and management of the entire Area in order to meet the requirements of Article 145. The format could be a general policy adopted by the Assembly pursuant to Article 160(1), which can be updated regularly if needed and that applies equally to the ISA, all Member States, and contractors. This document would, inter alia:

- Affirm the Authority's obligation to: manage the Area for the benefit of mankind as a whole; ensure the effective protection of the marine environment from harmful effects that may arise from activities in the Area; protect and conserve the natural resources of the Area; and prevent damage to the flora and fauna of the marine environment, including through the protection and preservation of rare or fragile ecosystems and the habitat of depleted, threatened, or endangered species and other forms of marine life;
- set out overarching environmental objectives for the Area;
- inform regional-level and project-level management plans;
- ensure strategic environmental management is fully integrated into the Mining Code and ISA decision-making processes and is supported by institutional capacity;
- ensure environmental standards and measures continue to be identified in a systematic manner and allocated to the appropriate actors;
- ensure environmental management measures are given effect in a timely manner;
- articulate how key principles, such as the precautionary approach, ecosystem approach, and best environmental practices, will be operationalised in the Area;
- provide guidance on the environmental measures required before, during, and potentially after mining, essentially setting a strategic 'timeline' of steps that could also specify minimum data requirements at each step;
- elaborate a stakeholder participation strategy;
- specify how the ISA will engage with other international and regional bodies (e.g., IMO, RFMOs, and the CBD) on environmental matters; and
- articulate how management of the Area will contribute to the UN Sustainable Development Goal 14[66] and how the ISA will work with other relevant organisations in this context.

[66] UN SDG Goal 14 is to 'conserve and sustainably use the oceans, seas and marine resources for sustainable development.'

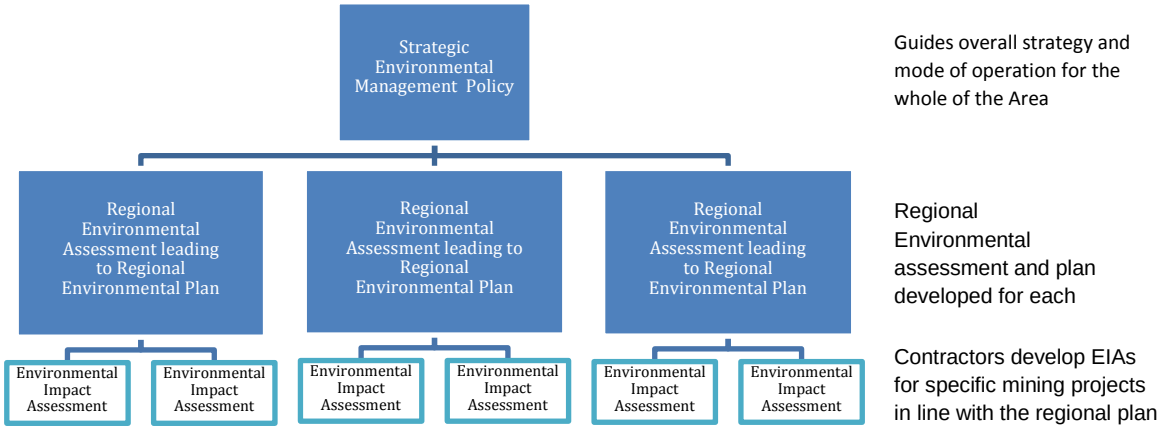

Figure 1: Model for environmental planning and management at different levels within the ISA, showing the relationships between the different tiers of assessment and planning.

REA

Regional Environmental Assessments should be conducted for each subregion of the Area and will involve collecting information on a particular region (ocean basin scale or smaller if the ecosystems or habitats are complex and frequently changing). The REA provides the information basis for determining the environmental criteria and objectives for local scale (or contractor block) activities that are part of the Environmental Impact Assessment (EIA). An REA is particularly appropriate where there will be multiple contracts in one region and/or where there are multiple activities taking place at the same time. An REA could be developed individually for different mineral types (SMS, nodules, crusts) or combined into a single regional assessment as appropriate. If there is any overlap between spatial extent and impacts, the REA for that area should include all mineral types combined. The REAs will be used to develop REMPs that outline specific management goals and objectives.

EIA

The Environmental Impact Assessment is a process of evaluating the likely environmental impacts of a proposed project or development. EIAs aim to predict the environmental impacts of a project during the project planning and design stage; identify ways to prevent, reduce, or mitigate adverse impacts; and present predictions and management options to decision-makers. EIAs are developed individually for specific projects; as a result they may lack consistency in indicators, targets, and goals. The SEMP and REMPs should influence individual project EIAs by setting global and regional environmental goals, targets, and indicators, identifying regionally significant habitats and biologically sensitive areas, and setting aside areas

of particular environmental interest as no-mining zones. This will help to achieve greater consistency in reaching environmental objectives at a regional or global scale.

Relationship between assessments and plans

An EIA is the formal decision-making process during which an optimal strategic approach is determined based on all available data and information. This decision-making process is usually documented in a report. In the case of EIA, this report is called the Environmental Impact Statement (EIS). Management plans are developed based on these assessments to ensure that the principles applied and approaches developed in the assessment process are maintained throughout the development and operation of the project. We recommend the ISA require both regional and project-based environmental management plans: Regional Environmental Management Plans (REMP) and Environmental Monitoring and Management Plans (EMMP).

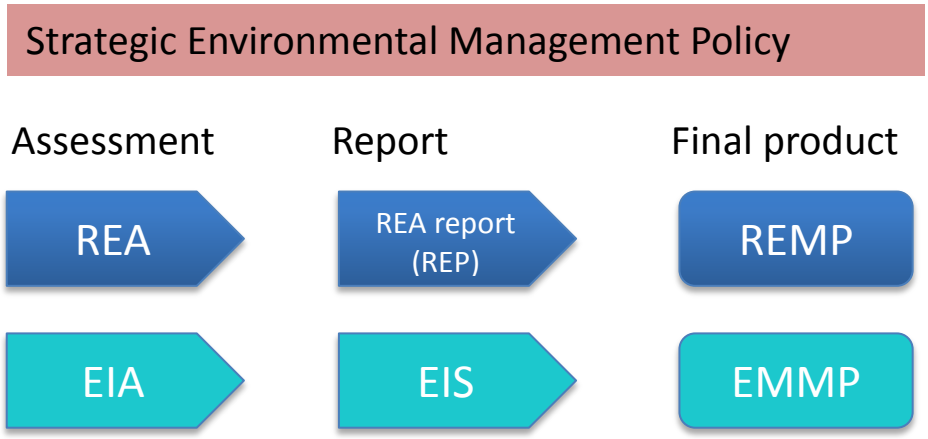

Figure 2: Relationship between assessments and plans.

Timing and ownership

The ISA should develop a strategic environmental management policy (SEMP) as soon as possible to establish overarching environmental goals and policies and to inform the development of new REAs and REMPs. An REA has already been carried out for the Clarion-Clipperton Zone (CCZ) leading to a REMP for that region, and a scientific assessment has begun towards the development of an REA in the North Atlantic. Both of these have lacked guidance from an overarching strategy. Once in place, the SEMP should guide all new REAs and REMPs. REMP development should involve the ISA, contractors, scientists, regional organizations, and other stakeholders. Ideally, REMPs should be in place before exploration contracts are approved. However, since many exploration contracts have already been approved, it is more practical that REMPs should be in place before any exploitation contracts are approved.

Legal status

EMMP. The EMMP must be binding on the contractor because it sets out specific environmental management and monitoring measures and obligations. As proposed in the draft regulations, it will be part of the contract and Plan of Work. If subsequent monitoring shows that harm from activities conducted under a Plan of Work is worse than predicted in an EMMP, the ISA should be able to refer to the EMMP and require contractors to remedy the situation including by, if necessary, adjusting, pausing, or re-locating their operations. This power should be specified in the Exploitation Regulations.

REMP. Compliance with relevant REMPs should also be required under the Exploitation Regulations and contracts. This will enable the ISA to ensure contractors uphold any commitments and obligations established under relevant REMPs. The REMPs should also inform the development of EMMPs, with goals and targets established under REMPs being reflected in the relevant EMMPs. The current CCZ-EMP does not create obligations for contractors, which is a potential shortcoming that may need to be addressed.

SEMP. The SEMP should be a policy document. As such, it would be beneficial to keep its provisions flexible and to allow updates to be made easily and regularly. The SEMP should set out what the ISA seeks to do rather than specifying particular obligations for contractors.

REA process

The REA process should, inter alia:

- determine the geographic region to be covered by the assessment and the mineral resources to be included;
- identify additional regional environmental objectives, taking into account any broader environmental objectives for the Area established in the SEMP;
- identify areas that should be reserved from exploitation in order to achieve effective protection of the marine environment and/or owing to environmental concerns including 1) pre-existing VMEs, MPAs, etc., 2) areas of biological, or geological importance not previously designated for protection, but that should be protected from mining; and 3) areas where substantial evidence indicates the risk of serious harm to the marine environment;
- identify areas that should be reserved from exploitation or will require special care owing to pre-existing activities, installations, or artifacts (e.g., shipping lanes, cables, pipelines, long-term scientific observatories, or cultural heritage sites);

- identify environmental issues specific to the region that need special attention in environmental planning and management, but where mining can be permitted, e.g., seasonal migration corridors (and the times and areas that are affected);
- collate relevant baseline data to provide an overview of the environmental status, issues, uncertainties, and vulnerabilities affecting the area;
- collate data on resilience and recovery (including thresholds and rates) and the efficacy of mitigation measures to provide an overview of regional sensitivities and optimal management approaches;
- identify cumulative and other relevant impacts that occur in the region that are not caused by, but may interact with or amplify the effects of, mining and other activities in the Area (e.g. fishing, ocean acidification, hypoxia, and climate change), as well as their severity, where and when they occur;
- evaluate indicators used to determine ecosystem health and impacts to identify potential approaches to be used in EMMP;
- identify and engage stakeholders in the production of the REMP; and
- identify a range of appropriate management measures; evaluate their potential efficacy, uncertainty and further mitigation measures; recommend an appropriate regional management approach.

The REA process should be documented in a REA report, which should be a public document alongside the REMP.

Content of the REMP

The REMP should:

- set clear objectives for the environmental management of the region, guided by the SEMP;
- produce a plan for conservation measures across the area of the REMP based on sound science and best practice. This should include spatial management approaches including, but not limited to, APEIs, PRZ, VMEs, and consideration of other significant and sensitive habitats;
- produce a plan to assess and address cumulative impacts from mining and other activities in the region (for example fishing, climate change, ocean acidification, hypoxia, and any new and emerging activities);
- accommodate exploitation as far as possible, bearing in mind the constraints listed here;

- describe the requirements to monitor the effectiveness of the plan (including at sea) and to review it if necessary;
- specify any standard environmental management requirements, such as monitoring or mitigation measures, for contractors operating in the region;
- specify region-specific baseline information that must be collected by all contractors for effective environmental management;
- define areas with key knowledge gaps and uncertainties to direct additional research effort, by contractors or outside parties;
- outline a stakeholder consultation strategy for the region, e.g., who should be consulted and when, including how the ISA will engage with other competent organisations in designing and enforcing areas of protection and recognizing any measures they have established (Convention on the Prevention of Marine Pollution by Dumping of Wastes, VMEs, etc.); and
- include a mechanism and timeline for review and for implementation of any changes.

The REMP should include a map showing the area managed under the plan, any set-asides, any exploration or exploitation contracts, any reserved areas, and any other areas of significance.

Development of draft regulations

The above recommendations can be incorporated into the draft Environmental Regulations as suggested in the Annotated Draft Environmental Regulations (Annex 1). See particularly draft regulation 2*bis*, 2*ter*, and 2*quarter*.

Code Project Issue Paper #5

Environmental Baseline Studies and Scoping Reports

Code Project Issue Paper #5
Environmental Baseline Studies and Scoping Reports

Lead Authors: Daniel Jones and David Billett

Introduction

Environmental baseline data are essential for robust assessments of the potential environmental impacts of a deep-sea mining project. They are also useful in determining when 'harmful effects' and 'serious harm' have been caused. Baseline data are essential for effective environmental management, including ensuring that best-practice approaches are used, such as adaptive management. Baseline data allow a contractor to demonstrate in an Environmental Impact Statement (EIS) that they: 1) have comprehensive knowledge of the environment they wish to exploit, 2) will be able to measure changes to this environment, and 3) have a basis for evaluating the environmental risks of the project. Baseline data also allow the contractor to demonstrate they have used Best Scientific Knowledge and Best Available Technologies. A comprehensive EIS will provide the ISA with vital information that can inform its decision on whether to issue an exploitation contract and will play an important role in a social licence to operate from the international community.

Knowledge of the environmental conditions in deep-sea locations requires the gathering of novel field data at and around the proposed project site and at multiple times, including seasonal and interannual changes. The time required to understand these longer term changes indicates that ISA regulations should require baseline environmental data collection throughout the exploration phase and not shift the requirement to the exploitation regulations, other than to ensure that adequate baseline data have been collected.

Environmental baseline data allow contractors, the ISA, and sponsoring States to 1) measure changes, 2) predict potential risks and impacts prior to development, 3) provide quantified and justified solutions to avoid and minimise impacts and 4) evaluate the actual impacts of exploitation.

Environmental baseline data allow areas of uncertainty to be identified and addressed through other means, such as on-site verification, additional data collection, modelling, the application of the precautionary approach, and adaptive management.

Environmental baseline data should be used in the Environmental Management and Monitoring Plan (EMMP) to justify the selection of a subset of the most effective management measures (in terms of accuracy, efficacy, statistical robustness, and cost) for the effective protection of the Marine Environment from harmful effects arising from exploitation activities in the Area and

against which natural and man-made environmental changes in the operational area can be assessed.

Scoping is a critical early step in the preparation of an EIA and refers to the process of determining the major issues and impacts that will be important in decision-making on the proposal, and need to be addressed in an EIA. An environmental scoping exercise is essential to stimulate ongoing dialogue between the contractor and the Authority on the EIA process and the content of an EIS and EMMP. Scoping allows critical gaps in environmental baseline data and their suitability for assessing risk, uncertainty, impacts, and monitoring to be identified and addressed early in the environmental assessment process, before the full EIS is submitted. Scoping will be valuable to contractors by improving regulatory certainty and potentially reducing the time required for EIS approval.

Environmental Baseline Studies (DR 19)

Do the current LTC Recommendations provide for clear expectations as to baseline needs for exploitation?

Guidance on conducting an environmental baseline survey for deep-sea mining EIAs exists in a wide range of sources, including ISA workshops and reports[67], guidance documents[68], academic workshops[69], and academic literature[70]. There is general agreement among these sources. Additional guidance for marine sampling in general[71] further expands upon these methods.

The ISA's existing Recommendations and guidance for contractors for the assessment of the possible environmental impacts arising from exploration for marine minerals in the Area (ISBA/19/LTC/8) (hereinafter the "LTC Recommendations") should be updated to reflect the guidance noted above. In addition, as recognised in the Working Draft, the Exploitation Regulations require greater clarity on what constitutes an "adequate" or "good" baseline. The requirements need to be specific enough to be an enforceable obligation on the contractors.

Should the criteria for baseline studies be addressed in the regulations or should they be reflected in relevant Recommendations /Guidelines? We recommend a combined approach.

Defining the requirements for baseline studies requires a balance between raising the minimum standard and encouraging proactive, responsible environmental management based on best-available scientific knowledge. Although detailed baseline guidance offers surety and

[67] Some information in International Seabed Authority 2011 ISA Technical Study 10
[68] For example: Clark et al. 2014 NIWA Client Report WLG2014-67; Secretariat of the Pacific Community 2016 Pacific-ACP states regional scientific research guidelines for deep sea minerals
[69] For example: VentBase 2012 workshop reported in Collins et al. 2013 Marine Policy 42:198-209
[70] For example: Boschen et al. 2013 Ocean & Coastal Management 84:54-67
[71] For example: Eleftheriou 2013 Methods for the Study of Marine Benthos; and Clark et al. 2016 Biological sampling in the deep sea

advantages to contractors, particularly in quantifying impacts, it may deter some contractors from going beyond the minimum requirement. Mechanisms in regulations to encourage contractors to obtain comprehensive and additional baseline data should be supported.

A robust evaluation process of baseline data is required through Scoping (detailed below). This evaluation will ensure that inadequate baseline data are flagged early, providing time to rectify deficiencies and facilitating high performance levels for environmentally responsible contractors.

There should be a requirement to submit environmental baseline data to ISA-approved databases in accordance with Article 14 of Annex III of the 1994 Agreement. All baseline and monitoring data should be made publicly available to facilitate review by the ISA and stakeholders. Article 14 of Annex III of the Convention makes it clear that environmental data shall not be deemed proprietary.

Environmental baseline studies should use best available methodologies and best available technologies. As these will change with time, Draft Regulation 19 (DR19) should avoid being too specific to prevent simple box ticking exercises in environmental baseline surveys. Rather, as noted above, general principles in DR19 should be considered during a Scoping discussion between a contractor and the Authority.

DR 19 should clearly specify that baseline data are required to be submitted and made available for scrutiny prior to the submission of an application for exploitation. DR 19 says “An adequate Environmental Baseline study shall be conducted”, when it should say “an adequate Environmental Baseline must have been conducted during the exploration phase…”. Given that so many contractors do not seem to have prepared adequate baselines yet (as reported in the LTC Chairman’s reports to the ISA Council), the exploitation regulations should be formulated to make sure that contractors provide adequate baseline data prior to the award of an exploitation contract.

Recommended amendments to DR 19

We recommend that Paragraph DR 19.1 be amended to clarify that the onus is on the contractor to establish an adequate Environmental Baseline during the exploration phase of the contract. This would encourage appropriate progress before the Scoping Phase. A specific process could be added whereby the Secretariat, or the Legal and Technical Commission, in consultation with the Secretariat, as appropriate, and subject to a review by appropriately qualified external experts, certifies that the environmental baseline is adequate as a precondition to its consideration of an Application, or, if not, that the contractor undertakes further specific tasks. This iterative process, which would be structured similarly to the process envisioned in DR 20 for the Environmental Scoping Report, would mean the Contractor has the opportunity before the scoping to ensure the baseline data are adequate.

Generally, all data need to be collected in a demonstrably robust way, with consideration given to the distribution and number of samples, the sampling unit size, replication, method of collection/processing and eventual analysis (including statistical analysis), and consistent with any guidelines provided by the Authority.

The legal regime should require: 1) baseline data to characterise the environment of the contractors' licence area comprehensively (as detailed in both the exploration and exploitation regulations) and 2) the data to be adequate to initiate a monitoring plan (in the exploitation regulations). While there may be substantial overlap in the types of data collected, these two aims will require different sampling approaches. In particular the way in which baseline data are to be used during subsequent monitoring should be clearly articulated.

In addition, the following sub-paragraphs may be added to DR 19 to clarify what comprises a 'good baseline'. Data are required to:

- Identify the existence and location of internationally and regionally recognized marine protected areas, other areas of special interest, other contractor licence areas, and, where appropriate, Vulnerable Marine Ecosystems (VMEs);
- resolve seasonal variation, inter-annual variation, and other relevant, potentially episodic and extreme, events;
- assess potential ore and sediment toxicity;
- determine existing levels of nutrient loading and pollution at sites;
- determine the nature, magnitude, and extent of existing impacts / modifications to the area (e.g., from fishing, climatic change);
- allow the locations, size, number and spacing of impact reference areas and preservation reference areas to be determined including buffer zones;
- establish the broad geomorphology of the contractor license area;
- establish characteristics of the benthic and pelagic species in the area which may be affected [species present / biodiversity, population sizes and biomass of species, distribution of species and populations in space and time, ecosystem functioning, ecosystem services], including data on connectivity and affected ecosystems;
- Determine alien/invasive species present in the area;
- establish marine mammal and fish populations which may be affected;
- establish currents, tides, eddies, and other oceanographic data sufficient to assess potential effects;
- establish the physical and chemical composition of the sediment which may be affected; and
- establish societal values placed on the area and its resources.

Other considerations

We believe the recommendation for the Authority to review and consider the use of marine evidence plans in the commentary section for DR 19 is more appropriate for strategic and regional environmental planning. Our documentation on spatial planning incorporates insights from the marine evidence planning process.

