

# THE OCEAN FOUNDATION

Deep Seabed Mining (DSM) Risk and Liability Considerations

*This is a living document, prepared by Bobbi-Jo Dobush at The Ocean Foundation and based on the references cited herein and on countless conversations and exchanges with many others. It is subject to update and addition.*

## **I. Introduction**

This report provides an introduction to considerations relevant to countries sponsoring deep seabed mining (DSM) activities, or considering it. The report is particularly geared to countries that are considering sponsoring corporations, and relevant information is given about corporations that currently have sponsorship contracts for deep sea mineral exploration.

Following brief background (Section II), this report is divided into topics for consideration: Market and Technology (Section III); Blue Economy Funding (Section IV); Compensation and Liability (Section V); the International Seabed Authority (Section VI); Partnerships (Section VII); Environmental (Section VIII); Social License (Section IX); and Emerging (Section X). For each section, the risks of supporting DSM – often exacerbated by uncertainties, are enumerated. Note that some considerations relevant to DSM in a nation’s Exclusive Economic Zone (EEZ) or in the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction (the Area)<sup>1</sup> are at times identical and at times distinct; the report specifies this. Lastly, a Conclusion posits that the risk does not justify the potential reward. (Section XI).

## **II. Background**

A nation may support DSM in its EEZ and in the Area. All potential DSM in the Area is governed by the International Seabed Authority (ISA). Negotiations toward regulations for commercial exploitation of the seafloor in the Area (“exploitation regulations”) are ongoing. At the ISA, member states of the United Nations Convention on the Law of the Sea (UNCLOS) have been tasked with creating rules and regulations surrounding the protection, exploration, and exploitation of the seabed in areas that lie outside the jurisdiction of individual countries since 1994. In June 2021, the Pacific Island state Nauru formally announced its desire to commercially mine the seabed floor, setting off a two-year countdown found in UNCLOS to encourage the adoption of regulations – now casually named the “two-year rule.” Exploitation regulations are currently far from finished. However, this “rule” is a potential legal loophole, as the current lack of adopted regulations will allow mining applications to be considered for provisional approval. With the July 9, 2023 deadline quickly approaching, the “what-if” question revolves around what will happen if a state submits a plan of work for mining after this date with no adopted regulations in place. Though Member States worked diligently during the March meetings, they realized regulations will not be adopted by the July deadline. They agreed to continue discussing this “what-if” question intersessionally before the July meetings to properly ensure mining does not go forward in the absence of regulations.

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<sup>1</sup> United Nations Convention on Law of the Sea (UNCLOS) Article 1(1).

### III. Market and Technology Considerations

Rapid decarbonization of our energy system is necessary to avoid catastrophic collapse of natural systems. However, by the time seabed minerals could come to market, innovations in battery technology and in recycling may have rendered them obsolete. Further, processing minerals from the seabed will create byproducts for which there are no known markets (wastes). Relatedly, the technology is so complicated, and so untested, that many believe it is not technically feasible to extract and process seabed minerals at scale (as least not for any reasonable cost). These considerations are the same for DSM in the Area or in a nation’s EEZ.

#### A. Seabed Minerals Are Not Necessary for a Green Transition, or To Decarbonize

##### 1. Modeling Mineral Demand Is Highly Uncertain, Due to Rapid Innovation

In the short term, decarbonization may require increased supply of certain metals, including those found in polymetallic nodules. However, technology is evolving rapidly in the battery and electrification sector, and modeled assumptions vary widely. For example, for one oft-cited demand scenario, “assumed recycling rates, assumptions on decreasing material intensity across technologies, the deployment of backstop technologies or the assumed average size of EV batteries had significant impact on a model’s results.”<sup>2</sup> This holds true for all modeling of mineral demand, as “[a]ssumptions on which projections are based are subject to considerable uncertainties and are likely to evolve substantially over the coming decades.”<sup>3</sup> In quantitative terms, identified land-based resources for copper, nickel, cobalt, and manganese have all increased since the mid-1990s. A 2020 study commissioned by the ISA found that the exhaustion of raw material bases of industrial metals in general is a distant prospect.<sup>4</sup>

2020 ISA Study	Reserves	Resources
Cobalt <sup>5</sup>	45 years	100 years +
Manganese <sup>6</sup>	70-90 years	150-200 years
Copper <sup>7</sup>	40 years	100+ years
Nickel <sup>8</sup>	40+ years	60+ years

<sup>2</sup> An investigation into seabed mineral and minerals, 2020 WWF, [https://wwfint.awsassets.panda.org/downloads/an\\_investigation\\_into\\_deep\\_seabed\\_mining\\_and\\_minerals\\_for\\_wwf\\_full\\_report\\_2020.pdf](https://wwfint.awsassets.panda.org/downloads/an_investigation_into_deep_seabed_mining_and_minerals_for_wwf_full_report_2020.pdf).