Environmental Scoping Report – Draft Regulation 20 (DR 20)

An important issue for the Environmental Regulations is whether scoping is obligatory or voluntary. We strongly suggest that Environmental Scoping Reports be mandatory.

The ISA draft regulations present a clear commentary for DR 20, outlining the role of a scoping stage and its importance. An additional reason for scoping (and its mandatory nature) is that scoping could be more effective in ensuring high environmental standards than setting very detailed baseline data requirements in DR19.

Scoping is an important part of the EIA process in most jurisdictions. In the UK, as a typical example, the proponent may ask the relevant authority for its formal opinion on the information to be supplied in the Environmental Statement (a "scoping opinion"). This allows the relevant authority to clarify what it considers the main effects of the development are likely to be and, therefore, the aspects on which the applicant's Environmental Statement should focus. There is no right to seek a formal scoping opinion once an application has been submitted.

To meet the current requirements of the draft regulations, only the contractor and the Authority (potentially with Appropriately Qualified Experts [DR 20.4]) need to be involved in the "scoping opinion" given by the ISA. It should be clarified that this is the job of the Secretariat, through a body that acts as an active regulator. However, to be most effective, an ISA scoping process should require the involvement of Appropriately Qualified Experts, followed by a public consultation process open to all stakeholders. The principal reason for stakeholder consultation at the scoping stage is to establish the breadth and detail of stakeholder concerns as early as possible in the environmental assessment process. Doing so enables the contractors and ISA to proactively address comments or concerns, improving the acceptability of the assessment and avoiding potentially costly amendments at a later date.

Scoping should be obligatory in order to improve regulatory control, as it enables early intervention in the event of sub-standard EIA processes. It also helps contractors avoid wasting time and money on unnecessary or misguided research and provides comfort that the future EIA/EIS will not be rejected by the ISA for procedural flaws. Furthermore, scoping discussions should clarify the key issues, ensuring subsequent EIA and the contractors' resources are targeted at the areas of most relevance to the environmental management measures to be put in place.

The timescales around scoping are important. DR 20 sets out timeframes for requests for additional information (DR 20.1), the supply of that information (DR 20.3) and the duration of publication prior to public comment (DR 20.5). It does not specify how long the decision making process leading to a scoping opinion may take (DR 20.6). This is likely to be slow and underscores the importance of a Secretariat-led review, which can manage Commission requests for additional information (DR 6T).

There is currently no timeline for how long the scoping opinion has validity. Given the dynamic nature of the seabed mining industry and marine scientific research, we recommend a period of less than 5 years between a scoping opinion being issued and the completion of the full EIA. Changes in best available techniques, baseline conditions, environmental stressors, and policy could all change the nature of the scoping opinion.

The regulations should clarify that ISA approval of a scoping opinion does not guarantee approval of the EIA. Language to this effect could be added around DR 20.6c. The substantive permit decision should be based on whether or not the likely impacts are acceptable. ISA review and approval should take into account the quality and completeness of the information provided, not just the categories of information provided. Our particular concern is that the scoping report will outline a series of topics, but not the amount or quality of information required to complete a satisfactory assessment (i.e., it will become a box ticking exercise with little regard for data quality) – this appears to happen in other jurisdictions to varying degrees.

It is clear that for effective and timely management, the ISA will have to devolve some responsibility to a competent body/organ of the ISA (potentially the inspectorate) to act as an active regulator. If a new body is decided upon, it should be in place as soon as the Exploitation Regulations come into force and the Exploitation Regulations should set out and refer to their responsibilities.

If the scoping opinion lists what to do (as stipulated in DR 20.2j), it is important that the subsequent EIA addresses each point with sufficient detail and rigour for subsequent approval. The quality of information (relevance, quantification of uncertainty, etc.) will be important as well as the type of information and topics covered. The scoping report should include a clear methodology for the proposed EIA and data collection as well the topics to be included (this would require an expansion of DR 20.2j/l to include methodology). It appears that the methodology required (DR 20.2b) relates to the scoping process (i.e., defining which environmental impacts are most relevant) and not studies carried out as part of the EIA. Links could be made to other sections of the environmental regulations with more detail, for example DR 41.

The above recommendations can be incorporated into the draft regulations as suggested in the Annotated Draft Environmental Regulations (Annex 1). See particularly DR 17 – DR 20.

Code Project Issue Paper #6
Significance of Environmental Impact

Code Project Issue Paper #6
Significance of Environmental Impact

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Introduction

The ISA Discussion Paper on the Development and Drafting of Regulations on Exploitation for Mineral Resources in the Area (*Environmental Matters*) poses a number of questions around how to determine whether an activity, or component thereof, is likely to have a significant Environmental Impact. The Discussion Paper (p. 36) specifically asks whether the regulations should provide appropriate criteria for determining the "significance" of the impact of an activity or whether this is better left to a guidance document; whether any impact thresholds or acceptable impact criteria can be established at this stage; and whether this should be a consideration for any strategic assessment process which duly informs project-level EIAs.

***Short answers*:** As discussed below, we believe: (1) the regulations should provide criteria for determining the "significance" of the impacts of activities; (2) it is possible (and important) to establish impact thresholds and criteria in the near-term; and (3) such criteria and thresholds should inform project-level EIAs.

1. Criteria for the "significance" of environmental impacts.

The term "significant" with respect to environmental impacts is commonly used in Environmental Impact Assessment (EIA) or Environmental Impact Statement (EIS) documentation in many states. However, while efforts have been made to establish methods for decision (such as in the context of managing ocean floor trawling), a uniform, standardized, and formal procedure for determining the environmental "significance" of an activity's impact under international law does not exist.

Criteria of "significance" in guidelines and publications vary in detail among various states, but generally consider the *extent, magnitude, duration, timing, frequency,* and *reversibility of an impact*. These criteria are not standardized (or formalized). Their use, as it follows from practice, is case specific (CIEEM, 2016; Dunker and Beanlands, 1986; Johnston et al. 2000; Marazza et al. 2009). Two examples that we find useful are discussed below.

Example from Australia

Australia has addressed the question of "significance" in the course of implementing its Environment Protection and Biodiversity Conservation Act. Thus, Australia provides the following definition:

> A *significant impact* is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have significant impact depends upon the sensitivity, value and quality of environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.
>
> "Significant impact guidelines 1.2. Environment Protection and Biodiversity Conservation Act 1999" (Australian Government, 2013), hereinafter "Australian Guidelines".

The Australian Guidelines further provide the following observations on the question of determining when a "significant impact" should be deemed "likely" to occur:

> To be 'likely' it is **not** necessary for a significant impact to have a greater than 50 percent chance of happening; it is sufficient if a significant impact on the environment is a **real or not remote** chance or possibility.
>
> If there is scientific uncertainty about the impacts of your action and potential impacts are serious or irreversible, the precautionary principle is applicable. Accordingly, a lack of scientific certainty about the potential impacts of an action will not itself justify a decision that the action is not likely to have a significant impact on the environment. Australian Guidelines at 3 (emphasis in original).

The Australian Guidelines also develop an approach with elements of "formal" evaluation:

> Once all the potential impacts of an action are identified, the next step is to consider how severe those impacts are likely to be. The following criteria are relevant:
>
> - the scale of the action and its impacts
> - the intensity of the action and its impacts, and
> - the duration and frequency of the action and its impacts.
>
> *Scale*
>
> The scale of the action and its impacts is a fundamental consideration when predicting the severity of impacts. A larger-scale action with widespread impacts is more likely to have a significant impact on the environment than a smaller-scale action with localized impacts.

However, it is important to consider scale in conjunction with the intensity and duration/frequency of the impacts.

Intensity

Intensity refers to the strength and concentration of the impacts. Open cut mining, which involves comprehensive modification of the environment, is an example of an action with high intensity impacts. Low density grazing of livestock on native pastures is an example of an action with low intensity impacts in most circumstances.

Timing, duration and frequency

An action may consist of a continuous activity or it may consist of a series of periodic activities. The starting point is to consider the duration and frequency of each component of an action. However, it is most important to consider the duration and frequency of the impacts. It is necessary to consider the long term and indirect impacts of the proposal on the environment as well as the immediate impacts. Impacts may persist long after an action ceases, or may be irreversible. In order to assess the severity of impacts one should consider the total, cumulative impact that can be attributed to the whole action over time.

In order to judge the severity of potential impacts, it is necessary to consider the likely scale, intensity, duration and frequency of impacts collectively. The following categories may assist in drawing a conceptual distinction between different levels of severity:

Severe: Severe impacts generally have two or more of the following characteristics: permanent/ irreversible; medium-large scale; moderate-high intensity.

Moderate: Moderate impacts generally have two or more of the following characteristics: medium-long term; small-medium scale; moderate intensity.

Minor: Minor impacts generally have two or more of the following characteristics: short term/ reversible; small-scale/localized; low intensity.

Severity of impacts alone does not necessarily indicate significance. The potential impacts of the action must be considered in the context of the environment in which the action will take place, particularly if the action is likely to impact upon sensitive or valuable components of the environment. Australian Guidelines at 11-13 (emphasis added).

Example from the USA

In the USA, the question of environmental "significance" has been the subject of federal regulation and has been extensively considered by the courts, particularly in litigation filed pursuant to the National Environmental Policy Act of 1969 ("NEPA").

The leading USA federal regulation is one issued by the White House Council on Environmental Quality (CEQ), which published a regulation nearly 40 years ago that endeavours to define the term "significantly" when used in NEPA to describe "actions significantly affecting the quality of the human environment." The CEQ regulation addresses both the ecological and social impacts of any proposed action. That regulation suggests that both the "context" and the "intensity" of the action must be considered:

> *Significantly* as used in NEPA requires considerations of both context and intensity:
>
> (a) *Context.* This means that the significance of an action must be analysed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.
>
> (b) *Intensity.* This refers to the severity of impact. … The following should be considered in evaluating intensity:
>
> (1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.
>
> (2) The degree to which the proposed action affects public health or safety.
>
> (3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
>
> (4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.
>
> (5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks. …
>
> (7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a

> cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts. …

Typically, in the USA, the agency in charge of overseeing the action makes a determination as to whether that action is "significant." Agencies are required to consult the CEQ regulation (and the agencies' own separate NEPA implementing regulations, if any) to assist them in this determination. Often, those decisions are then challenged in court.

Courts in the USA sometimes agree with the agency decision as to whether or not an action is properly deemed to be "significant", and sometimes disagree. For a case rejecting an agency determination that a particular action was not "significant," see *National Parks & Conservation Association v. Babbitt*, 241 F. 3d 722, 730-732 (9th Cir. 2001).

To summarize numerous cases litigated in the USA over the past several decades, the courts rely upon the CEQ regulation for guidance in making a "significance" determination, and often place extra weight on basic questions such as the extent and severity of the physical impacts triggered by the action in question, as well as the economic costs. In addition, as illustrated by the National Parks case cited above, some USA courts find actions to be "significant" because they are both controversial and fraught with uncertainty.

Levin et al. (2016) discuss factors that would indicate a significant adverse change:

> If information is not available to set particular ecological thresholds, a suite of other indicators can be used to determine the likelihood of significant adverse change and impacts, including those that address species-, community- or ecosystem-level impacts. Here all three ecological levels are considered. Significant species-level changes or impacts include: (i) extinction; (ii) significant decline in abundance; (iii) decline in foundation species; (iv) reduction below critical reproductive density; (v) loss of source populations; and/or (vi) loss of critical stepping-stone populations. Community-level impacts include (i) alteration of key trophic linkages among species in a community; (ii) reduction in species diversity beyond natural levels of variability; and / or (iii) regional declines in habitat heterogeneity, such as loss of entire habitats or community types. At the ecosystem-level, impairment of important ecosystem functions such as biomass production, nutrient recycling or carbon burial can lead to loss of major ecosystem services upon which society depends.

Efforts at the international level to define whether actions are significant include attempts made with respect to the control of trawling the ocean floor, and with respect to the regulation of genetically-modified organisms.

Thus, the term "significant" is addressed directly in the Nagoya-Kuala Lumpur Supplementary Protocol to the Convention on Biological Diversity. That Supplementary Protocol provides:

> *A "significant" adverse effect is to be determined on the basis of factors, such as:*
> *(a) The long-term or permanent change, to be understood as change that will not be redressed through natural recovery within a reasonable period of time;*
> *(b) The extent of the qualitative or quantitative changes that adversely affect the components of biological diversity;*
> *(c) The reduction of the ability of components of biological diversity to provide goods and services;*
> *(d) The extent of any adverse effects on human health…*

2. Importance of scale in application of "significance" criteria in different deep-sea environments.

Mining for different mineral resources (nodules, sulphides and crusts) affects different types of ecosystems (abyssal sediments, ocean ridges, seamounts). These ecosystems have contrasting scales (Levin et al., 2016).

To predict the severity of impacts, it is fundamental to evaluate the scale of an impact relative to the scale of an ecosystem.

The scale of an impact will have two dimensions: direct physical impact (i) and indirect impacts (ii). Direct physical impact will take place "on-site" (within the mining area). Indirect impacts, such as those caused by plumes, affect areas outside the mining area.

Direct physical impacts

Polymetallic sulphides

Mining for polymetallic sulphides will affect hydrothermal vent ecosystems. Their scale is from 10s to 100s of meters across. These are very localised but harbour high densities of marine life. Particular hydrothermal vent ecosystems and unique communities may be completely eliminated by mining at active hot vents. Thus, "*severe*" *on-site impact.*

Inactive hydrothermal vent ecosystems are poorly known. The question remains whether these habitats host a specific (unique) fauna (including microbial). The area of these habitats is typically small and they are distributed mosaically. Particular ecosystems and habitats may be eliminated by mining at inactive vent fields. "*Severe*" *on-site impact.*

Seamounts

The seamount ecosystems occur on seamount summits and flanks; they are very localised and mosaically distributed. The scale varies from ~10 km^2 to 1000 km^2. The mine sizes are expected to be very large – over many tens of km^2 per operator per year. Direct physical impact will result in removal and disruption of hard bottom habitats and removal of sessile and slow-moving fauna. "*Severe*" *on-site impact.*

Polymetallic nodules

These ecosystems occupy vast areas of abyssal plains (>1000s km^2). However, specific habitats, for example with nodules of certain size and certain density, can be more localised. The mine sizes will be enormous – over 100 km^2 per operator per year, which adds to the severity. Nodules will not regrow for at least tens of thousands of years; hence a permanent loss of habitat will take place due to the complete removal and/or disruption of the surface layer, including soft sediment and nodule habitats, removal of unique nodule-associated sessile fauna and slow-moving fauna. "*Severe*" *on-site impact.*

The on-site effect in all types of environment will be "severe" (elimination of ecosystems, communities, habitats, populations etc.).

Indirect Impacts

Plume effect

Polymetallic nodules

Given the scale of potential operations, unless technology can be deployed effectively to limit/control/capture disturbed sediment, broad-scale plumes can be expected unless they are contained. Plumes may extend over a variety of habitats, such as fields with nodules of specific size and density, local mounds, knolls, and seamounts. Given the scale and duration of potential mining operations, the effect from plumes can be expected to vary from "severe" near the discharge area to "minor" some distance from the discharge area (likely 10-100 km away).

Can any impact thresholds or acceptable impact criteria be established at this stage? Additional work needs to be done to establish appropriate indicators, impact thresholds, and acceptable impact criteria. Indicators may include physical, chemical, and biological indicators. Indicator development should be carried out with wide consultation from international experts, likely though specific workshops. As part of this, existing guidance and appropriate indicators and thresholds used by other international bodies should be evaluated in the context of deep-sea mining. Additional research is likely needed to evaluate impact thresholds and criteria; in the absence of robust information, any preliminary thresholds should

be conservative in nature, consistent with a precautionary approach. Potential indicators are suggested in a parallel paper on Adaptive Management (Code Project Issue Paper #3).

Polymetallic sulphides

Impact from mining at inactive vents will be wider than the local mine site owing to sediment plumes. Plume behaviour will be difficult to predict given the topographic and hydrological complexity of the ridge environment.

Seamounts

Plume effect will depend on hydrological regime, location of mining (summit or flanks), and presence of other seamounts in the area. Plume behaviour will be more difficult to predict compared to the abyssal plain environment, raising the question of whether a threshold can be set for the plume effect in a ridge and seamount environment. Perhaps a standard rule of "xx times the diameter of a mined area" can be applied?

3. Legal aspects

UNCLOS Articles 145 and 192 establish rigorous requirements (applicable to the ISA and to states) that mandate protection of the marine environment.

Additionally, under UNCLOS Articles 136 and 140, the common heritage of mankind principle guides the application of the regime governing the Area. The Common Heritage principle, in turn, requires effective environmental management principles to preserve the deep-sea environment for future generations. This includes the precautionary principle, which is incorporated in Draft Regulation 7. The over-arching duty of the ISA to employ the precautionary principle directly informs its approach to determining whether or not an activity is deemed to create "significant" environmental effects.

In all events, the precautionary approach must be applied to any proposal for extraction activities in the deep sea because seabed mining poses a high risk of harm to the marine environment. As the ISA has stated, "the primary obligation in the Convention is to ensure the 'effective protection for the marine environment from harmful effects' from seabed mining (art. 145)."[72] To this effect, the International Tribunal for the Law of the Sea (ITLOS) has recognized that the precautionary principle helps ensure protection of the marine environment,[73] and therefore forms "an integral part of the 'due diligence' obligation."[74]

[72] International Seabed Authority, *Analysis of the Draft Regulations on Prospecting and Exploration for Polymetallic Sulphides and Cobalt-Rich Ferromanganese Crusts in the Area*, ISBA/12/C/2 (Part II), at 9 (May 24, 2006) [*hereinafter* Analysis on Polymetallic Sulphides and Cobalt-Rich Ferromanganese Crusts].

[73] International Seabed Authority, *Decision of the Assembly of the International Seabed Authority Relating to the Advisory Opinion of the Seabed Disputes Chamber of the International Tribunal for the Law of the Sea on*

Moreover, ITLOS has observed that the precautionary principle is approaching customary international law status.[75]

The European Commission has explained the precautionary approach is triggered: "[W]hen there are *reasonable grounds* for concern that potential hazards may affect the environment or human, animal or plant health, and when at the same time the *available data preclude a detailed risk evaluation*, the precautionary principle has been politically accepted as a risk management strategy in several fields."[76] It also noted that the precautionary approach applies when there is "a potential risk, even if this risk cannot be fully demonstrated or quantified or its effects determined because of the insufficiency or inclusive nature of the scientific data."[77] The scientific community currently lacks sufficient knowledge to effectively mitigate the environmental impacts of deep-seabed mining.[78] Thus, the precautionary principle is at its strongest in the deep-sea context.

In light of the language in Article 145, the ITLOS Advisory Opinion, and the European Commission commentary, the language in Draft Regulation 7 regarding "plausible indications of potential risks" must be interpreted to trigger the precautionary approach at a particularly low probability and gravity of risk. Such a low threshold is necessary to ensure effective protection of the marine environment from harmful effects.

Once the precautionary approach is triggered, the ISA should implement a process whereby decision-making entities start from the assumption that when faced with a high degree of uncertainty and the potential for catastrophic damage, the approval process will not continue to the next stage unless industry and sponsoring States can prove that exploitation activities will not cause serious harm to the marine environment. This is consistent with the mandate under UNCLOS Article 196, which requires the following:

> States shall take all measures necessary to prevent, reduce and control pollution of the marine environment resulting from the use of technologies under their jurisdiction or control, or the intentional or accidental introduction of species, alien or new, to a particular part of the marine environment, which may cause significant and harmful changes thereto.[79]

Matters Relating to the Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area ¶ 131, ISBA/17/A/9 (July 25, 2011) [*hereinafter* ITLOS Decision]. ¶¶ 122–23.

[74] *Id.*, ¶ 131.

[75] *Id.*, ¶ 135.

[76] Precautionary Principle Communication, Annex III ¶ 3 (emphasis added).

[77] *Id.*, ¶ 5.1.

[78] Levin, et al., "Defining Serious Harm," at 249 (discussing the lack of baseline data as grounds for imposing higher restrictions on exploitation, at least until more scientific evidence is available).

[79] UNCLOS, art. 196.