<sup>3</sup> Miller, KA; Brigden, K; Santillo, D; Currie, D; Johnston, P; Thompson, KF, Challenging the Need for Deep Seabed Mining From the Perspective of Metal Demand, Biodiversity, Ecosystems Services, and Benefit Sharing, <https://doi.org/10.3389/fmars.2021.706161>.

<sup>4</sup> Laptava Anna, Chernova Alexandra, Khodina Marina, Mustafa Tatiana, Mustafina Farida, and Smolnikova Anastasiya from All-Russian Scientific-Research Institute of Mineral Resources Named after N.M. Fedorovsky (FSBI “VIMS”). Study of the Potential Impacts of Polymetallic Nodules Production from the Area on the Economics of Developing Land-based Producers of those Metals which are Likely to be Most Seriously Affect, Report to the International Seabed Authority (advanced unedited version), 12 May 2020, <https://www.isa.org.jm/wp-content/uploads/2022/06/impactstudy.pdf> (hereinafter ISA Metals Study).

<sup>5</sup> ISA Metals Study, para. 761.

<sup>6</sup> ISA Metals Study, para. 775.

<sup>7</sup> ISA Metals Study, para 45.

<sup>8</sup> ISA Metals Study, para XX.

### 2. Innovation May Outpace Demand for New Sources of Minerals, Including Cobalt & Nickel

First, it is important to note that lithium, the key component in current large batteries, is not found in relevant quantities in the polymetallic nodules found in licensed areas of the Clarion Clipperton Zone. A November 2022 study found that “the adoption of different chemistries for electric vehicle batteries and moving away from lithium-ion batteries for stationary applications could reduce the total demand for cobalt, nickel, and manganese by 40-50% of cumulative demand between 2022 and 2050 compared to current technologies and business-as-usual scenarios.”<sup>9</sup>

Battery technology is evolving and altering the market, with innovations that require no or little nickel or cobalt, two of the minerals sought after in nodules. Proponents of innovations away from these metals believe that reducing dependence on and demand for them will have the co-benefits of limiting terrestrial mining, easing some geopolitical concerns, and avoiding DSM.<sup>10</sup>

Companies are investing heavily in alternatives to traditional nickel- and cobalt-based batteries. For example, Clarios, a global leader in battery technology, has paired up with Natron Energy Inc. to mass produce sodium-ion batteries which do not contain minerals like cobalt, nickel, or copper.<sup>11</sup> Electric vehicle producers are also utilizing new technologies to decrease their need for deep seabed minerals. Tesla currently uses a lithium iron phosphate (LFP) battery in all Model Y and Model 3 cars, requiring no nickel or cobalt.<sup>12</sup> Similarly, the world’s number two electric carmaker, BYD, announced plans to move to LFP batteries and away from nickel-, cobalt-, and manganese (NCM)-based batteries.<sup>13</sup>

A study commissioned by the ISA itself found that “changes in the chemical composition of lithium-ion batteries aimed at the complete replacement of cobalt or at reducing its content may reduce the potential consumption of cobalt.”<sup>14</sup> TMC has recognized this risk, stating in its U.S. Securities Exchange Commission (SEC) filing, Form S-1 Registration statement that, “[t]echnology changes rapidly in the industries that utilize our materials. If these industries introduce new technologies or products that no longer require the metals that we intend to collect and process, or if suitable substitutes become available, it could result in a decline in demand for our metal products.”<sup>15</sup>

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<sup>9</sup> Moana Simas, Fabian Aponte, and Kirsten Wiebe (SINTEF Industry), Circular Economy and Critical Minerals for the Green Transition, pp. 4-5.

[https://www.fint.awsassets.panda.org/downloads/the\\_future\\_is\\_circular\\_\\_\\_sintefmineralsfinalreport\\_nov\\_2022\\_\\_\\_1\\_\\_\\_1.pdf](https://www.fint.awsassets.panda.org/downloads/the_future_is_circular___sintefmineralsfinalreport_nov_2022___1___1.pdf)

<sup>10</sup> See, e.g., The Ocean Foundation blog series, <https://oceanfdn.org/deep-seabed-minerals-green-transition-part-1/>

<sup>11</sup> <https://www.clarios.com/news-views/news-detail/2022/05/04/natron-collaborates-with-clarios-on-world-s-first-mass-manufacturing-of-sodium-ion-batteries>

<sup>12</sup> <https://www.businessinsider.com/tesla-use-cobalt-free-batteries-in-model-3-production-china-2020-9?r=US&IR=T>

<sup>13</sup> <https://www.mining.com/world-no-2-electric-carmaker-goes-entirely-nickel-cobalt-free/>

<sup>14</sup> ISA Metals Study, para. 771.

<sup>15</sup> TMC S-1 Registration Statement Post-Effective Amendment No. 1, April 13, 2022,

<https://www.sec.gov/ix?doc=/Archives/edgar/data/0001798562/000110465922045575/tmc-20211231xs1.htm> (hereinafter TMC S-1, Apr. 2022), p. 21.