The burden should be on industry and sponsoring States to prove that exploitation activities can proceed safely, not on the ISA or outside groups to prove harm. This is consistent with Draft Regulation 21, which requires that "[t]he burden of proof [be] on an Applicant to demonstrate that the risk of the Environmental Impacts, and consequential Mitigation and management thereof, will meet the Environmental Objectives of the Authority and that the Plan of Work is environmentally Acceptable."

To address these issues, the ISA should consider adopting a new regulation explaining how the precautionary approach will be applied in the deep-sea context, and should consider revising the language in Draft Regulation 7 to provide as follows:

> All persons engaged in activities in the Area shall apply the Precautionary Approach to the assessment and management of risk of harm to the Marine Environment from Exploitation Activities in the Area. **The Precautionary Approach shall be applied w**here scientific evidence concerning the scope and potential negative impact of the activity in question is insufficient **to prove that the Exploitation Activities will not harm the Marine Environment and** where there are plausible indications of potential risks of **significant adverse changes** to the Marine Environment.
>
> **A contract shall not be approved for Exploitation Activities where the Best Available Scientific Evidence provides plausible indications of potential risks of Serious Harm to the Marine Environment. When deciding whether to approve a contract for Exploitation Activities, the ISA shall use a uniform process for determining whether the burden of proof with regard to scientific evidence has been satisfied for all applicants, and thus the requirements will not vary based on the applicant's capabilities.**

4. Recommendations

With this as background, our succinct responses to the issues raised under Question #6 are as follows:

First, we could look to the approaches developed in Australia and USA for criteria in determining "significance."

Second, it would be preferable to include these criteria in the regulations.

Third, the ISA (perhaps the LTC, or the Environmental Division of the ISA Secretariat), could make the initial determination as to "significance" with an opportunity for wider review.

In addition, we offer the following closing observations:

The term "significant" with respect to environmental impacts can be used in regulations with the understanding that criteria for "significance" are not standardized (and can hardly be).

The evaluation of "significance" of environmental impact is an important part of an Environmental Impact Assessment. Fundamental to this evaluation is the scale of an impact in relation to the scale of impacted ecosystem.

It may be valuable to measure the "severity" of an impact, by reference to one or more indicators. This could then be considered in the context of the environment in which the action will take place to determine the "significance" of the impact.

5. References

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Code Project Issue Paper #7

Good Industry Practice; Best Environmental Practice

Code Project Issue Paper #7
Good Industry Practice; Best Environmental Practice

Lead Authors: Leon Gerber & Renee Grogan

INTRODUCTION

The ISA's Discussion Paper on 'Exploitation for Mineral Resources in the Area – Environmental Matters' and its *Draft Environmental Regulations*[80] – include frequent reference to the terms 'Good Industry Practice', 'Best Environmental Practice', and 'Appropriately Qualified Expert(s)'. What these terms entail, particularly in the case of environmental matters, is an important topic for consideration.

Accordingly, this paper examines whether the various draft regulations, in particular the *Draft Environmental Regulations,* the 'Working Draft Regulations and Standard Contract Terms on Exploitation for Mineral Resources in the Area' (*Draft Exploitation Regulations*),[81] and associated discussion papers define these terms and, if so, whether the terms in their present form provide an acceptable scope for the ISA to meet its goals as articulated in UNCLOS, or whether improvements should be considered.

This paper is divided in four parts, with the first examining the term 'Good Industry Practice'. The second evaluates the term 'Best Environmental Practice' and the third examines the term 'Appropriately Qualified Expert(s)'. The paper concludes with general comments and recommendations related to the consideration of economic constraints and feasibility. Where relevant, recommendations and proposed amendments are provided at the end of each part.

1. 'GOOD INDUSTRY PRACTICE'

1.1. Reference to 'Good Industry Practice' in the *Draft Environmental Regulations*

The term 'Good Industry Practice' is referenced in 15 of the *Draft Environmental Regulations*:

Draft Regulation 8	Best Environmental Practices
Draft Regulation 13	Waste minimization
Draft Regulation 17	Environmental assessment
Draft Regulation 26	Preparation of Environmental Impact Statement

[80] ISA, *A Discussion Paper on the development and drafting of Regulations on Exploitation for Mineral Resources in the Area (Environmental Matters)* (Kingston: Jamaica, 2017).

[81] ISA, 'Working Draft Regulations and Standard Contract Terms on Exploitation for Mineral Resources in the Area' (Kingston: Jamaica, 2016).

Draft Regulation 28	Requirements for Environmental Management System
Draft Regulation 29	Preparation of Environmental Management and Monitoring Plan
Draft Regulation 31	Purpose of Closure Plan
Draft Regulation 41	Matters to be taken into account by the Commission
Draft Regulation 42	Amendments and modifications of the Environmental Plans
Draft Regulation 44	Provision for a Financial Guarantee or Security
Draft Regulation 45	Factors to be considered by the Commission
Draft Regulation 50	General
Draft Regulation 51	Adherence to Contract – Compliance with Environmental Management and Monitoring Plan and Closure Plan
Draft Regulation 60	Emergency Response and Contingency Plans
Draft Regulation 65	Suspension of/cessation of activities/care and maintenance (temporary suspension)

As a point of departure, Draft Regulation 1 of the *Draft Environmental Regulations* sets out the contextual use and scope of various terms in the context of the *Draft Environmental Regulations*. In particular, Draft Regulation 1(3) provides an indicative list of defined terms in Schedule 1.[82]

Although these draft regulations incorporate the term, the nature and scope of 'Good Industry Practice' is not explicitly defined in the *Draft Environmental Regulations*. However, Draft Regulation 1(1) provides that:

> *"…Where applicable, terms used in the Regulations and Standard Contract Terms on Exploitation for Mineral Resources in the Area shall have the same meaning in these Regulations."*

The term 'Good Industry Practice' is defined in the *Draft Exploitation Regulations* as:

> *"...the exercise of that degree of skill, diligence, prudence and foresight which would reasonably and ordinarily be expected to be applied by a skilled and experienced person engaged in the marine mining industry and includes but is not limited to the guidance provided, as applicable, by the IFC Performance Standards, by the International Organization for Standardization standards, the International Marine Minerals Society,*

[82] Draft Regulation 1(3) of the *Draft Environmental Regulations* provides in particular that "… a list of defined terms (indicative at this stage) can be found at Schedule 1 to this working draft."

the performance requirements under these Regulations, the Recommendations made from time to time under these Regulations by the Commission and other International Recognized Standards, adopted, endorsed or issued by the Authority from time to time" [emphasis added].[83]

It is therefore clear that the definition of 'Good Industry Practice' in the *Draft Exploitation Regulations* can suitably be applied (with amendments, see para 1.3. below) within the context of the *Draft Environmental Regulations*. It should be noted, however, that given the frontier nature of marine mining, what exactly constitutes 'Good Industry Practice' remains dynamic. Draft Regulation 1(3) acknowledges the dynamic nature of some terms by providing that:

"… Definitions will advance as both the regulatory content evolves and/or a common approach toward terms based on internationally accepted definitions is established. The content of the draft should drive the formulation of definitions".

1.2. Contextualisation of 'Good Industry Practice' in the *Draft Environmental Regulations*

1.2.1. Restricted vs. non-restricted guidelines for 'Good Industry Practice'

Apart from the contextual reference to marine mining operations, the definition of the term 'Good Industry Practice' as set out in the *Draft Exploitation Regulations* corresponds to defined terms in a number of generally accepted international industry instruments, most notably the International Bar Association Model Mining Development Agreement Project.[84]

The definition proposed in the *Draft Exploitation Regulations* lists a selection of international standards purportedly aimed at guiding contractors and the ISA as to expected conduct in terms of 'Good Industry Practice'. These include:

- International Finance Corporation ('IFC') Performance Standards,[85]
- The family of International Organisation for Standardisation ('ISO')[86] standards, and the
- International Marine Minerals Society.[87]

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[83] *See* Schedule 1: Use of terms and scope – Definitions of the ISA, *Working Draft Regulations and Standard Contract Terms on Exploitation for Mineral Resources in the Area* (Kingston: Jamaica, 2016)

[84] Compare for example the International Bar Association's suggested definition for 'Good Industry Practice' as set out in the Model Mining Development Agreement, where Section 1.1 defines it as: *"…the exercise of that degree of skill, diligence, prudence and foresight which would reasonably and ordinarily be expected to be applied by a skilled and experienced person engaged in the international mining industry and includes but is not limited to the guidance provided, as applicable, by the International Council on Mining and Metals, by the IFC Performance Standards, and by ISO 14001 standards*" [emphasis added]. *See* IBA, *MMDA 1.0 Model Mine Development Agreement: A Template for Negotiation and Drafting* (2011). www.mmdaproject.org/

[85] The IFC Performance Standards form an integrated part of the IFC Sustainability Framework. The former comprises eight standards that parties responsible for implementing and operating a project financed by the IFC need to meet throughout the life of the particular investment. IFC Performance Standards on Environmental and Social Sustainability (2012). www.ifc.org/wps/wcm/connect/c8f524004a73daeca09afdf998895a12/IFC_Performance_Standards.pdf?MOD=AJPERES.

[86] International Organisation for Standardisation, www.iso.org/standards.html.

In its present form, guidance is not restricted to these listed instruments. Rather, by the explicit inclusion of "…and *includes but is not limited to…*", the term allows any number of internationally recognised and established corporate guidelines and reporting initiatives to be applied in demonstrating compliance with 'Good Industry Practice'.

We suggest deleting specific examples from the definition, as it is in the same instance too wide and too limiting. Regarding the former, several standards included under the listed instruments, particularly in the case of the ISO family and IFC Principles, may not be applicable to marine mining. This may lead to uncertainty among contractors as to which standards or principles within the listed instruments will or should be applicable and will accordingly be considered by the ISA. In the latter instance, though the definition is left open-ended by providing for the possible application of other standards, it may also lead to a lack of legal certainty. By explicitly referring to three standards and guidelines, the term allows alternative interpretations to be advanced by contractors; specifically that certain non-listed sources may not be of a similar type or category to those listed (i.e., the IFC Principles, ISO standards, and the IMMS guidelines), and therefore should not be considered for application by either the contractor or the ISA (in terms of the Doctrine of *Ejusdem Generis* in the interpretation of statutes).

In light of the above, we suggest that an alternative approach be adopted whereby the required standards for 'Good Industry Practice' are restricted to those adopted, endorsed or issued by the Authority from time to time. Such an approach provides for a level of flexibility with regards to the adoption of novel standards, particularly those that may be more specifically aimed at marine mining contractors. We acknowledge that this may possibly present a *prima facie* concern to contractors due to regulatory uncertainty and the threat of future regulatory burden. However, it is submitted that given the due diligence and proposed transparency requirements for ISA endorsement procedures, coupled with a required consensus from States (including that of sponsoring States), a degree of contractor input will be possible, thus mitigating this concern.

A second notable advantage of such a restricted approach relates to clarity and a lessening of regulatory burden for both contractors and sponsoring States. Relying on a single source, that is to say a restricted list endorsed by the ISA, should moderate the need for both parties to continuously evaluate the appropriateness and applicability of newly established or evolved third-party developed standards to the marine mining sector.

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[87] IMMS, *Code for Environmental Management of Marine Mining (2011)*: http://www.immsoc.org/IMMS_downloads/ISBA-16LTC-2-EN.pdf. It should be borne in mind that following of and adherence to the principles and guidelines contained in the Code are voluntary in nature. The aim of the IMMS Code is to complement applicable binding national and international regulations for the protection of the marine environment with regard to marine mining where these regulations exist, and to provide environmental principles and guidelines for marine mining companies where these are absent or could be improved upon.

A further key advantage to a restricted approach is that it safeguards appropriate regulatory control by the ISA. Placing an unrestricted onus on contractors to select appropriate standards will undoubtedly result in a divergent selection and application of standards and guidelines – in turn possibly leading to non-compliance with the ISA's expectations of 'Good Industry Practice', and disputes as to the nature and scope of the term. However, if the onus to identify, adopt, endorse or issue relevant standards and expectations is restricted to the ISA, greater regulatory control and oversight can subsequently be achieved. We therefore suggest the ISA consider the identification of existing standards, with the aim of their adoption where appropriate, or adaption where required, that meet the particular requirements of contractors. Alternatively, the ISA may wish to consider the development of novel and dedicated standards, if suitable existing standards cannot be identified or suitably adapted.

Apart from the above, relying on a widely encompassing list of instruments may further pose a risk of inconsistent and double-regulation. Though similar terms may be present in a large number of recognised international standards, inconsistencies in scope and expectations among these instruments may arise, causing confusion when applied in terms of the ISA regulations or when incorporated into plans of work.

It is also important to note that, as the guidelines and reporting standards listed are largely voluntary in nature, ensuring contractor compliance with these standards may prove problematic to the ISA from an operational perspective. This issue is compounded when the possible number of non-listed guidance instruments and standards are considered. In the first instance, given the voluntary nature of these instruments, there may not be established oversight bodies with respect to these particular standards, thus raising the question as to how the ISA may succeed in such a capacity without a precedent to rely on. Moreover, given the number of possible standards that may be relied on by contractors in a non-restrictive approach, an undue and unrealistic operational burden may be placed on the ISA in having to verify compliance with multiple terms and definitions.

Following on from the above, a final consideration should be given to the legal nature and enforceability of voluntary codes. Given that contractors are legally required in terms of the Draft Regulations to apply 'Good Industry Practice' in various instances, whilst having to rely on voluntary instruments for guidance, it appears to give effect that these voluntary standards are to be applied in a mandatory manner in the Area. If this is indeed the aim of the ISA, it is important to consider whether the guidelines and standards are indeed capable of being applied in such a mandatory manner. Accordingly, it is suggested that the ISA may wish to rather consider adopting approaches by which such voluntary standards can be incorporated indirectly, whilst still remaining relevant. One such approach may, per example, be through the requirement of loan-financed projects to access finance through institutions that subscribe to the Equator- or IFC Principles. An alternative would be to require contractors to disclose project loan details during the application process, with an explicit assessment criterion relating

to the consideration by the ISA of whether finance can only be accessed through compliance with the aforementioned principles.

1.2.2. Examples of internationally accepted standards and guidelines

Notwithstanding the above discussion on whether to utilise a restricted or non-restricted approach to determine the standard of 'Good Industry Practice', and with particular reference to the suggestion of identifying/developing suitable guidance standards, it should be noted that various internationally recognised instruments may serve as guidance to the ISA in this particular regard. A non-exhaustive list includes the following:

- **Global Reporting Initiative Framework**[88]

The Global Reporting Initiative ('GRI') is an international independent standards organisation focused on enabling governments, third party stakeholders, and industry and business sectors to determine the extent of their impact on sustainability. The GRI framework, in particular, provides a standardised reporting mechanism aimed at enabling third parties to assess the environmental impact of companies' activities and supply chains. With more than 7,500 multinational organisations, public agencies, and small and medium enterprises relying on the GRI Guidelines for sustainability reporting, the GRI represents an important indicator as to current 'Good Industry Practice'.

- **Equator Principles**[89]

The Equator Principles comprise a globally applicable risk management framework for financial institutions, aimed at determining, assessing, and managing environmental and social risk in project finance. These principles offer a minimum standard for due diligence and to foster responsible risk decision-making relating to environmental and social aspects of financed projects. Given the close affiliation between the Equator Principles; the IFC Principles; and the World Bank Group's Environmental, Health, and Safety Guidelines ('EHS Guidelines'), these Principles form an important consideration of 'Good Industry Practice' and 'Best Environmental Practice'.

- **United Nations Global Compact**[90]

The UN Global Compact is an initiative aimed at encouraging businesses worldwide to adopt, implement, and report sustainable and socially responsible policies. It provides for a principle-

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88 GRI, *G4 Guidelines – Reporting Principles and Standard Disclosures* (2013), and complementary *Mining and Metals Sector Disclosures Document*. www.globalreporting.org/resourcelibrary/GRI-G4-Mining-and-Metals-Sector-Disclosures.pdf.

89 Equator Principles III (2013). Available at: www.equator-principles.com/index.php/ep3.

90 *Blueprint for Corporate Sustainability Leadership within the Global Compact* (2010). www.unglobalcompact.org/library/229.

based framework, founded on ten principles, relating to areas of human rights, labour, the environment, and anti-corruption. In particular, Principle 7 (Support a precautionary approach to environmental challenges); Principle 8 (Undertake initiatives to promote environmental responsibility); and Principle 9 (Encourage the development and diffusion of environmentally friendly technologies) may find direct application to marine mining. Though not a regulatory initiative, but rather a forum for engagement and collaboration, the Global Compact can be considered an important indicator for 'Good Industry Practice'.

- **ICMM's Sustainable Development Framework**[91]

The *International Council on Mining and Metals* is an international industry organisation aimed at promoting a safe, fair, and sustainable mining industry. Members of the organisations are required to commit to 10 Core Principles, which in turn serve as a best-practice framework for sustainable development. Though the ICMM (and its members) are at present focused on terrestrial mining, a number of these Principles can equally find application in the case of marine mining. In particular, Principle 6 (Pursue continual improvement in environmental performance issues); Principal 7 (Contribute to the conservation of biodiversity and integrated approaches to land-use planning),[92] and Principle 10 (Proactively engage key stakeholders on sustainable development challenges and opportunities in an open and transparent manner), may be useful to contractors/applicants in determining their compliance with 'Good Industry Practice'.

- **World Business Council on Sustainable Development**[93]

The World Business Council for Sustainable Development is a CEO-led, global advocacy association that deals exclusively with business and sustainable development. It has been identified by various observers, including the IFC, as one of the most influential forums for companies on corporate social responsibility issues, and business and sustainable development. Through its various initiatives, it provides for a useful indicator as to the current 'Good Industry Practice' in the context of sustainable development.

- **World Resources Institute Corporate Ecosystem Services Review**[94]

The World Resources Institute is an independent, non-governmental global research organization, with a focus on sustainable natural resource management. It established the

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91 www.icmm.com/en-gb/about-us/member-commitments/icmm-10-principles/the-principles.

92 ICMM, *Good Practice Guidance for Mining and Biodiversity* (London, UK: International Council on Mining and Metals, 2006). https://www.icmm.com/en-gb/publications/biodiversity/mining-and-biodiversity-good-practice-guidance.

93 www.wbcsd.org/Overview/Resources.

94 Hanson, C., J. Ranganathan, C. Iceland, and J. Finisdore. 2012. *The Corporate Ecosystem Services Review: Guidelines for Identifying Business Risks and Opportunities Arising from Ecosystem Change*. V. 2.0. (Washington, DC: World Resources Institute, 2012). Available at: www.wri.org/publication/corporate-ecosystem-services-review.

Corporate Ecosystem Services Review, a corporate strategy development framework to assist businesses in developing good industry strategies for managing risks and opportunities arising from their dependence and impact on ecosystems.

It should be noted that, further to the international initiatives listed above, various national and regional initiatives provide guidance for 'Good Industry Practice', particularly with regards to sustainable development, good corporate governance, and environmental protection.[95] Though overwhelmingly aimed at terrestrial mining and industry sectors, specific aspects of these established guidelines may arguably already be applicable or could be adapted for the purposes of the marine mining sector. Given the number of possibly appropriate international standards, coupled with domestic and regional initiatives, a comprehensive analysis falls beyond the scope of this paper. Accordingly, it is suggested that the ISA may wish to consider a dedicated and inclusive follow-up study to identify possible contenders in this regard.

1.3. Recommendations

1.3.1. General

In light of the definition in the *Draft Exploitation Regulations*, we submit that the ISA is not required to redefine the term 'Good Industry Practice' in the *Draft Environmental Regulations*.

- However, for the reasons above (see para. 1.2.1.), we suggest the ISA consider amending the definition of 'Good Industry Practice' in *the Draft Exploitation Regulations*, to provide for a more restricted approach in accordance with the suggestion below.
- We also suggest the ISA consider conducting a focused and comprehensive study aimed at identifying international, national, and regional initiatives that can offer appropriate and applicable guidance and/or application of the term 'Good Industry Practice' in the marine mining sector.

1.3.2. Suggested amendments to existing text

Suggested additions in **[bracketed bold type]**.