### 3. The circular economy is taking shape.

The circular economy is now the subject of serious interest by investors and entrepreneurs. A recent report indicates just 8.6% of the world's materials are part of a circular economy.<sup>16</sup> Recent research also indicates that by 2050, 45–52% of cobalt, 22–27% of lithium, and 40–46% of nickel could be supplied from recycled materials.<sup>17</sup>

The revenue potential for an EV circular economy is estimated to reach \$10 billion in 2030.<sup>18</sup> Infrastructure for the EV and electronics circular economies have seen attention and improvement in the past few years. Tesla Co-founder JB Straubel's Redwood Materials company plans to spend \$3.5 billion to build a new EV battery recycling and materials plant in Nevada.<sup>19</sup> Solvay, a chemical company, and Veolia, a utilities business, joined forces to develop a circular economy consortium for LFP battery metals.<sup>20</sup> This consortium aims to aid in the development of a recycling value chain.

The World Economic Forum anticipates the consumer electronics market to reach \$1.7 trillion by 2024, but highlights that studies show only 20% of electronic waste is recycled.<sup>21</sup> A circular economy for electronics would increase that percentage, and with a case study analysis of smartphones, recycling materials from smartphones alone is expected to generate a value of \$11.5 billion.<sup>22</sup> Electronics companies are also moving toward circularity and are similarly considering the end of life for products. A 2020 study commissioned by the ISA found that use of secondary or recycled cobalt,<sup>23</sup> copper,<sup>24</sup> nickel,<sup>25</sup> and manganese<sup>26</sup> will grow as part of the general trend to recycle minerals.<sup>27</sup>

#### B. Vast Uncertainties About Processing Metals from Nodules

TMC refers to nodules in shorthand as a “battery in a rock”. Metals have never been extracted at commercial scale from nodules. TMC's amended Form S-1 Registration Statement states that “the polymetallic nodules that we may recover will require specialized treatment and processing and there is no certainty that such processes will result in a recovery of metals that is consistent with our expectations.”<sup>28</sup>

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<sup>16</sup> <https://www.circularity-gap.world/2022>

<sup>17</sup> Jessica Dunn, Alissa Kendall, Margaret Slattery, Electric vehicle lithium-ion battery recycled content standards for the US – targets, costs, and environmental impacts, Resources, Conservation and Recycling, <https://doi.org/10.1016/j.resconrec.2022.106488>.

<sup>18</sup> <https://www.bcg.com/publications/2020/case-for-circular-economy-in-electric-vehicle-batteries>

<sup>19</sup> <https://www.forbes.com/sites/alanohnsman/2022/07/25/tesla-cofounder-is-building-a-35-billion-plant-to-make-ev-battery-parts-in-the-us/?sh=39b65769782c>

<sup>20</sup> <https://ellenmacarthurfoundation.org/articles/a-circular-economy-for-batteries-to-underpin-renewable-energy-growth>

<sup>21</sup> [https://www3.weforum.org/docs/WEF\\_A\\_New\\_Circular\\_Vision\\_for\\_Electronics.pdf](https://www3.weforum.org/docs/WEF_A_New_Circular_Vision_for_Electronics.pdf)

<sup>22</sup> <https://ellenmacarthurfoundation.org/circular-consumer-electronics-an-initial-exploration>

<sup>23</sup> ISA Metals Study, para. 282.

<sup>24</sup> ISA Metals Study, para. 742.

<sup>25</sup> ISA Metals Study, para. 758.

<sup>26</sup> ISA Metals Study, para. 778.

<sup>27</sup> ISA Metals Study, para. 282.

<sup>28</sup> TMC S-1, Apr. 2022, p. 24.

TMC notes also that it will rely on equipment that has been neither manufactured nor tested, and that “there is a risk that such processing and refining may not be economically viable and/or that the nodules will contain elements or compounds that would render them unsuitable for selected processing and refining ...”<sup>29</sup>

TMC had previously pursued a collaboration MoU with Epsilon Carbon Pvt, LTD. to build a processing plant in India, but that work is been paused due to capital concerns.<sup>30</sup> TMC is now pursuing an MoU for processing with Pacific Metals Co, Ltd. (PAMCO) of Japan; however a binding MoU had not been entered into as of March 31, 2023, when TMC issued a quarterly financial report.<sup>31</sup>

### C. Market Uncertainties, Especially for Manganese

TMC recognizes that demand fluctuations may affect its ability to sell its product, as the company is relying on expected growth in demand for EV minerals.<sup>32</sup> A 2020 study commissioned by the ISA found that there is high uncertainty around “the level of prices for commercial metals, which will be formed in the market by the time the contractors are ready to start production: it could be such that the contractors' work is not profitable.”<sup>33</sup>

For manganese, TMC’s “proposed full scale production plans would involve placing a large percentage of global manganese production in the market” which it may be difficult to sell, and which may drive down prices.<sup>34</sup> Specifically, the manganese silicate TMC as suggested may be useful for steel production “does not yet have recognition in the marketplace” which raises concerns regarding whether mineral processors would buy the product. Further, this non-conventional mineral product “may require additional approvals for export and import.”<sup>35</sup>

“In addition [TMC’s] financial success in part will depend in part on the expansion of the global manganese market to consume the additional volume of manganese that [the company] intend[s] to produce.”<sup>36</sup> If manganese silicate does not become a sought-after commodity, it would be a liability: a waste product to be disposed of.

## IV. Compatibility with a Sustainable Blue Economy & Blue Economy Funding

Some countries and regions are exploring DSM under the umbrella of the blue economy.<sup>37</sup> However, many actors, including funders, are explicitly excluding DSM from their definition of a blue economy. For example, the United Nations Environment Programme Finance Initiative (UNEP FI) released a 2022 report – targeted toward audiences in the financial sector, like

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<sup>29</sup> TMC S-1, Apr. 2022, p. 24.

<sup>30</sup> TMC 10Q <https://www.sec.gov/ix?doc=/Archives/edgar/data/0001798562/000110465923037110/tmc-20221231x10k.htm> (hereinafter TMC 10-Q), p. 97

<sup>31</sup> TMC 10Q, p. 97.

<sup>32</sup> TMC S-1, Apr. 2022, p. 21.

<sup>33</sup> ISA Metals Study 795.

<sup>34</sup> TMC S-1, Apr. 2022, p. 21.

<sup>35</sup> TMC S-1, Apr. 2022, p. 21.

<sup>36</sup> TMC S-1, Apr. 2022, p. 21.

<sup>37</sup> See, e.g. <https://www.iora.int/en/priorities-focus-areas/blue-economy>; <https://sdgs.un.org/partnership-progress/fostering-cooperation-promote-sustainable-development-africas-deep-seabed-0> (project led by Norway, a DSM proponent)



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## Deep Seabed Mining (DSM) Risk and Liability Considerations

banks, insurers, and investors – on the financial, biological, and other risks of deep seabed mining.<sup>38</sup> The report concludes “there is no foreseeable way in which the financing of deep-sea mining activities can be viewed as consistent with the Sustainable Blue Economy Finance Principles.”<sup>39</sup> UNEP FI is a partnership between UNEP and the global financial sector to mobilize private sector finance for sustainable development and it is important because it works with more than 450 banks, insurers, and investors and over 100 supporting institutions. The Task Force on Nature Related Financial Disclosure is an initiative “financed by governments, the UN and philanthropic foundations and, at present, hosts 75 organizations from the private and public sectors.” While TNFD guidance is still under development, it looks to the UNEP FI report to provide key content on nature, finance and business.<sup>40</sup>

In September 2022, the United States announced the first-ever U.S. Pacific Partnership Strategy for the Pacific Islands including a commitment of \$810 million, \$130 million of which is directed for climate finance.<sup>41</sup> Pressure is mounting against DSM in the United States, and that pressure could impact financing priorities. The three states that make up the U.S. Pacific coast have bans on DSM in their waters<sup>42</sup>, and Hawai’i is evaluating the same. Guam came out with a strong resolution calling on the U.S. federal government to implement a moratorium in the US EEZ and on the ISA to implement a moratorium on DSM in the Area.<sup>43</sup> At the third part of the 27<sup>th</sup> Session of the ISA, held in October and November 2022 (ISA 27-III), the United States (an Observer at the ISA) noted that the country’s EEZ & continental shelf are “immediately adjacent” to the CCZ and that broad interests including “indigenous communities that rely on an accessible and sustainable marine environment have the potential to be directly impacted by negative impacts and effects from exploitation activities in the Area.”<sup>44</sup>

The French government has explicitly called for a global ban on DSM, making clear that they seek such a ban in the Area, and will implement it in waters under France’s jurisdiction.

Banks are also beginning to evaluate whether commitments they have already undertaken implicitly prohibit financing for DSM projects. For example, the Equator Principles require all projects to comply with guidance around Free, Prior, and Informed Consent (FPIC) from Indigenous Peoples.<sup>45</sup> As conversations about various peoples’ relationship to the deep ocean and about underwater cultural heritage in jeopardy from DSM intensify, these commitments are being evaluated more closely. Banks that have pledged to avoid deep-sea mining financing include French multinational Credit Suisse,<sup>46</sup> British lenders Lloyds, NatWest, and Standard

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<sup>38</sup> <https://www.unepfi.org/publications/harmful-marine-extractives-deep-sea-mining/>

<sup>39</sup> <https://www.unepfi.org/publications/harmful-marine-extractives-deep-sea-mining/>

<sup>40</sup> <https://tnfd.global/news/june-newsletter-tnfd-releases-v02-of-beta-framework/>

<sup>41</sup> <https://www.whitehouse.gov/briefing-room/statements-releases/2022/09/29/fact-sheet-roadmap-for-a-21st-century-u-s-pacific-island-partnership/>

<sup>42</sup> [https://leginfo.ca.gov/faces/billCompareClient.xhtml?bill\\_id=20210220AB1832&showamends=false](https://leginfo.ca.gov/faces/billCompareClient.xhtml?bill_id=20210220AB1832&showamends=false) (California), <https://app.leg.wa.gov/billsummary?BillNumber=5145&Initiative=false&Year=2021> (Washington), [https://oregon.public.law/statutes/ors\\_274.610](https://oregon.public.law/statutes/ors_274.610) (Oregon).