- ***"Good Industry Practice"*** *means the exercise of that degree of skill, diligence, prudence and foresight which would reasonably and ordinarily be expected to be applied by a skilled and experienced person engaged in the marine mining industry,* ***[including the employment of 'Best Environmental Practice',]*** *and includes but is not limited to the guidance provided, as applicable, by the IFC Performance Standards, by the International Organization for Standardization standards, the International Marine Minerals Society,*

[95] *See for example*, the *Leading Practice Sustainable Development Program for the Mining Industry* series (Australia). Available at: https://industry.gov.au/resource/Programs/LPSD/Pages/LPSDhandbooks.aspx; IoDSA, *King IV: Report on Good Governance* (2016) (South Africa). Available at: www.iodsa.co.za/page/KingIVReport.

the performance requirements under these Regulations, the Recommendations made from time to time under these Regulations by the Commission and other International Recognized Standards, adopted, endorsed or issued by the Authority from time to time ***[any rules, regulations and procedures of the Authority, or recommendations of the Commission, and any other standards that may be adopted or endorsed by the Authority expressly for the purpose of this definition from time to time].***

2. 'BEST ENVIRONMENTAL PRACTICE'

2.1. Reference to 'Best Environmental Practice' in the *Draft Environmental Regulations*

The term 'Best Environmental Practice' is referred to a number of times in the Discussion Paper and incorporated into four of the *Draft Environmental Regulations*:

Draft Regulation 8	Best Environmental Practices
Draft Regulation 11	Co-operation
Draft Regulation 41	Matters to be taken into account by the Commission
Draft Regulation 51	Adherence to Contract – Compliance with Environmental Management and Monitoring Plan and Closure Plan

Unlike with the term 'Good Industry Practice', the *Draft Environmental Regulations* do provide a dedicated definition of the term 'Best Environmental Practice', specifically:

> *"…the application of the most appropriate combination of environmental control measures and strategies, [including Best Available Techniques]".*

As this term explicitly incorporates the term 'Best Available Techniques', which is also provided for in Schedule 1 of the *Draft Environmental Regulations*, it is necessary to read these two terms together in order to determine the full nature and scope of the aforementioned term. 'Best Available Techniques' is defined as:

> ***"…****the latest stage of development, state of the art processes, of facilities or of methods of operation that indicate the practical suitability of a particular measure for the prevention, reduction and control of pollution and the protection of the Marine Environment from the harmful effects of Exploitation Activities".*

In addition to these definitions, Draft Regulation 8 is dedicated to the concept of 'Best Environmental Practices':

Draft Regulation 8 Best Environmental Practices

1. *The best combination of environmental management and response measures shall be adopted in accordance with Good Industry Practice [and incorporating Best Available Techniques].*

2. *The development and application of environmental standards and protocols shall be continually reviewed in order that progressive improvements are made in the efficient and effective protection of the Marine Environment, including the reduction of Pollution and waste at source, as such improvements become relevant and practicable through technological development and advances in scientific knowledge, and are economically feasible.*

3. *Where the application of Best Environmental Practice does not deliver acceptable results, additional or alternative measures may be required and Best Environmental Practice redefined accordingly.*

2.2. Contextualising 'Best Environmental Practice' in the *Draft Environmental Regulations*

When the term 'Best Environmental Practice' is read together with the term 'Best Available Techniques', coupled with Draft Regulation 8, a number of notable implications can be derived and a number of concerns become apparent.

2.2.1. Draft Regulation 8(1)

As discussed in para 2.1., Schedule 1 of the *Draft Environmental Regulations* provides a definition of 'Best Environmental Practice'. However, this definition appears inconsistent with what appears to be provided for in Draft Regulation 8(1). In this regard, compare:

> ***Schedule 1:*** *"…the application of the most appropriate combination of environmental control measures and strategies, [including Best Available Techniques]".*
>
> ***8(1)****: The best combination of environmental management and response measures shall be adopted in accordance with Good Industry Practice [and incorporating Best Available Techniques].*

Apart from the above inconsistency, in its current form, Draft Regulation 8(1) does not reference a party responsible for adopting the *"…best combination of environmental management and response measures,"* merely implying that it is the relevant contractor. Moreover, the reference to "…*best combination of environmental management and response measures…"* can be perceived as ambiguous, given that the objective of '…the best combination of…' is not explicitly made clear. Though protection of the marine environment is presumably implied as a universal aim, in its current form, Draft Regulation 8(1) can potentially also be interpreted to merely denote the best combination of environmental management and response measure achievable by a particular contractor under the circumstances specific to its respective project. Such an interpretation would frustrate the very notion of applying 'Best Industry Practice' and it would result in individual and non-uniform application of environmental practices.

It should also be noted that, in its present form, the Draft Regulation does provide for a prescriptive application of 'Best Environmental Practice' by the inclusion of "…shall be

adopted…". A non-prescriptive reading of this draft regulation should correctly be cautioned against as such a reading could result in a disjointed or non-uniform adoption of 'Best Environmental Practices' by contractors. However, given the above shortcomings of the Draft Regulation 8(1), it is suggested that Draft Regulation 8(1) be consolidated with the definition contained in Schedule 1 by amending Draft Regulation 8(1) in its entirety as per the suggestion in para. 2.3. below.

2.2.2. Draft Regulation 8(2)

Draft Regulation 8(2) appears flawed in a number of instances. In terms of this Draft Regulation, *"… (t)he development and application of environmental standards and protocols shall be continually reviewed…"*. However, which particular standards and protocols are required to be continually reviewed is not qualified. In other words, it is unclear whether this relates to standards and protocols utilised by the contractor or that issued by the ISA, and what these would presumably comprise. Moreover, the Draft Regulation does not designate the party responsible for reviewing said standards and protocols, resulting in an uncertainty of whether this obligation to review rests upon the ISA, or the contractor.

Moreover, the lack of reference to 'Best Environmental Practice' in Draft Regulation 8(2) does not contribute to a clearer understanding of what the term entails, nor does it clearly speak to the obligation on contractors to apply the same.

In its present form, Draft Regulation 8(2) does allow for a measure of advancement in the nature and scope of 'Best Environmental Practices', by acknowledging the progressive nature of "*…environmental standards and protocols… through technological development and advances in scientific knowledge*...". However, it should be noted that the economic qualifier incorporated in the current Draft Regulation 8(2) (i.e. "… *as such improvements become relevant and practicable through technological development and advances in scientific knowledge, and are economically feasible..."*), could potentially frustrate any such progression due to individual contractor and project financial flow, thus resulting in a slower incorporation of relevant improvements in the sector as a whole. In other words, whilst certain technological improvement may be economically feasible in the case of Contractor A, Contractor B might advance the argument that the same might not be true in the case of its respective project. Consequently, potential operational discrepancies as to the application of 'Best Environmental Practices' between projects may arise, effectively resulting in 'Best Environmental Practices' devolving into mere 'Environmental Practices'. (For a further discussion and recommendations on economic considerations associated with the *Draft Environmental Regulations*, see Section 4 below).

2.2.3. Draft Regulation 8(3)

Draft Regulation 8(3) appears to allow for amendments to existing processes in the case of results being deemed non-acceptable. However, it should be noted that *"…acceptable*

results…" is not explicitly defined, nor is it qualified to whom such results should be acceptable, that is to say, the ISA or the contractor. As such, the ISA may wish to consider a closer alignment of this concept (and subsequent expectations as to *what* constitutes 'acceptable results') with practical and scientific requirements contained in the *Draft Environmental Regulations*, such as environmental baselines and the established thresholds provided for in the respective Environmental Monitoring and Management Programmes ('EMMPs').

Draft Regulation 8(3) further provides that *"…additional or alternative measures may be required…"* where the application of 'Best Environmental Practice' does not deliver acceptable results. As additional or alternative measures are not qualified in the Draft Regulation text, it is not clear what this would entail. This suggests that this might have been a deliberate drafting on the side of the ISA in order to provide for the greatest range of possible alternatives as, and when, it may be required.

Finally, Draft Regulation 8(3) provides that *"…and 'Best Environmental Practice' redefined accordingly…".* In its present form, the Draft Regulation does not designate a particular party responsible for redefining the term 'Best Environmental Practice', should it be deemed necessary by the party to whom this applies (see above). Though it is presumably by implication the ISA, this in itself raises a concern. The Draft Regulation currently allows for not only redefining the term to a more stringent standard, but can also be interpreted as to mandate the ISA to redefine the term to a lower standard, thus subsequently allowing for continuation of projects even when a contractor might be in breach of its obligation to protect the environment.

2.2.4. 'Best Environmental Practice' and the precautionary approach

It should also be noted that, the *Draft Exploitation Regulations* do not provide for an explicit definition of the term 'Best Environmental Practice', instead opting for incorporation through referral to the *Draft Environmental Regulations*, or through providing a seemingly expanded understanding of what the scope of the term would entail. An example of the latter is Draft Regulation 8(4)(c) of the *Draft Exploitation Regulations*, which provides that:

> *"The Commission shall determine if the proposed Plan of Work… (p)rovides for effective protection of the Marine Environment through the application of best environmental practices and a precautionary approach [including, but not restricted to, the impact on biodiversity, the protection and conservation of the Natural Resources of the Area, the protection of vulnerable marine ecosystems and cumulative effects of the Exploitation Activities through an Environmental Management and Monitoring Plan and Environmental Management Systems and Closure Plan]"* [emphasis added].[96]

[96] Draft Regulation 8(4)(c) of the ISA, 'Working Draft Regulations and Standard Contract Terms on Exploitation for Mineral Resources in the Area' (Kingston: Jamaica, 2016).

From the above Draft Regulation, it is clear that a precautionary approach is explicitly prescribed *in addition to* best environmental practices. Though this consequently suggests an added obligation with regards to 'Best Environmental Practices', specifically where Plans of Work are concerned, as opposed to the requirements contained in other Draft Regulations, this in itself may not be sufficient to provide for *"…effective protection…"*. This further implies that a precautionary approach should *not* necessarily be read into the scope of 'Best Environmental Practices' in certain circumstances. This view is further supported by the explicit and separate provision for the adoption of the precautionary approach by parties active in the Area.[97] Should this prove to be the case, this might place the term 'Best Environmental Practice' as currently defined in the *Draft Environmental Regulations* in conflict with a number of the internationally accepted standards and reporting codes that are intended to provide guidance to the nature and scope of this term.

2.3. Recommendations

2.3.1. General

We suggest the ISA grant serious consideration to amending Draft Regulation 8 to address the concerns raised above. The following points are noted for consideration:

- **Draft Regulation 8(1):** Align with the definition contained in Schedule 1 of the Draft Environmental Regulations, by substituting the current text with that suggested.
- **Draft Regulation 8(2):** Redraft to provide clarity and, more importantly, relevance as to "…*environmental standards and protocols…"*; obligations of parties with regards to reviewing such standards and protocols, and the parameters within which it would take place.
- **Draft Regulation 8(3):** Clarify or provide an *in situ* definition of what would be considered "…acceptable results…"; clarify the scope and context of *"…additional or alternative measures …"*; and limit the redefinition of 'Best Environmental Practice'.
- **General:** Consider clarifying whether a precautionary approach should be included in the definition of the term 'Best Environmental Practice'.
- **General:** Consider the inclusion of a Draft Regulation providing for guidance on 'Best Environmental Practice' to be issued by the Authority and subsequently adhered to by contractors.

2.3.2. Suggested amendments to existing text

In light of the above, we suggest the ISA consider amending the text of the *Draft Environmental Regulations* as shown below.

[97] See Draft Regulation 7 of the *Draft Environmental Regulations*, which provides that: "All persons engaged in activities in the Area shall apply the Precautionary Approach."

Suggested additions in **[bracketed bold type]**

- ***Schedule 1 "Best Environmental Practices"*** *means the application of the most appropriate combination of environmental control measures and strategies, [including Best Available Techniques]* ***[and the adoption of the Precautionary Approach].***

- ***Draft Regulation 8 Best Environmental Practices***

  1. ***[All contractors shall employ 'Best Environmental Practice' at all times].*** *The best environmental management and response measures shall be adopted in accordance with Good Industry Practice [and incorporating Best Available Techniques].*

  2. *The development and application of environmental standards and protocols* ***[adopted, endorsed or issued by the Authority expressly for the purpose of Best Environmental Practice]*** *shall be continually reviewed* ***[by the Authority]*** *in order that* ***[Best Environmental Practice be progressively improved with regards to]*** *progressive improvements are made in the efficient and effective protection of the Marine Environment, including the reduction of Pollution and waste at source, as such improvements become relevant and practicable through technological development and advances in scientific knowledge, and are economically feasible.*

  3. *Where the application of Best Environmental Practice does not deliver acceptable results* ***[in accordance with environmental standards and protocols as adopted, endorsed or issued by the Authority for the purpose of the efficient and effective protection of the Marine Environment,]*** *additional or alternative measures may be* ***[considered by the Authority for the purpose of redefining Best Environmental Practice to comply with obligations in terms of said environmental standards and protocols.]*** *required and Best Environmental Practice redefined accordingly.*

  4. ***[The Authority shall, when expressly requested by a contractor, issue guidance on the meaning of Best Environmental Practice within a particular context, the resulting guidance and any subsequent amendments thereto which shall subsequently be adhered to by all contractors].***

3. 'APPROPRIATELY QUALIFIED EXPERT(S)'

3.1. Reference to 'Appropriately Qualified Expert(s)' in the *Draft Environmental Regulations*

The term 'Appropriately Qualified Expert(s)' is used a number of times in the Discussion Paper, and incorporated in 12 of the *Draft Environmental Regulations*:

Draft Regulation 19	Environmental Baseline study
Draft Regulation 20	Environmental scoping report: preparation, review and opinion

Draft Regulation 26	Preparation of Environmental Impact Statement
Draft Regulation 29	Preparation of Environmental Management and Monitoring Plan
Draft Regulation 33	Review of Application for Approval of a Plan of Work: Preliminary review by the Authority
Draft Regulation 38	Authority's review and report on submissions
Draft Regulation 39	General
Draft Regulation 40	Facilitating involvement of Interested Persons in environmental decision-making
Draft Regulation 41	Matters to be taken into account by the Commission
Draft Regulation 42	Amendments and modifications of the Environmental Plans
Draft Regulation 46	Commission may obtain further advice
Draft Regulation 47	Evaluation Report to the Council

As is the case with the term 'Good Industry Practice', the *Draft Environmental Regulations* do not provide a definition of the term 'Appropriately Qualified Expert(s)'. However, the *Draft Exploitation Regulations* do provide a definition:

> ***"…** an individual or firm with demonstrable expertise of Good Industry Practice in the relevant subject matter who is not affiliated with the Authority, an Applicant for a Plan of Work, or sponsoring State or Contractor, as the case may be".*

3.2. Contextualising 'Appropriately Qualified Expert(s) in the *Draft Environmental Regulations*

A breakdown of the definition set out in the *Draft Exploitation Regulations* identifies a number of important aspects, which include:

- The respective expert can be an individual or firm;
- The respective expert is required to demonstrate their expertise of 'Good Industry Practice' in the relevant subject matter; and
- The respective expert may not be affiliated with the Authority, an Applicant for a Plan of Work, or sponsoring State or Contractor, as the case may be.

The term thus provides for a required level of expertise in the appropriate field, guided by 'Good Industry Practice' as applicable, though the exact administrative and procedural means of demonstrating such expertise is left open.

Given the technical operational requirements of marine mining, and the potential of the sector to impact diversely on the marine environment on the other, it is clear that the technical expertise and/or qualifications of 'Appropriately Qualified Expert(s)' will vary depending on particular needs and circumstances, as well as the status of applications (submission, review, etc.). In this respect, it is interesting to note that, at present, the definition of Schedule 1 of the *Draft Environmental Regulations* includes only one direct reference to the type of expertise and/or qualifications required of appropriately qualified experts. In this regard, see:

> ***"Substantial Evidence"*** *means Best Available Scientific Evidence consisting of relevant, adequate and well-informed studies and research conducted and assessed by Appropriately Qualified Experts qualified to evaluate Environmental Impacts and Effects in the Area…"* [emphasis added].[98]

We submit that avoiding a distinct reference to particular expertise and/or qualification in the presently defined term instead relying on "…Good Industry Practice in the relevant subject matter…" allows for flexibility as to 'Appropriately Qualified Expert(s), less ambiguity, and more of a robust defined term in general. Notwithstanding, the ISA may wish to consider, where appropriate, the inclusion of direct references to particular expertise and/or qualifications relevant to particular draft regulations.

Furthermore, as it currently stands, the term also includes a level of transparency and independence associated with such experts, in that those with an affiliation to either the Authority itself, applicants for a Plan of Work, sponsoring States or contractors would be precluded from participation. Again, this identifies an administrative and procedural matter with regards to how the required independence will/should be demonstrated.

3.3. Recommendations

3.3.1. General

'Appropriately Qualified Expert(s)' as a term is potentially robust to the evolution of regulatory content, with the present definition arguably broad enough to accommodate any such developments. At the same time, the definition includes requirements related to necessary expertise, as well as transparency and independence, thereby sufficiently qualifying the term.

For these reasons, we submit that the ISA does not need to amend the definition of 'Appropriately Qualified Expert(s)' in the Draft Exploration Regulations or provide additional guidance on the interpretation of said term.

However, to provide an additional layer of quality control, the ISA may wish to consider the inclusion of direct references to particular expertise and/or qualifications relevant to particular draft regulations, where appropriate.

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[98] Schedule 1 to the ISA, *A Discussion Paper on the development and drafting of Regulations on Exploitation for Mineral Resources in the Area (Environmental Matters)* (Kingston: Jamaica, 2017).

Finally, though not directly related to the term 'Appropriately Qualified Expert(s)', we suggest the ISA consider revising the term 'Substantial Evidence' in accordance with the text below.

3.3.2. Suggested amendments to existing text

Suggested additions in **[bracketed bold type]**

- We suggest that, where applied in specific, the phrase 'Appropriately Qualified Expert(s)' on the subject-matter of [xxx]' be included where appropriate to the requirements of a particular section.
- ***"Substantial Evidence"*** *means Best Available Scientific Evidence consisting of relevant, adequate and well-informed studies and research conducted and assessed by Appropriately Qualified Experts qualified to evaluate Environmental Impacts and Effects in the Area, and where it can reasonably be concluded by such experts, on the basis of such evidence and reasonable scientific confidence* ***[taking into account the precautionary approach]*** *[there is a risk of Serious Harm to the Marine Environment]".*

4. ECONOMIC CONSTRAINTS OR FEASIBILITY

4.1. Reference to economic constraints or feasibility

Though not explicitly defined, 'economic constraints' or 'feasibility' is referred to in 11 of the *Draft Environmental Regulations*:

Draft Regulation 8	Best Environmental Practices
Draft Regulation 17	Environmental assessment
Draft Regulation 19	Environmental Baseline study
Draft Regulation 27	Information requirements for the Environmental Impact Statement
Draft Regulation 30	Information requirements for the Environmental Management and Monitoring Plan
Draft Regulation 32	Information requirements for the Closure Plan
Draft Regulation 42	Amendments and modifications of the Environmental Plans
Draft Regulation 47	Evaluation Report to the Council
Draft Regulation 50	General
Draft Regulation 60	Emergency Response and Contingency Plans
Draft Regulation 68	Purpose of the Fund

4.2. Comments regarding the appropriateness of economic constraints or feasibility considerations

There is no explicit basis in UNCLOS for requiring economic constraints or feasibility to be considered. On the contrary, the Seabed Disputes Chamber ('SDC') of the International Tribunal for the Law of the Sea ('ITLOS') indicates the opposite in its Advisory Opinion on several occasions.[99] Alternately put, economic constraints do not constrain the obligation of due diligence.