<sup>43</sup> [https://www.guamlegislature.com/36th\\_Guam\\_Legislature/COR\\_Res\\_36th/Res.%20No.%202010-36%20\(COR\).pdf](https://www.guamlegislature.com/36th_Guam_Legislature/COR_Res_36th/Res.%20No.%202010-36%20(COR).pdf)

<sup>44</sup> Statement of the United States at ISA 27-III, November 4, 2022.

<sup>45</sup> See, e.g., Guidance Note: Evaluating Projects with Affected Indigenous Peoples. [https://equator-principles.com/app/uploads/Affected\\_Indigenous\\_People\\_Sep2020.pdf](https://equator-principles.com/app/uploads/Affected_Indigenous_People_Sep2020.pdf)

<sup>46</sup> <https://www.credit-suisse.com/media/assets/corporate/docs/about-us/responsibility/banking/policy-summaries-en.pdf>

Chartered, Dutch bank ABN Amro, and Spanish group BBVA.<sup>47</sup> ABN Amro pledged to avoid DSM after it experience major losses following the Nautilus Minerals bankruptcy.<sup>48</sup>

An October 2022 WWF report analyzed current investment in seabed mining, and compiled a list of banks and institutions that have committed not to invest in DSM:

- The European Investment Bank excludes DSM as “Projects unacceptable in climate and environmental terms”.
- The IUCN: “Deep-sea mining should be halted until the criteria specified by IUCN are met”.
- The European Parliament called for a moratorium on DSM.
- The World Bank urged caution in Deep-sea mining in the Pacific.
- The UNEP: “the sustainable blue economy is a goal for the wider blue economy, and therefore excludes non-renewable extractive industries (e.g., offshore oil and gas, and deep-sea mining) as well as unsustainable practices in other sectors.”
- The UNEP guide to “Harmful marine extractives: Deep-sea mining”: “In their current form, there is no foreseeable way in which the financing of deep-sea mining activities can be viewed as consistent with the Sustainable Blue Economy Finance Principles.”
- The UNCTAD (United Nations Conference on Trade and Development): “industries that are known to pose a high risk to the environment are excluded ... [including] offshore oil and gas, deep- and ultra-deep-water oil and gas, marine and seabed mining.”
- The High-Level Panel for a Sustainable Ocean Economy stated that DSM “is conceptually difficult to align with the definition of a sustainable ocean economy.”<sup>49</sup>

## V. Compensation and Liability Considerations

The potential liabilities associated with DSM are varied and complex. In the Area, liabilities can be broken down into those governed by the ISA regime, and those not governed by the ISA regime (including both for harm to resources in the Area and for harm to resources in the EEZs

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<sup>47</sup> <https://www.eco-business.com/news/credit-suisse-joins-growing-list-of-banks-shunning-deep-sea-mining/>;  
<https://shareholdersandinvestors.bbva.com/wp-content/uploads/2021/01/Environmental-and-Social-Framework-Dec.2020-140121.pdf>.

<sup>48</sup> Deep Seabed Mining: WWF’s guide for financial institutions (2022),  
[https://wwfint.awsassets.panda.org/downloads/wwf\\_briefing\\_financial\\_institutions\\_dsm.pdf](https://wwfint.awsassets.panda.org/downloads/wwf_briefing_financial_institutions_dsm.pdf)

<sup>49</sup> Deep Seabed Mining: WWF’s guide for financial institutions (2022), citing  
[https://www.eib.org/attachments/publications/eib\\_eligibility\\_excluded\\_activities\\_en.pdf](https://www.eib.org/attachments/publications/eib_eligibility_excluded_activities_en.pdf);  
<https://www.iucn.org/resources/issues-brief/deep-sea-mining>;  
<https://www.savethehighseas.org/2022/05/03/european-parliament-calls-once-again-for-a-moratorium-on-deep-sea-mining/>;  
<https://www.worldbank.org/en/news/press-release/2016/04/28/world-bank-report-urges-caution-in-deep-sea-mining-in-the-pacific>;  
<https://www.unepfi.org/publications/turning-the-tide/>;  
<https://www.unepfi.org/publications/harmful-marine-extractives-deep-sea-mining/>;  
[https://unctad.org/system/files/official-document/ditcted2020d4\\_en.pdf](https://unctad.org/system/files/official-document/ditcted2020d4_en.pdf);  
<https://oceanpanel.org/publication/ocean-solutions-that-benefit-people-nature-and-the-economy/>;  
<https://shareholdersandinvestors.bbva.com/wp-content/uploads/2021/01/Environmental-and-Social-Framework-Dec.2020-140121.pdf>.

of other states resulting from activities in the area). Lastly, there are national liabilities for mining in a state's own EEZ to be considered.

Uncertainty pervades throughout all of these governance spheres. In fact, eight reports and a synthesis dedicated to exactly this topic were commissioned by the ISA's Legal and Technical Commission (LTC) in 2017.<sup>50</sup> These issues remain largely unresolved.

This report seeks to unpack some key outstanding issues. There are many scenarios in which a state may be held liable for damages caused by DSM activities. If there were a liability incident, any injured party would likely seek recourse from all potentially liable parties. In the Area, the standard of liability for a Sponsoring State is negligence (states are required to take reasonable steps – a standard subject to interpretation – to ensure contractor compliance).<sup>51</sup> Were a contractor to be financially insolvent, it is all but guaranteed that those seeking recourse from liability would take a hard look at the Sponsoring State's laws, regulations, and administrative procedures looking for any negligence. Any conversation around Sponsoring State liability must also be informed by the fact that the contractors with whom some Sponsoring States have been working are undercapitalized and have a history of volatility. (See Section VII, Partnership Considerations for further details on risk related to TMC and Deep Sea Mining Finance Limited (DSMF)).

### A. Liability from Activities in the Area; ISA Regime

Liability in the Area is governed by UNCLOS and by the regulations being developed by the ISA. "Recognizing the centrality of liability rules for a responsible and effective exploitation regime, the Legal and Technical Commission (LTC) of the ISA identified "responsibility and liability" as a priority deliverable in the development of the Mining Code for the exploitation stage of deep seabed mining."<sup>52</sup> The resulting papers provide an incredibly rich starting point for discussions at the ISA. However, many, if not all - of these liability issues remain unresolved with many relevant provisions of the draft exploitation regulations still under negotiation.<sup>53</sup>

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<sup>50</sup> Centre for International Governance Innovation, <https://www.cigionline.org/series/liability-issues-deep-seabed-mining-series/> ("The Liability Issues for Deep Seabed Mining project was developed by the Centre for International Governance Innovation (CIGI), the Commonwealth Secretariat and the Secretariat of the International Seabed Authority (ISA) to assist in clarifying legal issues of responsibility and liability underpinning the development of exploitation regulations for the deep seabed. CIGI, in collaboration with the ISA Secretariat and the Commonwealth Secretariat, in 2017, invited leading legal experts to form the Legal Working Group on Liability for Environmental Harm from Activities in the Area to discuss liability related to environmental damage, with the goal of providing the Legal and Technical Commission, as well as members of the ISA with an in-depth examination of potential legal issues and avenues.")

<sup>51</sup> Seabed Disputes Chamber of the ITLOS, Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area (2011), Advisory Opinion, No 17 (SDC Advisory Opinion 2011) para 110; [https://www.itlos.org/fileadmin/itlos/documents/cases/case\\_no\\_17/17\\_adv\\_op\\_010211\\_en.pdf](https://www.itlos.org/fileadmin/itlos/documents/cases/case_no_17/17_adv_op_010211_en.pdf)

<sup>52</sup> ISBA/22/C/17, Annex II [https://isa.org.jm/files/files/documents/isba-22c-17\\_1.pdf](https://isa.org.jm/files/files/documents/isba-22c-17_1.pdf); Legal Liability for Environmental Harm: Synthesis and Overview, p. 2 [https://www.cigionline.org/static/documents/documents/Deep%20Seabed%20paper%20no.1\\_3.pdf](https://www.cigionline.org/static/documents/documents/Deep%20Seabed%20paper%20no.1_3.pdf)

<sup>53</sup> See, e.g., ISBA/27/C/IWG/IM/CRP.1/Rev.1 Draft regulations on exploitation of mineral resources in the Area Part I, Part II (Regulation 5), Part V, Part VIII (Appendix II) [https://isa.org.jm/files/files/documents/The\\_co-facilitators%27\\_revised\\_text.pdf](https://isa.org.jm/files/files/documents/The_co-facilitators%27_revised_text.pdf); ISBA/27/C/IWG/ICE/CRP.1/Rev.2 Draft regulations on exploitation of mineral resources in the Area Part XI: Regulations 96 to 105, [https://isa.org.jm/files/files/documents/ICE\\_facilitator%27s\\_revised\\_text.docx](https://isa.org.jm/files/files/documents/ICE_facilitator%27s_revised_text.docx)



### a. Financial Guarantee for Exploration Contracts

Even the ISA regulations for mineral exploration, which are finished, leave many well-recognized open questions regarding liability.<sup>54</sup> It is also unclear to what extent the ISA's exploration regulations are being followed. For example, at ISA 27-III, questions were raised regarding the payment required under Exploration Regulation 33(8) (requiring payment of a financial guarantee to the ISA by exploration contractors "prior to the commencement of testing of collecting systems.")<sup>55</sup> Despite the fact that TMC was, concurrently with ISA 27-III, testing a collector system in the CCZ, information on whether TMC had provided the financial guarantee required under the exploration regulations had not been shared with the ISA's Council. If something were to go wrong during testing, it is unclear whether monies would be available to pay for any liabilities incurred.