In para 110 of the Advisory opinion, the Chamber states:

> *"…it is an obligation to deploy adequate means, to exercise best possible efforts, to do the utmost, to obtain this result... this obligation may be characterized… as an obligation of 'due diligence'."*[100]

In para 117 of the Advisory opinion, the Chamber states:

> *The content of "due diligence" obligations may not easily be described in precise terms. Among the factors that make such a description difficult is the fact that "due diligence" is a variable concept. It may change over time as measures considered sufficiently diligent at a certain moment may become not diligent enough in light, for instance, of new scientific or technological knowledge. It may also change in relation to the risks involved in the activity. As regards activities in the Area, it seems reasonable to state that prospecting is, generally speaking, less risky than exploration activities which, in turn, entail less risk than exploitation. Moreover, activities in the Area concerning different kinds of minerals, for example, polymetallic nodules on the one hand and polymetallic sulphides or cobalt rich ferromanganese crusts on the other, may require different standards of diligence. <u>The standard of due diligence has to be more severe for the riskier activities</u>.*[101]

With regards to differing State compliance requirements in applying the precautionary approach, the Chamber states in para 161 of the Advisory opinion:

> *"The reference to different capabilities in the Rio Declaration does not, however, apply to the obligation to follow "best environmental practices" set out… in… the Sulphides Regulations."*[102]

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[99] SDC:ITLOS, *Advisory Opinion on responsibilities and obligations of states sponsoring persons and entities with respect to activities in the Area* (2011), available at: www.itlos.org/fileadmin/itlos/documents/cases/case_no_17/adv_op_010211.pdf.

[100] *Idem,* at para 110.

[101] *Idem*, at para 117.

[102] *Idem*, at para 161.

The Chamber goes further to state in para 162 of the Advisory Opinion, that:

> *"…the reference to 'capabilities' is only a broad and imprecise reference to the differences in developed and developing States. What counts in a specific situation is the level of scientific knowledge and technical capability available to a given State in the relevant scientific and technical fields."*[103]

Finally, the Chamber states in para 242(b) of the Advisory Opinion, that:

> *"…the obligation to apply a precautionary approach as reflected in Principle 15 of the Rio Declaration and set out in the Nodules Regulations and the Sulphides Regulations; this obligation is also to be considered an integral part of the "due diligence" obligation of the sponsoring State and applicable beyond the scope of the two Regulations…".*[104]

And in para 242(c):

> *"…the obligation to apply the 'best environmental practices'…".*[105]

It should be noted that, whilst the statements by SDC do indicate an absence of economic considerations, the Advisory Opinion is necessarily limited to an opinion on the responsibilities and obligations of *States* sponsoring persons and entities with respect to activities in the Area.[106] However, Article 145 of the UN Convention on the Law of the Sea (UNCLOS) provides that:

> *"Necessary measures shall be taken in accordance with this Convention with respect to activities in the Area to ensure effective protection for the marine environment from harmful effects which may arise from such activities. To this end the Authority shall adopt appropriate rules, regulations and procedures for* inter alia*:*
>
> > *(a) the prevention, reduction and control of pollution and other hazards to the marine environment, including the coastline, and of interference with the ecological balance of the marine environment, particular attention being paid to the need for protection from harmful effects of such activities as drilling, dredging, excavation, disposal of waste, construction and operation or maintenance of installations, pipelines and other devices related to such activities;*
> >
> > *(b) the protection and conservation of the natural resources of the Area and the prevention of damage to the flora and fauna of the marine environment"*

In Article 145, no reference or requirement is made with regards to economic constraints or feasibility. This suggests that the inclusion of economic constraints or feasibility regarding

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[103] *Idem*, at para 162.
[104] Idem, at para 242.
[105] *Ibid*.
[106] *Idem*, at para 1.

measures to protect the marine environment should not be considered in the *Draft Environmental Regulations*.

4.3. Recommendations

In light of the above, we suggest the ISA consider amending the text of the *Draft Environmental Regulations* to exclude references to economic constraint or feasibility, unless contextually necessary and/or appropriate.

Code Project Issue Paper #8

Public Consultation

Code Project Issue Paper #8
Public Consultation

Lead Authors: Duncan Currie and Leon Gerber

Introduction

Principle 10 of the Rio Declaration[107] states that environmental issues are best handled with participation of all concerned citizens and that effective access to judicial and administrative proceedings, including redress and remedy, shall be provided. The Rio+20 Outcome Document *Future We Want*[108] states the need for institutions at all levels that are effective, transparent, accountable, and democratic, and underscores that broad public participation and access to information and judicial and administrative proceedings are essential to the promotion of sustainable development.[109] States therefore resolved to strengthen the institutional framework for sustainable development, which will enhance the participation and effective engagement of civil society and other relevant stakeholders in the relevant international fora and promote transparency and broad public participation and partnerships to implement sustainable development.[110]

The International Seabed Authority (ISA) draft Exploitation Regulations should likewise enhance participation and effective engagement of stakeholders and promote transparency to strengthen the institutional framework of the ISA.

Effective stakeholder engagement requires robust, transparent processes for such engagement to be built into the rules and regulations and the addition of dispute resolution mechanisms, reviews, and appeals. The Aarhus Convention[111] provides international best practices in

[107] Principle 10: "Environmental issues are best handled with participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided." Rio Declaration 1992. A/CONF.151/26 (Vol. I). At http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm.

[108] The Future We Want. 2012. A/RES/66/288. At https://sustainabledevelopment.un.org/futurewewant.html. Para 10.

[109] The Future We Want para 43.

[110] The Future We Want para 76(h).

[111] Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters. Aarhus, Denmark, 25 June 1998. At https://www.unece.org/env/pp/treatytext.html.

transparency[112] that can be used as a model for the ISA and that are already incorporated in the Clarion-Clipperton Zone Environmental Management Plan ("CCZ EMP").[113] Its provisions provide strong guidance for procedures to implement transparency. A number of ISA Member States and sponsoring States are parties to this Convention, which, though enjoying predominantly European participation, is open to any UN Member.[114]

The Aarhus Convention has three 'pillars':[115] access to information, public participation, and access to justice. The Almaty Guidelines[116] provide general guidance on promoting and applying these principles in international fora dealing with environmental matters, as discussed below.

Access to Information

The Almaty Guidelines state that "Each Party should encourage international forums to develop and make available to the public a clear and transparent set of policies and procedures on access to the environmental information that they hold in order to make access by the public more consistent and reliable."[117] Environmental information contained in all official documents developed and produced within each international forum should be made available to the public through the Internet, or through other appropriate means, in a timely manner, subject to

[112] See Kravchenko, S (2007). "The Aarhus convention and innovations in compliance with multilateral environmental law and Policy". Colorado Journal of International Environmental Law and Policy. 18 (1): 1–50, and Dellinger, M (2011). "Ten Years of the Aarhus Convention: How Procedural Democracy Is Paving the Way for Substantive Change in National and International Environmental Law". Colorado Journal of International Environmental Law and Policy. 23(2) 309-366.

[113] "The Authority shall enable public participation in environmental decision-making procedures in accordance with the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, 1998, and its own rules and procedures." Environmental Management Plan for the Clarion-Clipperton Zone. ISBA /17/LTC/7. C.13 (f). At https://www.isa.org.jm/environmental-management-plan-clarion-clipperton-zone.

[114] The Convention is open for accession to any Member State of the United Nations, under article 19.3. See ratifications at https://www.unece.org/env/pp/ratification.html and map of 47 parties at https://www.unece.org/env/pp/aarhus/map.html. The Meeting of the Parties, at its second session, adopted decision II/9 which makes clear that the approval by Meeting of the Parties referred to in article 19.3, should not be interpreted as implying a substantive review of the national legal system and administrative practices of any State wishing to accede to the Convention, and at its fourth session, the Meeting of the Parties adopted decision IV/5 on accession to the Convention by non-ECE member States. That decision once again encourages States outside the region to accede to the Convention and welcomes any expression of interest to do so.

[115] Access to information is provided for in articles 4, 5 of the Aarhus Convention; Public participation in articles 6,7,8 and access to justice in Aarhus Convention articles 9. See generally guidance provided in the Aarhus Convention Implementation Guide (2nd edition 2014) .E.13.II.E.3. At https://www.unece.org/env/pp/implementation_guide.html

[116] Almaty Guidelines on Promoting the Principles of the Aarhus Convention in International Forums (2005). ECE/MP.PP/2005/2/Add.5. At https://www.unece.org/fileadmin/DAM/env/documents/2005/pp/ece/ece.mp.pp.2005.2.add.5.e.pdf.

[117] Almaty Guidelines para. 19.

the relevant rules of each individual forum and with due regard for paragraph 25.[118] Tools such as clearing houses, interactive databases, and registers should be promoted,[119] and information should be provided proactively, in a meaningful and accessible form.[120] Any refusal should be in writing, stating reasons and be subject to a review procedure,[121] and should be free or, at most, subject to a reasonable charge.[122]

In the context of the ISA, information on claims, contracts, environmental information, environmental baselines, impact assessment, procedures, and monitoring reports should be available to the public, subject only to commercial confidentiality, which is strictly defined and subject to review procedures.[123]

Confidential Information

Annex III of UNCLOS provides in article 14.2 that "[d]ata necessary for the formulation by the Authority of rules, regulations and procedures concerning protection of the marine environment and safety, other than equipment design data, shall not be deemed proprietary."[124] Article 5 of Annex III likewise provides that "1. When submitting a plan of work, every applicant shall make available to the Authority a general description of the equipment and methods to be used in carrying out activities in the Area, and other relevant non-proprietary information about the characteristics of such technology and information as to where such technology is available."

The definition and identification of non-proprietary data is therefore crucial. An ISA Secretariat Note[125] last year recommended a formal decision to apply additional[126] procedures for the handling of confidential data and information. "Confidential Information" is currently defined in the (currently) separate Exploitation Draft.[127]

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[118] 25. Requests for environmental information should be permitted to be refused only on the basis of specific grounds for refusal, taking into account the relevant provisions of the Convention, including the requirement that grounds for refusal should be interpreted in a restrictive way, taking into account the public interest in disclosure.
[119] Almaty Guidelines para. 21.
[120] Almaty Guidelines para. 22.
[121] Almaty Guidelines para. 26.
[122] Almaty Guidelines para. 27.
[123] Draft Regulation 46 provides for confidentiality of information.
[124] Regulation 38 of the Sulphides Regulations uses the same wording.
[125] ISBA/22/LTC/6 Procedures for the handling of confidential data and information pursuant to rule 12 of the rules of procedure of the Legal and Technical Commission.
[126] Additional procedures for the handling of confidential data and information contained in annex II to the Secretary-General's bulletin to the members of the Commission. ISBA/ST/SGB/2011/03. At http://undocs.org/ISBA/ST/SGB/2011/03.
[127] The current proposal is: "Environmental Information" means any Information relating to the protection and preservation of the Marine Environment, in particular those from environmental assessment, management and monitoring programmes and includes any Information on:
(a) The state of elements of the environment, such as air and atmosphere, water, soil, land, landscape and natural sites, biological diversity and its components, and the interaction among these elements;

It is important that engineering processes relevant to environmental effects are Environmental Information, since these are critical for assessing potential environmental effects. For instance, processes and activities on the seafloor or in a mining vessel which determine the composition and characteristics of the sediment plume need to be known and evaluated. We propose to add a new category to Environmental Information: "(b) All processes and activities that can affect the marine environment;" and "other factors that can affect the environment".

In addition, the category in the (Exploitation) regulation 46(2)(d) needs to be amended. It currently reads:

> *Information designated as Confidential Information at the time it was disclosed to the Authority, provided that such designation is deemed to be well-founded on the basis that there would be substantial risk of serious and unfair economic prejudice if the data and information were to be released;*

However, the definition is too vague ('deemed' and the meaning of 'well-founded') the economic prejudice needs to be subject to public interest considerations consistent with the Environmental Regulations and it needs to be clear that the definitions are subject to the paragraph 4 exceptions. We propose: (additions in *italics*)

> (a) Information designated as Confidential Information at the time it was disclosed to the Authority, *subject to the exceptions in paragraph 4*, and provided that *(1) such designation is on the basis of* substantial risk of serious and unfair economic prejudice if the data and information were to be released, and *(2) the information is not Environmental Information.*

Public Participation

The Almaty Guidelines note that public participation generally contributes to the quality of decision-making on environmental matters in international forums by bringing different opinions and expertise to the process and increasing transparency and accountability.[128] Participation in the meetings of international forums, including their subsidiary bodies and other groups, should be allowed at all relevant stages of the decision-making process, unless there is a reasonable basis to exclude such participation according to transparent and clearly

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(b) Factors, such as substances, energy, noise and radiation, and activities or measures, including administrative measures, environmental agreements, policies, [regulations], plans and programmes, affecting or likely to affect the elements of the environment within the scope of subparagraph (a) above, and cost-benefit and other economic analyses and assumptions used in environmental decision-making;
(c) The state of human health and safety, conditions of human life, cultural sites and built structures, inasmuch as they are or may be affected by the state of the elements of the environment or, through these elements, by the factors, activities or measures referred to in subparagraph (b) above.

[128] Almaty Guidelines para. 28.

stated standards that are made available, if possible, in advance.[129] Participation should be as broad as possible. In an international context, relevant stakeholders may include: the members of the public who are, or are likely to be, most directly affected; representatives of public-interest organizations, such as environmental citizens' organizations; and representatives of other interests that might cause, contribute to, be affected by, or be in a position to alleviate the problems under discussion.[130] Participation should include access to all documents relevant to the decision-making process produced for the meetings, circulation of written statements, and the ability to speak at meetings, without prejudice to the ability of international forums to prioritize their business and apply their rules of procedure.[131] The opportunity to participate should be provided at a stage when options are still open and effective public influence can be exerted. [132]

The public should be informed in due time of the opportunities, procedures, and criteria for public participation in the decision-making and of the availability of information for the public, such as drafts for comments, final documents, decisions, and reports, through web sites, and, where appropriate, directly. Transparent and clearly stated standards should be set regarding the provision of comments, and the public should be informed accordingly.[133] Due account should be taken of the outcome of public participation.[134]

In the context of the ISA, we **recommend** access by accredited observers to meetings of all governing bodies, including the Assembly, the Council, and the Legal and Technical Commission, and any subsidiary bodies, which should be open unless specifically closed for defined purposes unless there is a reasonable basis to exclude such participation (such as when matters of commercial confidence are being discussed) according to transparent and clearly stated standards that are made available in advance.

Stakeholders should have access to procedures in the application and execution stages of seabed mining, such as the Environmental Baselines, Scoping Reports, Environmental Impact Assessments and Statements, and Plans of Work.

Access would involve reasonable opportunities to participate in environmental impact assessment hearings, such as the ability to produce scientific evidence and experts and make submissions on EIA, EMMP, and other matters, as well as in any review hearings. Participation should be subject to specific and well-communicated timelines and procedures. All relevant material such as applications, draft contracts, environmental data, and advance notice of

[129] Almaty Guidelines para. 29.
[130] Almaty Guidelines para. 30.
[131] Almaty Guidelines para. 34.
[132] Almaty Guidelines para. 35.
[133] Almaty Guidelines para. 36.
[134] Almaty Guidelines para. 37.

meetings, hearings, and other procedural events should be posted on the internet, subject to clearly defined exceptions for confidentiality. Sometimes this may be best accomplished by video conferencing to allow participation by stakeholders and experts from around the world. The ISA should establish procedures to facilitate this. Jurisdictions such as New Zealand have established procedures to publish EIAs, invite submissions and hold hearings into proposed seabed mining applications.[135]

Access to Review Procedures

Measures to facilitate public access to review procedures[136] include review procedures relating to information requests,[137] review procedures relating to public participation,[138] and access to administrative and judicial review procedures.[139] The Guidelines also state that effective access to justice must be granted; how this access to justice could be addressed in the ISA context may require further consideration.[140]

In the context of seabed mining, this means that access to review procedures, such as environmental impact assessment, compliance hearings, review hearings, and proceedings before the Seabed Disputes Chamber of the International Tribunal of the Law of the Sea (ITLOS) should be provided. ITLOS did not permit the filing of *amicus curiae* briefs by NGOs in the seabed mining Advisory Opinion proceedings,[141] Addressing this may require an additional agreement conferring jurisdiction on ITLOS to allow participation by non-State entities.[142]

Definitions

The Almaty Guidelines make it clear that the terms 'environmental information',[143] 'the public,' and 'the public concerned' shall be understood as defined in the Convention.[144]

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[135] See EPA website at http://www.epa.govt.nz/EEZ/Pages/default.aspx.
[136] Almaty Guidelines para. 40.
[137] Aarhus Convention article 9.3.
[138] Aarhus Convention article 9.2
[139] Aarhus Convention article 9.3.
[140] Aarhus Convention article 9.5.
[141] See Case 17, Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area: Advisory Opinion. 1 February 2011. Para 13. Advisory Opinion at https://www.itlos.org/fileadmin/itlos/documents/cases/case_no_17/adv_op_010211.pdf.
[142] ITLOS Statute article 20.2 provides that "2. The Tribunal shall be open to entities other than States Parties in any case expressly provided for in Part XI or in any case submitted pursuant to any other agreement conferring jurisdiction on the Tribunal which is accepted by all the parties to that case." Statute of the International Tribunal for the Law of the Sea. At https://www.itlos.org/fileadmin/itlos/documents/basic_texts/statute_en.pdf.
[143] Aarhus Convention article 2.3. "Environmental information" means any information in written, visual, aural, electronic or any other material form on:
(a) The state of elements of the environment, such as air and atmosphere, water, soil, land, landscape and natural sites, biological diversity and its components, including genetically modified organisms, and the interaction among these elements;
(b) Factors, such as substances, energy, noise and radiation, and activities or measures, including administrative measures, environmental agreements, policies, legislation, plans and programmes, affecting or likely to affect the elements of the environment within the scope of subparagraph (a) above, and cost-benefit and other economic analyses and assumptions used in environmental decision-making;

"The public" means "one or more natural or legal persons, and, in accordance with national legislation or practice, their associations, organizations or groups."[145]

"The public concerned" means the public affected or likely to be affected by, or having an interest in, the environmental decision-making; for the purposes of this definition, non-governmental organizations promoting environmental protection and meeting any requirements under national law shall be deemed to have an interest. [146] This contrasts with the proposed definition of Interested Persons in the Discussion Paper.

"Interested Person(s)" "means a natural or juristic person or an association of persons that, in the opinion of the Authority, is directly affected by the carrying out of Exploitation Activities in the Area or who has relevant information or expertise."

This proposed definition has a number of difficulties: firstly, restricting the criterion of persons who are 'directly affected' is not appropriate to the Area which is subject to the common heritage of mankind,[147] whereby all persons can potentially be 'directly affected'. Secondly, the criterion of a person "who has relevant information or expertise" is more appropriate to a scientific or technical adviser; it is entirely inappropriate in the context of public participation, where, as with the Aarhus Convention, interest alone suffices, and, where for the sake of good order, it is stated that non-governmental organizations promoting environmental protection and meeting any requirements under national law shall be deemed to have an interest.

Stakeholders in seabed mining matters and other matters relating to the Area are an open-ended list, and are not restricted to environmental NGOs. While it is tempting to define participation in terms of observer status having been granted at the ISA, that would firstly invite potentially unnecessary or even inappropriate applications for persons (which would include entities) which may have no ongoing or broader interest in the ISA than in a particular matter, and secondly could exclude persons who should have access but who may not qualify as observers.

It is **recommended** that the definition of "Interested Person" be deleted and that the term **"Interested Person(s)" be replaced by the term "Stakeholder(s)" throughout**, and that "Stakeholder(s)" be defined as: *"*persons having an interest of any kind in the Area. Non-governmental organizations promoting or involved in environmental protection or marine

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(c) The state of human health and safety, conditions of human life, cultural sites and built structures, inasmuch as they are or may be affected by the state of the elements of the environment or, through these elements, by the factors, activities or measures referred to in subparagraph (b) above.

[144] Almaty Guidelines para 8.

[145] Aarhus Convention article 2.4.

[146] Aarhus Convention article 2.5.

[147] UNCLOS art 134: The Area and its resources are the common heritage of mankind.

scientific research and meeting any requirements under ISA procedures shall be deemed to have an interest."

Note that, in this context, the term "person" should include any legal person such as an organization incorporated in a domestic jurisdiction. Stakeholders should be open-ended due to the Area being both beyond national jurisdictions and due to its status as the common heritage of mankind.

Recommendations

1. Replace the term "Interested Person" with the term "Stakeholder" throughout and define "Stakeholder": **"**a person having an interest of any kind in the Area." Non-governmental or academic organizations promoting or involved in environmental protection or marine research and meeting any requirements under ISA procedures shall be deemed to have an interest.