### b. Effective Control

Sponsoring states must have "effective control" over the companies they sponsor, but the ISA has not explicitly defined what that means.<sup>56</sup>

Questions regarding effective control and transfer of rights were raised at recent ISA sessions, including regarding the process to follow if a contractor has a change of control.<sup>57</sup> During a discussion on transfer of rights and obligations, the question was asked as to whether the scenario in which a current ISA contractor is bought in its entirety is covered by a draft document on 'transfer of rights', or whether it falls outside the scope of this document.<sup>58</sup> For example, an Observer noted that this situation is directly applicable to a recent instance where a contractor came under new ownership and the rights and obligations of the contractor's prior and new ownership are unclear.<sup>59</sup>

Questions of effective control came up again in the first meeting of the ISA's 28<sup>th</sup> session in March 2023 (ISA 28-I) regarding the transfer of United Kingdom Seabed Resources from the United States' based Lockheed Martin to the Norwegian Loke Minerals.<sup>60</sup> One of the papers commissioned by the ISA on liability studied the issue of effective control under the convention

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<sup>54</sup> For example, the Exploration Regulations do not define what constitutes compensable damage. See Legal Liability for Environmental Harm: Synthesis and Overview, p. 15 [https://www.cigionline.org/static/documents/documents/Deep%20Seabed%20paper%20no.1\\_3.pdf](https://www.cigionline.org/static/documents/documents/Deep%20Seabed%20paper%20no.1_3.pdf), citing SDC Advisory Opinion 2011, para 179.

<sup>55</sup> Statement by Observer The Ocean Foundation (on behalf of itself and the Pew Charitable Trusts) on November 3, 2022.

<sup>56</sup> ISA Mining Code, Exploration Regulations, Reg. 9 [https://isa.org.jm/files/files/documents/isba-19c-17\\_0.pdf](https://isa.org.jm/files/files/documents/isba-19c-17_0.pdf)

<sup>57</sup> ISA 27<sup>th</sup> Session Part III Daily Bulletin, Meetings of the ISA Council, Day 4, 3 November 2022. <https://mailchi.mp/58b0934b5e8d/27th-session-part-iii-bulletin-council-meetings-day-4> ("... questions were raised concerning the practicalities in relation to partial transfer of rights and the division of obligations, the transfer of confidential information, the explicit consent of the sponsoring State, effective control of the Sponsoring State(s), financial guarantee, the technical capability of the transferee and the fee associated with the procedure.")

<sup>58</sup> Statement by the Deep Sea Conservation Coalition at ISA 27-III, 3 Nov., 2022.

<sup>59</sup> Statement by the Deep Sea Conservation Coalition at ISA 27-III, 3 Nov., 2022.

<sup>60</sup> Statement by the Deep Sea Conservation Coalition at ISA 28-I, 24 March, 2023; see also <https://www.reuters.com/markets/deals/norways-loke-buys-uk-deep-sea-mining-firm-lockheed-2023-03-16/>

and concluded that the test must be an economic, not only regulatory, test: “An economic control analysis is also needed to fulfill the concept of “effective control” under [UNCLOS].”<sup>61</sup>

### **c. Pledging Contracts as Security Under Exploitation Regulations**

In another example, Draft Regulation 22 of the ISA’s current draft exploitation regulations raises the possibility of a contract being pledged as security.<sup>62</sup> As currently drafted, if a contractor were to go bankrupt, a lender is not obligated to pay the contractor’s obligations. This example further brings into question where, in what format, and in how much money would actually be set aside to fulfill various contractor obligations under the regulations. And, if the framing of current Draft Regulation 22 is simply an oversight, it provides an example of how much work remains to be done on the exploitation regulations.

### **d. Safe Harbor Via National Laws**

UNCLOS provides that a Sponsoring State shall not be liable for the damages caused by contractors “if “the State Party has taken all necessary and appropriate measures to secure effective compliance.”<sup>63</sup> UNCLOS Annex III elaborates that a Sponsoring State will not be liable if “that State Party has adopted laws and regulations and taken administrative measures which are, within the framework of its legal system, reasonably appropriate for securing compliance by persons under its jurisdiction.”<sup>64</sup>

However, any potential insulation from liability under this provision would be applicable only to damage in the Area, governed by UNCLOS (as opposed to liability governed under other international law, or for harm in a state’s own EEZ). Further, an argument could be made that a Sponsoring State has not met the standard of diligence – in other words, that its domestic legislation is not reasonably appropriate for securing compliance from a contractor.

The conversation on what is required of Sponsoring States is ongoing. A November 2022 book chapter found that, “[g]aps in current domestic legislation may entail non-compliance with [UNCLOS] Article 235, which entails a failure of a State’s due diligence obligations and has the potential to expose States to liability.”<sup>65</sup> The fact there is not an internationally agreed upon standard for complying with a Sponsoring States’ due diligence obligations means that if a liability incident were to occur, the state would be subject to uncertainty around both what the diligence standard is, and whether the state had complied with it.