2. Accredited observers should have access to all meetings of all governing bodies, including the Assembly, the Council, the Legal and Technical Commission, and any subsidiary bodies, which should be open unless specifically closed for defined purposes, unless there is a reasonable basis to exclude such participation (such as when matters of commercial confidence are being discussed) according to transparent and clearly stated standards that are made available in advance.

3. Accredited observers and stakeholders should have access to all relevant processes during the application and execution stages of seabed mining, such as the Environmental Baselines, Scoping Reports, Environmental Impact Assessments and Statements, and Plans of Work. It should involve reasonable opportunities to participate in environmental impact assessment hearings, such as the ability to produce scientific evidence and experts and make submissions on EIA, EMMP, and other matters, as well as in any review hearings. Participation should be subject to specific and well-communicated timelines and procedures. All relevant material such as applications, draft contracts, environmental data, and advance notice of meetings, hearings, and other procedural events should be posted on the internet, subject to clearly defined exceptions for confidentiality. Provision may be made for video conferencing to allow participation by stakeholders and experts from around the world. The ISA should establish procedures to facilitate this.

Finally, in order to establish a clear structure for public consultation procedures within the ISA Mining Code, the ISA may wish to consider introducing a new term: **Transparency Procedures,**

and a modular approach to transparency, with certain elements applied at various junctures in the regulatory process. This term could be defined as indicated below.

Transparency Procedures

All ISA decision processes related to seabed mining shall be subject to transparency, which shall mean the Authority shall provide access to information, opportunities for public participation and access to review. Transparency shall be subject to defined protocols and definitions to protect confidential Proprietary Data, which shall exclude Environmental Information.

Key components of a modular process – with different components or combinations of components to be applied at different junctures – could include: notification (publication of key documents); stakeholder comment (invitation, review, and consideration of, and response to, stakeholder comments); public consultations or hearings; and review procedures.

Code Project Issue Paper #9

Plans of Work – Timelines

Code Project Issue Paper #9
Plans of Work – Timelines

Lead Authors: Laleta Davis Mattis and Lily Xiangxin Xu

Introduction

The Discussion Paper recognizes that time limits in the evaluation of and decision making in connection with the approval of a Plan of Work will need to be set in order to provide a responsive and clear time-bound decision-making process (para 7.22). The draft regulations attempt to define certain key time limits in the regulatory process. It is the aim of this paper to consider these issues in the light of the overall approval process for a Plan of Work, the complexities involved (which may be resource-specific and/or location-specific as well) and the interests of a fair and proper process and procedure.

The paper will also address the issue of the operational practices of the various organs of the Authority and the timing of meetings of the Council and the Commission in particular and their implications for the timing of the meeting schedules of these organs.

Our comments are prefaced on the observation in para 7.23 that "The content of the regulations must drive the form and functioning of the Authority. This includes the resourcing needs for the Secretariat, e.g., the need to establish an 'Environmental division /EIA Unit' in the Secretariat function to help guide (scope) the EIA process such that as detailed and as comprehensive an EIS is produced for consideration and evaluation by the Commission."

Development of the Plan of Work

Generally, "development of the Plan of Work" refers to the overall process, including substantive work such as Feasibility Study and Environmental Impact Assessment. The Draft Exploitation regulations define 'Plan of Work' to mean:

"…a Plan of Work for Exploitation in the Area being collectively all and any plan or other document setting out the activities for the conduct of the Exploitation, which form part of, or is proposed to be part of, an Exploitation Contract."

Narrowly defined, "development of the Plan of Work" refers to the preparation of the full complement of requirements laid out in the draft regulations. The preparation and submission of the various documents comprising the plan of work may take varying times depending on the information gathered at the exploration phase; the available environmental information; and

the scale of revisions (if any) requested by the ISA. Similarly, the timeline for the review of such Plans of Work may depend upon the complexity of the project, the adequacy of the information provided, and the number of Plans of Work under review at the time. Given time constraints and the LTC's already large workload, the Commission may decide to assess applications in the order in which they are received. We recommend the ISA consider "receipt of an application" to be receipt of all the mandatory information to be submitted.

Review of the Plan of Work

The Discussion Paper and *Working draft of Exploitation Regulations and Standard Contract Terms (Exploitation Regulations)* provide specific timelines for the review of plans of work. Specific suggestions for strengthening these are outlined in the table below and in the Annotated Draft Environmental Regulations (Annex 1).

Reference	Provision	Comments
Exploit.Reg 6 **Receipt of application**	The Secretary-General shall: (a) Acknowledge in writing within 30 Days receipt of every application for approval of a Plan of Work submitted under this part. (d) Notify the members of the Commission of receipt of ~~such~~ **a complete** ~~–~~application. The Commission shall **acknowledge and if practicable** consider such application at its next meeting provided that the notification and information under paragraph (c) has been circulated at least 30 Days prior to the commencement of that meeting of the Commission.	Acknowledgement of an application means receipt of a completed application, inclusive of all mandatory documents. We further note the draft environmental regulations envision that an initial EMMP and initial Closure Plan can be submitted as part of the Applicant's package to the Commission.
DR 33 **Review of Application for Approval of a Plan of**	1. The Authority shall review the Environmental Plans within ~~60~~ **up to 120** days of receipt of an application for approval of a Plan of Work and ensure that they conform to and have been prepared in accordance with these Regulations and the	The Secretariat's preliminary review will focus on conformity with the requirements of the Regulations and Guidelines. This will require some level of scientific competence to assess the completeness and usability of the information the Applicant has submitted,

Work: **Preliminary review by the Authority**	Authority's guidelines and that an Applicant has made all reasonable efforts to provide the information required. 2. The Authority may require the Applicant to provide any further information that it considers relevant to the plan(s) or where the Authority finds that the plan(s) do not conform to these Regulations, it shall notify the Applicant, indicating its reasons for any amendments to the plan(s). The Applicant may, within ~~45~~ **90** days, re-submit modified plan(s) to the Authority. 3. **Once it considers that the Application is complete, the Authority shall forward the application to the Commission for consideration.**	even though the final, substantive assessment will be the work of the Commission. For example, in its preliminary review, the Secretariat will need to review (per DR 38) the adequacy of the information provided, the methodologies used, the uncertainties and ways in which the precautionary approach has been applied, and any advice or opinions received from Appropriately Qualified Experts engaged by the Authority. The Authority may need to establish and draw upon a pool of experts for these elements of its review. We believe **60 days is too short a timeline for this preliminary review**. We recommend it be extended to 120 days. We also recommend allowing the Applicant more time (90 days) to respond to ISA requests for information or amendments. This will allow contractors more time to provide the high quality information required by the ISA.
DR 37 **Applicant's Response to Submissions by Interested Persons**	1. In consultation with the Authority, the Applicant may make an arrangement to address the submission either directly with ~~Interested Persons~~ **Stakeholders** or to provide the Authority with such information as is reasonably required to adequately address the relevant submission. In either case, the Applicant shall take such action as is necessary to address the relevant submission made within ~~60~~ **120** days of the date of the determination by the Authority.	It is important for the Applicant to respond to Stakeholder comments. The flexible timeline of "up to" 120 days is not prescriptive and allows Applicants to provide higher quality responses to comments.
Exploitation Regulation 8(7)	**7.** If the Commission finds that the Application does not comply with these Regulations **and any further requirements of the Commission,** it	We recommend Applicants be given up to one year to re-submit their Application and provide any additional information required by the LTC. The LTC is less

Assessment of Applicants	shall notify the Applicant in writing, through the Secretary-General, indicating its reasons. The Applicant may, within ~~45 Days~~ **one year** of such notification, modify and re-submit its Application. **If the Applicant cannot complete the revised Application, the Applicant may, upon receipt of the notification from the Commission, request a further period within which to submit the revised Application and the Commission shall consider the application and grant a further period, which in the opinion of the Commission is sufficient to submit the modified application.**	concerned with the speed of the re-submission than with the adequacy of the Application and the fulfilment of the ISA's commitment to ensuring the protection of the Marine environment consistent with principles of environmental management. Borrowing from the submissions of some contractors from the Berlin meeting, it is in the interest of the contractor to comply with the recommendations of the LTC; it is the role of the LTC to ensure that contractors comply with the regulations. It is therefore not fatal to the process if the time for re-submission of plans of work is extended.
Exploitation Regulation 4(5) **Form of Applications and Information to Accompany a Plan of Work for Exploitation**	**5.** The Commission may permit the delivery and submission of the Environmental Management and Monitoring Plan and Closure Plan at a date later to that of the original application**. The Commission shall require delivery of a final Environmental Management and Monitoring Plan at least 6 calendar months prior to the proposed commencement of mining activities in the relevant Mining Area.**	Draft regulation 4(5) stipulates EMMP and Closure Plan may be submitted at a later date to that of original application while Draft Regulation 29(1) further provides that an applicant shall prepare an initial EMMP and Closure Plan. However, these two draft regulations don't provide an exact date by which the EMMP and Closure Plan shall be submitted. Given the importance of the EMMP and Closure Plan to environmental protection, the ability of the Applicant to perform its duties cannot be clear until the EMMP is reviewed and approved. Thus, the EMMP and Closure Plan must be submitted and assessed as part of applications. We recommend this be made explicit in the draft Exploitation Regulations as well as in the draft Environmental Regulations.
Exploitation Regulation 9	4. **The Commission shall not grant an approval for a Plan of Work until all the information requested has been submitted by the applicant.**	
DR 41	**2. The Commission shall consider**	We propose adding this language to DR

Matters to be taken into account by the Commission **Commission's recommendation for the approval of a Plan of Work**		**applications expeditiously and submit its report and recommendations to the Council on the designation of the areas and the plan of work for exploration at the first possible opportunity, taking into account the schedule of meetings of the Authority. In discharging its duties, the Commission shall apply these Regulations and the rules, regulations and procedures of the Authority in a uniform and non-discriminatory manner.**	41 as the timing of LTC reviews and recommendations will depend on the frequency of LTC and Council meetings.
Exploitation Regulation 11 **Commission's recommendation for the approval of a Plan of Work**	**4.**	If the Commission is not satisfied that the Applicant meets the criteria listed in regulation 8(1) and that the proposed Plan of Work, including any amendments or modifications thereto, meets the criteria listed in regulation 8(4), and it accordingly is of the view that it should not recommend approval of the Plan of Work, it shall so inform the Applicant and provide the Applicant with a further opportunity to make representations within ~~60 Days~~ **one year**. The Commission shall consider any such representations made by the Applicant at its next available meeting in preparing its report and recommendations to the Council.	Consistent with the philosophy that it is not so much for the LTC to be concerned about the timeline of the re-submission (which is also of importance to the Contractor), but about the quality of the application, the regulations could provide up to one year for re-submission. The concept is that it is the obligation of the contractor to comply with the regulations and for the LTC to facilitate expeditious review.

Governance Issues

The Article 154 review and comments from the Berlin workshop identified governance gaps, including in the composition of the LTC. The authors of this paper have the view that there should be a subsidiary body like a special committee whose members report to the LTC, almost akin to a sub-committee of the LTC charged with the responsibility to assist in the environmental review of the plans of Work. The authors considered and took into account the current legal framework within which the LTC operates.

The authors believe a subsidiary organ to the LTC could be useful, but that care must be taken that this committee does not fall to the same critique of the LTC over time. A subsidiary, non-

statutory group (working group or subcommittee) could be established with the approval of the LTC. It is then up to the LTC to delegate work to the working group since it is the LTC that is vested with the legal authority to carry out the work pursuant to Article 185 of The Convention.

The Article 154 review also identified the possibility of an LTC not seized with the necessary skills sets and recommended that the Council embark on a mission to ensure that the LTC possesses the requisite skills. The authors recommend that in order to ensure relevant expertise is captured, the ISA will need to identify the skills required when vacancies arise so that Member States submitting candidates are aware of the skills required for the candidates to be accepted. The authors also agreed that the meetings of Council and the LTC should be more frequent given the matters identified *ante.*

Code Project Issue Paper #10

Modification and Periodic Review of EMMPs and Closure Plans

Code Project Issue Paper #10
Modification and Periodic Review of EMMPs and Closure Plans

Lead Authors: Steve Roady and Lily Xiangxin Xu

The ISA Discussion Paper on the Development and Drafting of Regulations on Exploitation for Mineral Resources *(Environmental Matters)* (p. 60) asks for an assessment as to triggers for determining whether any particular new circumstance can be deemed "material" – that is, the Discussion Paper seeks a way to ensure a proper evaluation of the question whether any particular change (in, e.g., information or impacts) is sufficiently important to require revisions in existing EMMPs and Closure Plans.

Two separate issues arise here: one from the perspective of the Contractors, the other from the perspective of the ISA. Contractors need to be able to modify activities and closure plans easily (and without being subjected to detailed review and possible delay) with respect to operational changes that do not "materially" affect the marine environment. At the same time, the Authority must be able to require Contractors to make changes to their activities and closure plans to reflect "material" new information and technologies that suggest adjustments in the way operations should be conducted so that those operations remain in compliance with UNCLOS' Article 145 mandate to protect the marine environment.

Guidelines established pursuant to the Draft Regulations should provide both the Contractor and the ISA with clear rules to govern this "materiality" determination. For its part, the Authority should have the ability to require the Contractor to revise an EMMP or Closure Plan if application of the guidelines demonstrates that the new information or circumstance is "material". For their part, any Contractors should have the ability to receive approval from the ISA to revise an EMMP or Closure Plan upon a demonstration that the new information is not "material".

What criteria or process should be used to determine whether a change is "material"?

The question of "Material Changes" is addressed in Draft Regulation 48(2), which provides that the Authority "may, in consultation with a Contractor, vary or amend the Environmental Plans where there is a Material Change relating to, arising from, or as a consequence of":

a) a proposed change in the scale or intensity of mining activities;

b) Environmental Incidents;

c) a required improvement in Environmental Performance;

d) Environmental audits; and

e) the impact of mining activities on the Marine Environment as the direct result of increased scientific knowledge, information or experience, including that arising from the testing of collecting systems prior to the commencement of commercial mining activities.

Before responding to the question of the procedure that could be used to determine whether a change is "material," it is useful to consider a definition of the term itself. The Draft Regulations (pp. 97-98) define "material change" as one that is "not a minor or administrative change, to the basis on which the original report, document, or plan, including a Plan of Work, was accepted or approved by the Authority including, inter alia, physical modifications, availability of new knowledge or technology and operational management changes, according to the Authority's guidelines."

In the USA, the federal government has issued regulations and guidance pursuant to the National Environmental Policy Act ("NEPA") that could also be instructive.

Guidance under NEPA can be read to treat the following as "material": (1) if there are substantial project changes that are relevant to environmental concerns, or (2) if there arise significant new circumstances or information that bears on environmental concerns.[148] Reference to this formulation highlights that there are two types of circumstances in which a change to a Plan of Work might be required: (1) something changes about the operation of the mining work itself (for example, the Contractor wishes to proceed at a faster rate); and (2) something changes external to the project itself (for example, a new buffer zone is designated adjacent to the mined area).

The identification of "material" changes will always be a difficult problem, since there may be no quantifiable criteria in most cases. Although some criteria could be listed, it is impossible to exhaust all the possibilities of "material changes" in clear standards and procedures. Hence, the question of whether a particular change is "material" needs to be considered on a case-by-case

[148] Council on Environmental Quality, Executive Office of the President, Regulations for Implementing The Procedural Provisions Of The National Environmental Policy Act, 40 C.F.R. Parts 1500-1508 (2005 Reprint), at 1502.9(c)(1).

base. According to the experience of terrestrial mining practice, it is possible in some specific occasions and on some specific issues to deploy criteria that will facilitate a decision on materiality. The unique difficulty in the context of deep seabed mining is the lack of underlying baseline information about the resources and ecosystem that could be affected by the change in question.[149]

A useful approach can be adapted from the approach used by Western Australia's Environmental Protection Authority to evaluate changes to proposals.[150] Such Guidelines would rely upon the following:

- Summary of detrimental environmental effects of the original proposal, and whether these have occurred so far during operations;
- Summary of the detrimental environmental effects expected from the change in the proposal (i.e. is it a smaller or larger footprint, has the discharge depth changed, have they got a new mining tool…etc.);
    - The values, sensitivity and quality of the environment which is impacted;
    - The extent (intensity, duration, magnitude and geographic footprint) of the additional impact;
    - The resilience of the environment to cope with this additional impact.
- Summary of the detrimental environmental effects of the change in the proposal (i.e. is it a smaller or larger footprint, has the discharge depth changed, have they got a new mining tool…etc.);
- Whether the impacts of the proposed change are in addition to, or different from, the detrimental environmental effects of the original (approved) proposal;
- Whether the additional or different detrimental environmental effects resulting from the proposed change are significant (see 5.1.6 of attached) taking into consideration:
    - The values, sensitivity and quality of the environment that is likely to be impacted;
    - The extent (intensity, duration, magnitude and geographic footprint) of the likely impacts;
    - The consequence of the likely impacts (or change in impacts);
    - The resilience of the environment to cope with change;

[149] Levin L.A. et al. 2016. Defining "serious harm" to the marine environment in the context of deep-seabed mining. Marine Policy, 74: 245–259 at 249.

[150] Environmental Protection Authority, Western Australia, Environmental Assessment Guidelines for Changes to Proposals after Assessment (March 2015).

- The cumulative impact of changes to the proposal and the cumulative impact with other proposals (projects);
- The level of confidence in the prediction of impacts;
- The objectives of the Act (in this case UNCLOS);
- Public or stakeholder concern.

Various criteria have been developed in the course of attempting to define whether a particular action can properly be deemed to be "significant." As discussed in a parallel paper ("Significance Test"), both Australia and the USA have developed a rather detailed list of questions in that context; these questions/factors might also profitably be consulted in assessing whether an action is "material."

Based on this kind of analogy, factors that could be helpful in determining whether a change that the contractor wishes to pursue is "material" include the following:

(1) whether the change would increase the environmental effects of the project

(2) whether the change would increase the severity of environmental effects

(3) whether the change would increase the scale of the project

(4) whether the change would increase the duration of the project

(5) whether the change would increase the project's cumulative impacts

We suggest that the ISA establish a team of Appropriately Qualified Experts that would operate within the Authority under the auspices of the Secretariat and provide advice to the LTC. This team of experts would oversee the process by which "materiality" determinations are made with respect to environmental issues. This expert team would be charged to establish and maintain an active and up-to-date database of all information relevant to deep sea mining. In addition, it would be charged to review on a regular basis (not less than twice annually) all new circumstances and information relevant to the exploitation of mineral resources in the Area that it discovers *sua sponte* or that are brought to its attention from whatever source (including stakeholders, Contractors, and state actors). This expert team would evaluate each new data point against the five criteria listed above and prepare an evaluation as to whether these new circumstances, either individually or in aggregate, fall within this conception of what is "material" with respect to any particular Exploitation Contracts in force. This team could also provide suggestions for appropriate changes to Plans of Work. The work of this team would be undertaken on a regular, ongoing basis and would in that manner serve to supplement the Environmental Performance Review process established pursuant to Draft Regulation 49.

UNCLOS Article 145 explicitly requires the ISA to adopt regulations and procedures to ensure effective protection of the marine environment. The scope of the protective requirements imposed by Article 145 is comprehensive. *Inter alia*, Article 145 mandates that the procedures

prevent interference with "the ecological balance of the marine environment." In light of this mandate, the ISA would be fully justified in establishing a team of "materiality" experts.

What process would a finding of "materiality" trigger?

As noted above, this question can be addressed from two different perspectives: (1) the perspective of the ISA; and (2) the perspective of the Contractors.

As for the first perspective, UNCLOS Article 145 provides ample authority for – indeed, it compels – the conclusion that the ISA can and should require changes to Contracts, EMMPs and Closure plans in instances where it is finally determined that a new circumstance is "material." UNCLOS Article 145 makes clear that it is the obligation of the ISA to do so. In order to carry out that obligation, the standard provisions of any contract entered into for purposes of exploiting the mineral resources of the Area must include a provision empowering the Authority to make such changes. These Exploitation Contracts will replace the Exploration Contracts and their terms will override any terms contained in such Exploration Contracts. We suggest the following process: (1) the LTC reviews the finding of the expert team; (2) the LTC either accepts or rejects the expert team's finding that the new circumstance is "material;" (3) if it accepts a finding of "materiality" from the expert team, the LTC advises the Contractor that the Contractor must revise the EMMP or Closure Plan to ensure effective protection of the marine environment as required by Article 145; (4) the Contractor drafts the revision and submits it to the LTC; (5) a consultation phase is initiated with public comment and scientific advice; and (6) if the LTC accedes to the revision, it passes the revision to the Council for final approval.

As for the second perspective, Draft Exploitation Regulation 18 and Draft Environmental Regulation 48 contemplate that the Contractor is eligible to apply for modification of Environmental Plans when "material" changes occur. We suggest the following process: (1) where the expert team agrees that a new circumstance is "material," the Contractor would be required to submit its proposed changes and pursue the same procedure described above; (2) a consultation phase is initiated with public comment and scientific advice; and (3) where the expert team concludes, taking into account the consultation, that the new circumstance is not "material," the Contractor would be allowed to proceed under its original EMMP or Closure Plan without the need of revision.

In every instance where the Contractor disputes a finding as to materiality, the burden of proof shall fall on the Contractor to produce evidence in support of its position, and the precautionary principle should apply. Contractors shall not be allowed to rely upon a lack of information or data as grounds for establishing whether a particular circumstance can be considered "material". This approach is consistent with Draft Environmental Regulation 21, which places the burden of proof on the Applicant to demonstrate that its proposed Plan of Work is environmentally acceptable.

The expert team would be empowered to suggest two kinds of changes. The first kind would be changes to particular Contracts to address changes in operations under those Contracts that the expert team deemed "material". The second kind would be changes to the Environmental and Exploitation regulations that the expert team deems vital to ensuring that all exploitation Contracts contain provisions and requirements that ensure effective protection of the marine environment.

What should be the impact of updated regulations or guidance?

There is no doubt that updated regulations or guidance should be abided by all Contractors that are granted mining rights after the ISA adopts the final Exploitation Regulations. The manner in which such compliance can be ensured is to include a provision in all contracts going forward that expressly authorizes the ISA to revise operational requirements.

The source of uncertainty with respect to the question whether the ISA can require presently-existing Exploration Contractors (those who achieved Contractor status before finalization of the Exploitation Regulations) to comply with updated regulations/guidance lies in the text both of UNCLOS Annex 3 and in the Exploration Regulations.

For its part, Article 19 of UNCLOS Annex 3 provides that "[a]ny contract entered into in accordance with article 153, paragraph 3 may be revised only with the consent of the parties." This provision could, however, be addressed satisfactorily in the manner noted in the Code Project paper on Adaptive Management. That is, a term of the new Exploitation contract would make clear that the contractor is required to comply with all changes to the ISA's Environmental Regulations made by the ISA at any time and with changes mandated under the Regulations.

Separately, Section 24.2 of the Exploration Regulations provides that contracts "to facilitate the application of any rules, regulations and procedures adopted by the Authority subsequent to the entry into force of [the] contract" may be revised "by agreement between the Contractor and the Authority." Similarly, Section 24.3 of the Exploration Regulations states that contracts "may be revised, amended, or otherwise modified only with the consent of the Contractor and the Authority."

Finally, Regulation 44 of the Exploration Regulations provides that "any such amendments shall be without prejudice to the rights conferred on any Contractor with the Authority under the provisions of a contract entered into pursuant to these Regulations in force at the time of any such amendment." Like the other language, this text allows room for existing contractors to resist the imposition of new requirements.

The resolution of the potential problem presented by Sections 24.2, 24.3, and 44 of the Exploration Regulations should be straightforward. Once a Contractor moves from the Exploration regulatory regime to the Exploitation regime, the Exploitation and Environmental Regulations govern. To the extent this regulatory picture is not clear, the Exploitation and

Environmental Regulations should include appropriate language directing that they control. Having made the pre-eminence of the new regulations clear, the ISA need only be sure to include explicit language obligating the Contractors to comply with ongoing directives.

Acting in this fashion to ensure that UNCLOS Article 145 protections are achieved is well within the power of the ISA – and the ISA is in fact required to take actions to ensure protection of the marine ecosystem. Numerous UNCLOS provisions underscore the duty of the ISA to control activities in the area. These include Articles 153(1), 153(4), 157(1), 162(2)(l), and Annex III, Article 3(4)(b).

Requiring Contractors to remain in compliance with all requirements imposed by the ISA going forward would be consistent with normal regulatory practice. In the USA, for instance, existing contractors and facilities operators are routinely required to retrofit and improve their operations in light of new regulations and guidance. For example, when the Surface Mine Control and Reclamation Act was made law in 1977, it imposed a sweeping new range of requirements on mine operators.[151] Various mining operators challenged this law on the ground, *inter alia*, that it was unlawful to impose new requirements for environmental protection on existing operations. The U.S. Supreme Court rejected that challenge.[152]

Similarly, both the U.S. Clean Air Act[153] and the U.S. Clean Water Act[154] imposed stringent requirements on existing facilities that required substantive changes in operations to reduce pollution. Under the Clean Air Act, for example, existing sources of air pollution were required to obtain comprehensive operating permits.[155] These permits provide detailed measures for limiting the emission of harmful air pollutants such as sulfur dioxide.[156] In similar fashion, the Clean Water Act required existing sources of water pollution to obtain permits allowing them to discharge effluent under specified limits and conditions.[157] These permits provide specific limits on particular constituents of water pollution (e.g., pH, fecal coliform) for the operators of individual facilities.[158] We believe that this sort of approach should be followed.

The relevant articles and regulations are:

Exploration Regulations, Regulation 44 Review

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[151] 30 U.S.C. 1201, et seq. (1977).

[152] *Hodel v. Virginia Surface Mining & Reclamation Association*, 452 U.S. 264 (1981).

[153] 42 U.S.C. 7401, et seq. (1970).

[154] 33 U.S.C. 1251, et seq. (1972).

[155] https://www.epa.gov/title-v-operating-permits (describing Clean Air Act operating permit requirements).

[156] See, e.g., http://www.dec.ny.gov/dardata/boss/afs/permits/prr_906030002100030_r1.pdf (Clean Air Act permit for a coal-fired electric power generation plant located in western New York State, USA).

[157] See https://www.epa.gov/npdes (describing the National Pollutant Discharge Elimination System under the USA Clean Water Act).

[158] See https://www3.epa.gov/reg3wapd/pdf/pdf_npdes/stormwater/DCMS4/MS4FinalLimitedModDocument/FinalModifiedPermit_10-25-12.pdf (Clean Water Act permit for stormwater discharges for the District of Columbia, USA).

1. Five years following the approval of these Regulations by the Assembly, or at any time thereafter, the Council shall undertake a review of the manner in which the Regulations have operated in practice.

2. If, in the light of improved knowledge or technology, it becomes apparent that the Regulations are not adequate, any State Party, Authority, or any contractor through its sponsoring State may at any time request the Council to consider, at its next ordinary session, revisions to these Regulations.

3. In the light of the review, the Council may adopt and apply provisionally, pending approval by the Assembly, amendments to the provisions of these Regulations, taking into account the recommendations of the Legal and Technical Commission or other subordinate organs concerned. Any such amendments shall be without prejudice to the rights conferred on any Contractor with the Authority under the provisions of a contract entered into pursuant to these Regulations in force at the time of any such amendment.

4. In the event that any provisions of these Regulations are amended, the Contractor and the Authority may revise the contract in accordance with section 24 of annex 4.

Exploration Regulations, Annex 4, Section 24 Revision

24.1 When circumstances have arisen or are likely to arise which, in the opinion of the Authority or the Contractor, would render this contract inequitable or make it impracticable or impossible to achieve the objectives set out in this contract or in Part XI of the Convention or the Agreement, the parties shall enter into the process set out under this Regulation.

24.2 This contract may also be revised by agreement between the Contractor and the Authority to facilitate the application of any rules, regulations and procedures adopted by the Authority subsequent to the entry into force of this contract.

24.3 This contract may be revised, amended or otherwise modified only in accordance with this Regulation and with the consent of the Contractor and the Authority by an appropriate instrument signed by the authorized representatives of the parties.

LOSC, Annex 3, Article 19 Revision of contract

1. When circumstances have arisen or are likely to arise which, in the opinion of either party, would render the contract inequitable or make it impracticable or impossible to achieve the objectives set out in the contract or in Part XI, the parties shall enter into negotiations to revise it accordingly.

2. Any contract entered into in accordance with article 153, paragraph 3, may be revised only with the consent of the parties.

Code Project Issue Paper #11
Vulnerable Marine Ecosystems
and Wider Environmental Management Aims

Code Project Issue Paper #11

Vulnerable Marine Ecosystems and Wider Environmental Management Aims

Lead Authors: David Billett and Andrey Gebruk

Should VMEs be explicitly considered in the regulations, if so, how are they defined? Are there other spatial management requirements that should be integrated?

1. Introduction

UNCLOS article 194.5 requires measures to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life.

The concept of Vulnerable Marine Ecosystems (VME) is a key tool in deep-sea environmental management as developed by the UN General Assembly (Resolutions 61/105 in 2006; 64/72 in 2009 and 66/68 in 2011). VME guidelines have been developed primarily for the management of deep-sea fisheries (FAO, RFMOs and CCAMLR – details in section 2). They have led to regulators identifying a restricted number of 'indicator' taxa being used to take management decisions (NEAFC, 2014; NAFO, 2017; EU Regulation 2016/2336; CCAMLR, 2009). This has allowed regional variations to be applied within the broader global UNGA framework depending on which local taxa are classified as indicator VMEs. Indicator taxa were developed in the context of deep-sea fishing, and in the context of particular indicator taxa being retained in a trawl net so as to indicate the presence of a VME. This paper seeks to address whether the VME concept can be adapted for regulating deep-sea mining activities and whether it is suitable for ISA responsibilities to protect and preserve the [wider] marine environment including pelagic ecosystems.

Text relating to VMEs appears in the draft working document of the ISA Environmental Regulations in relation to Draft Regulations 41(f), 45(b) and 54. The ISA Exploration Regulations also contain provisions for the consideration of VMEs; polymetallic nodules (ISBA/19/C/17; Reg.31), polymetallic sulphides (ISBA/16/A/12/Rev.1; Reg.33) and cobalt-rich crusts (ISBA/18/A/11; Reg.33).

2. Vulnerable Marine Ecosystems

What is a vulnerable marine ecosystem?

The guidelines for "Vulnerable Marine Ecosystems" (VMEs) were developed by the Food and Agriculture Organization of the United Nations (FAO) in 2008 following Resolution 61/05 of the United Nations General Assembly (UNGA) in 2006. Further resolutions 64/72 in 2009 and 66/68

in 2011 also relate to protection of “vulnerable marine ecosystems from significant adverse impacts of bottom fishing”. Criteria for the identification of VMEs were first published by FAO in “International Guidelines for the Management of Deep-Sea Fisheries In the High Seas” (2009). These criteria were based on five biological characteristics: 1) uniqueness/rarity, 2) functional significance, 3) fragility, 4) life-history traits of component species and 5) structural complexity. Regional Fisheries Management Organisations (RFMOs) have generally used these criteria.

Parallel to FAO the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) adopted five of the FAO VME criteria and added issues concerning motility and larval dispersal (CCAMLR, 2009). Similar to FAO, the CCAMLR approach was aimed at identifying VME benthic taxa susceptible to lasting damage from bottom fishing.

Under European law (Council of the EU, 2008) VMEs are defined as “any marine ecosystem whose integrity (i.e. ecosystem structure or function) is, according to the best scientific information available and to the precautionary principle, threatened by significant adverse impacts resulting from physical contact with bottom gears in the normal course of fishing operations, including, inter alia, reefs, seamounts, hydrothermal vents, cold water corals or cold water sponge beds. The most vulnerable ecosystems are those that are easily disturbed and in addition are very slow to recover, or may never recover".

The UNEP World Conservation Monitoring Centre (WCMC) defines VMEs as “marine ecosystems which are easily damaged because of their physical and functional fragility” (http://biodiversitya-z.org/content/vulnerable-marine-ecosystem-vme). A broader approach, similar to the FAO scheme, was developed by the Convention on Biological Diversity (CBD) to describe Ecologically or Biologically Significant Areas (EBSAs) in open-ocean waters and deep-sea habitats (CBD, 2008). The CBD criteria are broader than those applied by fisheries organisations and may provide approaches suitable for pelagic ecosystems. CBD criteria for describing EBSAs include: uniqueness or rarity; special importance for life history stages of species; importance for threatened, endangered or declining species and/or habitats, vulnerability, fragility, sensitivity, or slow recovery, biological productivity, biological diversity and naturalness (annex I, decision IX/20) https://www.cbd.int/ebsa/resources. A comparison of the criteria in all these documents is provided by Ardron et al. (2013).

3. VMEs in the Deep-Sea Mining Context

Limitations of VMEs as a conservation tool in the DSM context:

1) The VME criteria suggest that some ecosystems, habitats and species are more vulnerable (susceptible to damage) than others. However, scientific research has demonstrated that most species in the deep sea share similar characteristics of slow recovery, reduced reproductive output and long generation times (e.g. Thiel, 2003; Miljutin et al., 2011). All can be classed as

'vulnerable' to human impacts using the existing VME criteria. There is no mechanism to quantify and rank vulnerabilities apart from "expert opinion" which may be influenced by personal preference and knowledge. There are examples of more formal (quantitative) approaches of assessing vulnerability (discussed in section 3).

2) The term "vulnerable" (applied to ecosystems, habitats, species etc.) is widely used in conservation biology to describe the level of threat to a species/habitat. This has led to some confusion in terms because "vulnerable" has been defined to mean a state less threatened than "endangered" but more threatened than "near threatened" (more details Annex 1). Others, who have been involved in the evolution of the VME and EBSA criteria, suggest that the process of assessment of threat to a particular species existence, and developed for taxa on land, is not appropriate in a context of the deep sea given the great uncertainty as to how widespread a species or habitat is. In most cases, species ranges have been inferred from knowledge of proxies that are known to regulate species distributions, such as depth and organic input derived from primary productivity at the sea surface or from hydrothermal activity at the seafloor.

3) Whilst the VME criteria are reasonably comprehensive (at least for the seabed environment within the range of bottom trawling fishing gear), the practicalities of identifying them (and absence of effective baseline assessments and compliance) has led to restrictive lists of ecosystems, habitats and species being used. They also favour large megafaunal benthic taxa. This means that many species in other deep-sea habitats and those of a smaller size have been ignored even though they may be equally or more important in delivering ecosystem services. The application of VME criteria developed for fisheries would not be appropriate in the deep-sea mining context because mining will reach to much greater depths where new and different habitats and taxa occur.

4) In the FAO bottom trawling context, vulnerability has generally related to the area actually physically impacted by an activity (e.g. by the trawl). There has been little or no consideration of habitats smothered by plumes passing downslope and down-current (e.g. Bailey et al., 2009; Puig et al., 2012; Paradis et al., 2017). In the deep-sea mining context, any assessment of vulnerability must consider both direct impacts (e.g. physical disturbance) and indirect impacts (e.g. plume effects).

5) Vulnerability in the context of terrestrial species assessment is scale dependent. In a deep-sea mining context, the degree of vulnerability to extinction should ideally be assessed in the context of 1) the basin-scale distributions of the species present, 2) the scale of the direct and indirect impacts of the mining and 3) cumulative impacts on the decadal timescales over which mining will take place. However, these aspects are unlikely to be known for some while. Moreover, vulnerability to extinction is not the only criterion that makes a species/habitat or ecosystem important to protect. It may be important, for example, as a source population, for ecosystem stability or integrity, as a prey or predators for other species, etc. The CBD EBSA

criteria are more relevant in this case. [https://www.cbd.int/doc/meetings/mar/ebsaws-2014-01/other/ebsaws-2014-01-azores-brochure-en.pdf]

6) In the deep sea, many species have restricted depth ranges of a few hundred metres in which they are abundant (Billett, 1991), with species changing continuously with depth owing to the effect of temperature and pressure on physiological processes and food availability. Due to the focus on deep-sea fisheries, VME criteria have generally not taken these factors into account, but they will be important for deep-sea mining, which will impact much broader depth ranges.

7) Due to the focus on deep-sea fisheries, VME criteria have not been applied to near-bottom and pelagic ecosystems.

Utility of VMEs as a conservation tool in the deep-sea mining context:

It is clear from Article 194.5 and from the FAO Guidelines that ecosystems and habitats, as well as populations and communities, may require special measures to achieve preservation and protection for certain ecological reasons. Therefore, the Authority may wish to develop a term different from "vulnerable", for example "protected", to apply to special areas in need of protection. However, this measure should be a subcomponent of wider environmental management measures and not as the primary conservation tool.

The VME criteria provide an informative signpost for what may be important to protect in the deep sea, such as hydrothermal vent communities (Gebruk et al. 1997; Fabri et al. 2011). However, the VME criteria would need to be elaborated to be appropriate for deep seabed mining.

In relation to cobalt crusts and seamounts, existing VME classifications for corals and sponges would need to be expanded to other species and taxa which may become the dominant faunal elements at depths deeper than the presently listed VME taxa occur. It should be noted that 90% of our knowledge of seamounts relates to seamounts with summits shallower than 200 m (Kvile et al., 2014). Seamounts of interest to deep-sea mining, typically with summits at c. 1300 m, will have a very different nature. Classifications for protected areas on seamounts may have to be adapted as more knowledge is gained.

The near-bed operational plume and the discharge plume from dewatering and transhipment activities have the potential to affect pelagic ecosystems. Like benthic ecosystems, these pelagic ecosystems are depth dependent, although perhaps over broader ranges. Specialist organisms occur in the Benthic Boundary Layer (the 100 m immediately above the seabed) (Billett, 1985; Rogacheva et al., 2012) and may be considered as locally vulnerable to plume effects. The pelagic realm has distinct zones (euphotic, mesopelagic, bathypelagic and abyssopelagic) that are home to gelatinous zooplankton that feed by producing fragile mucous

nets to capture low-density particles. These zooplankton might be particularly vulnerable to plumes and in need of specific protection measures.

4. A Way Forward

In order to prevent serious harm and achieve effective protection of the marine environment under UNCLOS, the ISA will need to pursue an ecosystem-based approach, as proposed in Draft Regulation 6. Within this context, the designation of VMEs and/or "protected areas" may be a valuable mechanism for ensuring the protection of particularly distinctive or significant species, habitats, or ecosystems. The designation of VMEs is not sufficient on its own and the current definition and usage of VMEs may not be adequate.

The criteria for EBSAs (listed above) may be a useful starting point for future discussions. However, the current application of EBSAs through the CBD regional workshops has been to apply the term over large ocean areas, as opposed to special circumscribed habitats or ecosystems as may be needed for seabed mining.

We recommend that a workshop should be convened in the near future to examine the use of VMEs and EBSAs in the deep-sea mining context. This workshop should examine the criteria to see if they properly relate to the whole range of ecosystems and species that will be encountered over the much broader depth range where deep-sea mining will occur, and assess the criteria against the scale of direct and indirect impacts from deep-sea mining. Options would be to:

1. Adapt the existing VME and EBSA criteria to accommodate all issues outlined in this document,
2. Set up a new system for identification of areas in need of protection within or adjacent to mining claims, to complement the larger "areas of particular environmental interest" as applied in the regional planning context, and/or
3. Examine other mechanisms such as use of Red Lists to assess status of the species, habitat or ecosystem.

The outcome of such a workshop would be to establish protocols for how areas in need of protection under the chosen set of criteria could be identified during marine surveys in the mining context

5. Recommendations on the Draft Regulations relating to faunal vulnerability and environmental management.

Specific proposals for strengthening the draft regulations are included in the Annotated Draft Environmental Regulations (Annex 1). See particularly, DRs 12, 21, 23, 24, 27, and 41.

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Use of Red List Criteria in Addition to VMEs

This appendix shows one other approach that could be taken to identify areas in need of protection.

One way forward could be ranking deep-sea habitats/ecosystems according to the level of potential threat based on formalized criteria similar to those adopted in Red Lists. In this regard the "Norwegian Red List for Ecosystems and Habitat Types 2011" (Lindgaard and Henriksen, 2011) may be useful.

The List includes the following categories relating to vulnerability: 1) Disappeared, 2) Critically endangered, 3) Endangered, 4) Vulnerable, 5) Near threatened and 6) Ecologically satisfactory. The categories in this Red List are based on well-developed and formalized criteria. They relate the surface area of the seabed that needs to be protected relative to the vulnerability, distribution characteristics and present health of habitats.

The set of criteria for the Red List assessment of habitat types (ecosystems) is basically a quantitative method, and such an assessment should ideally be based on direct analyses of the risk of a habitat type (ecosystem) disappearing or of its original state being significantly changed. There are other examples of national assessments in Europe of habitat types (reviewed in the "Norwegian Red List").

The rank categories used in the "Norwegian Red List" are very similar to those used in the IUCN "Red List Categories and Criteria" for species: 1) Extinct, 2) Extinct in the Wild, 3) Critically Endangered, 4) Endangered, 5) Vulnerable, 6) Near Threatened, 7) Least Concern.

Notably in both the IUCN and Red List schemes, 'vulnerable' lies in between 'endangered ' and 'near threatened'.

It should be noted that "red listing" deep-sea species in the DSM context is unrealistic: in many cases it will be the problem of data deficiency. In the Red Lists there is a specific category "Data deficient". However, there should be sufficient data to assess a threat ("vulnerability") of habitat types/ecosystems through high resolution seafloor mapping. Assessing deep-sea habitats through greater mapping (achievable now at reduced cost through the use of Autonomous Underwater Vehicles – AUVs) might be achievable compared with determining the ranges of species, communities, and ecosystems.

This approach allows vulnerability to be related to the area impacted and the total area occupied by a habitat or species within a region. Thus, habitats and species may not be threatened over the whole geographic range of a species, even if there are significant local impacts. Thresholds can be set within individual mining licence blocks relating the area impacted by mining to the wider habitat area. This encourages innovative solutions to reducing the area impacted by plumes. Relating the distributions of ecosystems/ habitats/ species (how localised or widespread, how much restricted by depth, how vulnerable to recovery, how

connected and over what time scales) relative to their total ranges in a mining licence area and to the wider subregion (e.g. eastern, central, western CCZ, biogeographical zones, Mid Ocean Ridge depth, length and hydrothermal activity) is best approached through this spatial management approach. The management approach also takes account of representativity and source/sink populations (directional genetic connectivity) in the wider Regional Environmental Management Plan.

Code Project Issue Paper #12
Recommendations for Further Research

Code Project Issue Paper #12
Recommendations for Further Research

Lead Authors: Phil Weaver, David Billett, Andrey Gebruk, Daniel Jones, Telmo Morato

Following recent research into deep-sea ecosystems by projects such as MIDAS (http://www.eu-midas.net/) and JPI-Oceans (http://www.jpi-oceans.eu/ecological-aspects-deep-sea-mining), and recent applications where offshore mining licences within the NZ EEZ were not granted, a number of research areas have been identified to fill significant gaps in our knowledge of deep-sea ecosystems. References to the issues can be found in documents available on the MIDAS website and particularly in the MIDAS document "Implications of MIDAS Results for Policy Makers" (http://www.eu-midas.net/sites/default/files/downloads/MIDAS_recommendations_for_policy_lowres.pdf). The research will facilitate the definition of thresholds of impacts and to enable cost-effective and meaningful monitoring (both during and subsequent to mining). Some of the most important areas for further research are listed below.

Research needs related to plumes

Plumes were identified as one of the most critical potential impacts in deep-sea mining since they can spread harmful impacts across much wider areas than the area actually mined. Critical areas that need further research are

1. **The extent and duration of plumes.** Observational studies measuring the spatial extent and temporal duration of plumes caused by mining activities are required, taking into account bathymetric information from the claim area which can have a strong influence on plume behaviour. The information is needed to feed into improved modelling approaches suitable for the scale of mining activities, which tend to fall between local and global modelling approaches. Many biogeochemical and biophysical processes that take place in the environment are presently not taken into account in models, such as flocculation and resuspension. Furthermore, research into technological approaches and their efficacy for minimising plumes is needed. Experimental information should be collected from all three mineral types because the particle composition and the interaction of currents with the geomorphology will vary. Understanding the composition of deep-sea mining sediment plumes, namely composition, particle size, densities, settling velocities, flocculation rates, critical shear stress of erosion, critical shear stress of deposition, erosion rates, radioactivity, life time of metals and REE are all important to model plume behaviour and its likely impacts on biological communities.

2. **The survivability thresholds for different groups of seabed organisms due to the resedimentation of particles from plumes**. Experimental information needs to be collected from all three mineral types because the particle composition will vary.

Different plume characteristics, such as particle size, particle angularity, toxicity, density of particles, sedimentation depth and duration of the impact of the plume, are likely have impacts on the parts of the benthic ecosystem. Improved research is needed to understand the impact of plumes on 1) species survivability and life-history traits (e.g. growth, reproduction, respiration, vision and feeding capacity), and 2) larval development and settlement. These factors may also influence connectivity between populations resulting in isolation and loss of biodiversity. Survivability may depend on taxon and on the size class of the organisms. The fauna of many DSM areas (especially nodules and crusts) will be accustomed to very low levels of natural particle supply and so may be particularly affected. The impacts may be difficult to measure in the natural environment before commercial mining starts because scientific experiments will not be able to create particle clouds of comparable density and duration to those produced during mining. However, scientific research may be able to guide best practice in monitoring strategies during mining operations. Knowledge of plume dispersion is required to inform contractors not only within their contract areas and but also potentially their effects in adjoining contract areas. Experimental information needs to be collected from all three mineral types because the particle composition and the interaction of currents with the geomorphology will vary. Modelling of plume behaviour will be essential and should use bathymetric information from the claim area as local topography can have a strong influence on plume behaviour. The potential effects of plumes downslope of mining activities should be studied especially in relation to sulphides (mid ocean ridges) and cobalt crusts (seamounts).

3. **The effect of plumes in the water column** at all depths from just above the seabed to surface waters. Very little research has been carried out on potential impacts in the pelagic environment. Operational seabed plumes will affect specialist benthopelagic communities in the Benthic Boundary Layer (BBL). Plumes may come from a variety of other sources including: 1) the returned water once the ore slurries have been dewatered on the ship and 2) dewatering after trans-shipment of ores to transport barges (assuming this is done in a wet state). In all cases, further research of the potential harm of plumes in the pelagic environments (including the BBL) is required. Release of plumes in surface waters may introduce water of different salinity, temperature and nutrient content, altering sea surface phytoplankton and zooplankton communities with potential effects further up the food chain and in the dynamics of particle flux to the seabed. Surface or midwater discharges can also affect visual predators by reducing water clarity. Deeper discharges might impact gelatinous zooplankton communities which in some cases feed by catching particles in mucous nets. Factors that will need to be measured include particle size, particle angularity, density of particles, duration of the impact of the plume, chemical changes in the water column that can reduce oxygen concentrations and affect nutrient cycling. Some effects may be long lasting because small particles have extremely low settling rates. The salinity and temperature of the returned water may have significant effects if a plume is discharged at depth. This will depend on how quickly the returned water is diluted in the local environment. Small changes in temperature may have significant effects on

deep-sea organisms. In many cases little is known of the pelagic organisms and their interactions in these environments. Plumes in the water column may also impact migration of large animals, (including fisheries targeted species) that should also be taken into account.

4. **The potential toxicity of plumes**, particularly for SMS mining. The oxidation of sulphides generated by the mining process will lead to the release of harmful metals, such as copper, cadmium and arsenic. However, owing to the rapid dilution effect of mixing in the local environment it is uncertain how far the potential toxic effect will be transmitted. It is also uncertain how potential toxic effects from bioaccumulation of metals will be transferred in the food web.

5. **Possible mitigation measures.** Although flocculation is generally discouraged except during accidents at sea, it may have some value to DSM if engineering solutions cannot substantially restrict plume spread. The chemicals used in flocculation can have harmful effects on biota, but if used on benthic plumes they would only contaminate mined areas where the organisms have been removed. Assuming they are not persistent beyond a few years, the net effect of their use may be much reduced aerial impact. Research is needed to verify this option.

Research needs related to ecotoxicology

1. **The effects of toxicity from seafloor mining**. MIDAS showed that the potential effects of toxic metals do not change linearly with changing pressure and temperature; the effects may vary depending on which metal is considered. Responses of organisms are complex and more research is required to predict potential toxic impacts of the metals. These metals will vary depending on the mineralogy of the source mineral. Research should include work on sulphides generated by SMS mining, on heavy metals and toxic elements in crusts and, potentially, manganese nodules. Other factors that need research are the potential for greater toxic effects on larval stages and cumulative effects of toxicity over the long term (chronic effects).

2. **Potential toxic effects in the returned water and trans-shipment plumes** that could affect organisms throughout the water column (see above).

3. **Ecotoxicity measures and indicators**. Standard methods assessing contaminants and their ecotoxicological effects are generally based on the survival of shallow water/coastal indicator species (algae, mussels, etc.). Their relevance to determining thresholds in deep-sea species is uncertain, and questionable. New methods, or new species that can be used for experimental studies, are needed to develop ecotoxicological standards for deep-sea environments.

Research needs related to species connectivity

1. **Understanding how species make connections across their geographic range** is important to understanding how DSM will impact species distributions and their ability to recover from mining impacts. This is potentially a huge field since it requires knowledge of life cycle behaviour for each species or group of species. In most cases, deep-sea species are only known from a few occurrences (just single occurrences for many CCZ species). Modern research methods such as DNA taxonomy and modelling may help but much more effort is needed, including research into stepping stone dispersal pathways; larval dispersal patterns (which may follow different patterns in successive years); source-sink population dynamics, and the role of large-scale episodic events in driving intermittent genetic connectivity between localities. Research on rapid assessment and cost-effective monitoring methods, such as environmental DNA (e-DNA), is required. At a fundamental level, large databases of accurately defined taxa are needed. This information is vital for the design of effective conservation, EIS submission and regional environmental management plans. In its absence, the precautionary principle needs to be applied, i.e. slow, careful steps with small areas approved at a time.

2. **There is a need to understand the connectivity of vent and non-vent fauna**. In particular, information on vent fauna on mid-ocean ridges with different hydrothermal characteristics and spreading rates is required. There is very little information on connectivity of non-vent fauna which may be impacted by mining of inactive seafloor massive sulphide (SMS) deposits. Greater knowledge of connectivity is also required of fauna on and between seamounts, such as in the western Pacific seamount clusters, which are of interest to cobalt crust mining. This knowledge is needed not only for depths directly impacted by mining, but also in areas that might be affected by plumes. Processes leading to standardised morphological and molecular taxonomy are required (see ISA taxonomy workshop reports).

Research needs related to ecosystem function

1. **Measuring ecosystem functioning.** Mining large areas of the ocean floor can have important consequences for the structure and biodiversity of benthic food webs and key ecological processes (e.g., biomass production, organic matter cycling). Such ecosystem functions may be impaired adjacent to the mine sites due to 1) deposition of waste sediment and its transport in plumes, and 2) toxicity, particularly for SMS sites. All levels of the biological communities, including bacteria, could be affected. More sophisticated autonomous instruments are required to monitor ecosystem functions (respiration, carbon and nutrient cycling etc.). These technologies need to be designed for 1) routine application by mining contractors and 2) to enable monitoring over long periods. A particular concern is the impact of plumes on ecosystem function over long time periods, an impact that will be difficult to measure before mining begins. Information on ecosystem function is required to set standards and create thresholds

that should not be exceeded for spread of plumes. Greater knowledge is required of natural change in ecosystem functions, e.g. with seasons and variable physical oceanographic processes. Knowledge on the effects of sediment compaction and sediment dissolution (in the redeposited sediment) on ecosystem function.

2. **Technologies, sensors and methods using AUVs, ROVs, observatories and rovers are required for wide scale monitoring**, potentially with real-time independent transmission back to shore for use by the Mining Inspectorate. Precision biological sampling is required in relation to the fine-scale geomorphology now evident in many of the very high-resolution mapping studies.

Research needs related to ecosystem recovery

Very little is known about the recovery dynamics of species and communities in the deep sea, especially for polymetallic nodule and cobalt crust areas. If restoration measures become management objectives, then further research is required in the following areas:

1. **More work is needed on recovery** of key species and communities to understand larval settlement and recolonization dynamics which may vary between locations, e.g. under different productivity scenarios in the CCZ or at different depths on seamounts and mid-ocean ridges.

2. **The effects of sediment compaction** caused by the weight of seabed vehicles in nodule areas needs study as it may prevent recolonization.

3. **The possible impact of a semi-fluid sediment layer deposited behind the mining vehicle** on limiting the ability for organisms to return to mined areas also needs research.

4. **Research is needed on the effectiveness of possible mitigation strategies** (e.g. restoration actions, such as deployment of artificial substrates and nutrient enhancement of sediments in the CCZ; propagation and transplant to stimulate recovery in SMS and cobalt crust areas). Synthetic nodules could perhaps provide a replacement substrate for obligate nodule dwelling taxa in the CCZ, but only if the organisms respond to them and only if they can be emplaced on the seabed where they will remain. Restoration experimentation assessing different methods could be undertaken at the time of the next Benthic Impact Experiment (BIE) by a contractor.

Research needs related to wider issues

1. More basic knowledge gathering is needed in the areas surrounding mining claims to assess how similar the ecosystems are to those that will be mined and whether there are any special habitats/ecosystems in these areas that need conservation.

2. If test mining happens, some effort should be dedicated to monitoring, in particular the extent and impact of plumes.

3. The effects of noise at the seabed caused by mining vehicles; in the water column caused by the pumps along the riser; and at the surface caused by the mother ship and barges need to be researched. Regulations may be needed to identify sound channels that occur at certain depths where propagation of sound is more intense and that lead to mitigation strategies such as sound shielding or alternative depth placements.

4. The effects of light and vibration need to be addressed both on the seabed (if used) and on the ship where birds and other species may be affected by attraction to the locations.

Code Project Issue Paper #13
CCZ Environmental Management Plan

Code Project Issue Paper #13
CCZ Environmental Management Plan

Lead Author: Phil Weaver

Introduction

A Regional Environmental Assessment (REA) of the Clarion-Clipperton Fracture Zone (CCZ) was carried out in a project supported by the Kaplan Fund between 2002 and 2007. This culminated in a workshop in 2007 that proposed nine Areas of Particular Environmental Interest (APEIs) in the CCZ, each 400x400 km (ISBA/14/LTC/2). (Note: The APEIs were initially called Preservation Reference Areas.) The LTC took the recommendations of the Kaplan project as a basis to develop an Environmental Management Plan (EMP) for the CCZ (ISBA/17/LTC/7) that was approved by the ISA in 2012 (ISBA/18/C/22) for an initial three-year period. The Plan's guiding principles are the common heritage of mankind; the precautionary approach; protection and preservation of the marine environment; prior EIA; conservation and sustainable use of biodiversity; and transparency. A review of the EMP was carried out by the LTC in 2016 (ISBA/22/LTC/12). This review noted that the implementation of most of the measures in the plan had yet to take place.

Design principles for the CCZ-EMP

The design principles for the CCZ may form a good model for carrying out other Regional Environmental Assessments leading to EMPs. They are described in Wedding, et al., (2013) and listed below:

- The design of APEIs and their implementation should fit into the existing legal framework of the International Seabed Authority for managing seabed mining and protecting the marine environment.
- To the extent that it is scientifically sound, the proposed network should minimize socioeconomic impacts, i.e. respect existing mining claims and be adaptable.
- The APEI network should maintain sustainable, intact and healthy marine populations in the planning region. It should capture the full range of habitats and communities including species life-stages in the CCZ.
- The MPA network should take into account biophysical gradients, which affect the biogeography of marine biodiversity in the planning region.
- Each MPA should protect a full range of habitat types found within each subregion. Nine CCZ sub-regions allow for biogeographic representation (based on three north-south and three east-west strata, reflecting strong productivity-driven gradients).

- Each MPA should be large enough to maintain minimum viable population sizes for species potentially restricted to a subregion. To allow for appropriate dispersal of larvae each APEI was defined as a 200x200 km box (40,000 km2).
- Each MPA should be surrounded by a buffer zone to insure that biota and habitats in the protected area are not affected by anthropogenic threats occurring outside the MPA. The buffer zones were set at 100 km to protect from the impact of plumes generated by the mining activities.
- The boundaries of the APEIs should be straight lines to facilitate rapid recognition and compliance.

Recent scientific research has indicated other criteria that should be taken into account when designing regional environmental management plans, including:

- The APEI network should protect *at least* 30% of the total management unit and should conserve at least 30% of discrete seafloor features (i.e., seamounts, active and inactive hydrothermal vents, transform faults).
- APEIs should be representative of the regional seascape in terms of continuous functions (i.e., depth, POC flux, slope, projected climate change variables).
- Placement of APEIs within the network should capture areas currently thought to be ecologically and/or evolutionarily important, as identified by scientific expert opinion.

Positive aspects of the CCZ-EMP

- The APEIs cover extensive areas, each one being 400x400 km, giving a total area of protection of 1,440,000 km^2, which is roughly 25% of the area of the CCZ (depending on how the CCZ boundaries are calculated).
- The plan was expert driven (science based) but had buy-in from all stakeholders.
- The review (ISBA/22/LTC/12) laid out a clear way forward that should strengthen the conservation measures across the CCZ.
- A recent review also called for two additional APEIs to be established in areas where large gaps occur between APEIs.

Issues with the CCZ-EMP

- **The small amount of data available to the Authority for the whole CCZ region**. The original CCZ EMP was based on very few actual data. The APEI plan was developed using proxies related to strong depth and surface ocean productivity-driven gradients. This produced nine sub-regions in the CCZ with different environmental characteristics. No actual data for the APEI regions were available at the time. The 2016 review of the CCZ EMP noted that three of the nine APEIs still had no data and that much of the environmental information had been generated from independent research projects. The

amount of data was also restricted in quantity and very few studies have been published in the open scientific literature. This lack of data could call into question the scientific validity of the CCZ EMP approach because the full range of habitats and communities present in the contractor areas may not be represented in the APEIs. In addition, no APEIs are located in the central area of the CCZ. Information is only just being gathered on the ranges of individual species and shows considerable variation between taxa. Some species may show ranges restricted to a few hundred kilometres, although this may be related also to the low sampling effort. A precautionary approach might suggest APEIs should be spaced less than 1000 km apart. Open sharing of contractor-collected environmental data and the encouragement, or the requirement, for contractors to collect data outside their contract areas, including in APEIs, would enhance the volume of data available.

- **The timing of the introduction of the APEIs**. Ideally the CCZ EMP would have been established before exploration contracts were awarded and following an assessment of large amounts of environmental data. In practice, owing to the paucity of data, the APEIs were established after a number of contracts had been awarded. Environmental Management Plans, wherever possible, should be introduced before exploitation occurs and last throughout the period of mining activities. Periodic reviews of the CCZ EMP and the number and siting of the APEIs should be established every 5 years.

- **Traditional conservation measures in the CCZ EMP**. Additional smaller APEIs may be required in the central portion of the CCZ in between the existing areas that have been licenced. In addition, each contractor will need to identify Preservation Reference Zones (PRZs) and Impact Reference Zones (PRZs) as part of their EIA process. The number size and siting of the PRZs are not considered at present in the CCZ EMP. Given that the CCZ-EMP is effectively a Regional Environmental Management Plan (REMP), it should include more detailed guidance on how the PRZs should be established and managed as a coherent network.

- **Mechanisms for independent monitoring** within contract areas, including in the Preservation Reference Zones (PRZs) and within the APEIs need to be established to evaluate impacts in each of these areas. Verification is required that PRZs and the APEI core areas have not been impacted by mining activities. Monitoring is also needed to assess how effective the APEIs are in contributing to the environmental goals under which they were established.

- **How the CCZ EMP fits in the context of an overarching Strategic Environmental Policy for the Area**. This has yet to be developed by the Authority.

- **Sub-regional EMPs.** It is possible that in such a vast area as the CCZ, sub-regional environmental management plans may be required.

- **Poor implementation.** The review of the EMP by the LTC in 2016 listed 13 measures that should have been carried out, of which only the creation of the nine APEIs and the

convening of the three workshops on taxonomy had been implemented.

- **Working with other international organisations**. Intergovernmental organizations should be encouraged to adopt compatible measures for other activities that may affect the environment in the APEI network (for example, fishing, shipping, ocean dumping) with exchange of information of mutual interest.

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