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<sup>61</sup> Andres Sebastian Rojas and Freedom-Kai Phillips Effective Control and Deep Seabed Mining: Toward a Definition, p. 10. <https://www.cigionline.org/publications/effective-control-and-deep-seabed-mining-toward-definition-1/>

<sup>62</sup> President’s Text, 11 October 2022. [https://isa.org.jm/files/files/documents/Presidents\\_text\\_11\\_10\\_22.pdf](https://isa.org.jm/files/files/documents/Presidents_text_11_10_22.pdf)

<sup>63</sup> UNCLOS Article 139. [https://www.un.org/depts/los/convention\\_agreements/texts/unclos/unclos\\_e.pdf](https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf)

<sup>64</sup> UNCLOS, Annex III, Article 4(4). [https://www.un.org/depts/los/convention\\_agreements/texts/unclos/unclos\\_e.pdf](https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf)

<sup>65</sup> Proelss, A., Steenkamp, R.C. (2023). Liability Under Part XI UNCLOS (Deep Seabed Mining). In: Gailhofer, P., Krebs, D., Proelss, A., Schmalenbach, K., Verheyen, R. (eds) Corporate Liability for Transboundary Environmental Harm. Springer, Cham. [https://doi.org/10.1007/978-3-031-13264-3\\_13](https://doi.org/10.1007/978-3-031-13264-3_13)

### B. In the Area, outside of ISA Regime

Even if a Sponsoring State was found to be without liability under UNCLOS, claims could be filed under other “existing and future rules of international law,”<sup>66</sup> and “developing States... can be held liable for environmental harm caused by their sponsored entity.”<sup>67</sup> A liability scheme will require careful delineation of its scope and boundaries, however, the exploitation regulations are far from such precision. For example, an issue as foundational as what counts as an “activity” covered by the ISA regime are still under debate.<sup>68</sup> For example, a plume or noise generated in the Area could affect migratory animals in the Area that typically travel to an adjacent country’s EEZ (for example cetaceans or commercially important fish). There could also be damage to fisheries interests in the Area or liability under the auspices of the Intergovernmental Conference on an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (the BBNJ Treaty process).<sup>69</sup> The entire legal regime, including for ownership, liability, and compensation, surrounding marine genetic resources is currently in development under the auspices of the BBNJ Treaty process.<sup>70</sup> That the BBNJ process has not yet concluded contributes further uncertainty.

### C. Affecting other EEZs

“Activities in the Area could also result in damage to living and non-living resources, the marine environment, persons and property ... in areas under coastal state jurisdiction [and] the coastal state would prima facie be considered the injured state with sufficient legal interest to bring claims.”<sup>71</sup> Particular liabilities could result from sediment plumes or noise that carried into a State’s EEZ, discussed further in Section VIII, Environmental Considerations. Liabilities may also result from damage to tangible or intangible cultural heritage, archeological or paleontological remains, or existing or future marine genetic resources.<sup>72</sup>

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<sup>66</sup> Neil Craik, Determining the Standard for Liability for Environmental Harm from Deep Seabed Mining Activities, p. 5 <https://www.cigionline.org/publications/determining-standard-liability-environmental-harm-deep-seabed-mining-activities/>, citing UNCLOS Articles 139(2) and 304 (“Responsibility and liability for damage: The provisions of this Convention regarding responsibility and liability for damage are without prejudice to the application of existing rules and the development of further rules regarding responsibility and liability under international law.”)

<sup>67</sup> Jaeckel, A. (2020). Benefitting from the Common Heritage of Humankind: From Expectation to Reality, *The International Journal of Marine and Coastal Law*, 35(4), 660-681. <https://doi.org/10.1163/15718085-BJA10032> citing LOSC (n 4), Arts 139, 153(4); Annex III, Art 4(4); SDC Advisory Opinion 2011.

<sup>68</sup> Legal Liability for Environmental Harm: Synthesis and Overview, p. 2 [https://www.cigionline.org/static/documents/documents/Deep%20Seabed%20paper%20no.1\\_3.pdf](https://www.cigionline.org/static/documents/documents/Deep%20Seabed%20paper%20no.1_3.pdf)

<sup>69</sup> BBNJ Treaty website, <https://www.un.org/bbnj/>.

<sup>70</sup> BBNJ Treaty website, <https://www.un.org/bbnj/>

<sup>71</sup> CIGI, Legal Liability for Environmental Harm: Synthesis and Overview, p. 23 [https://www.cigionline.org/static/documents/documents/Deep%20Seabed%20paper%20no.1\\_3.pdf](https://www.cigionline.org/static/documents/documents/Deep%20Seabed%20paper%20no.1_3.pdf)

<sup>72</sup> Miller, KA; Brigden, K; Santillo, D; Currie, D; Johnston, P; Thompson, KF, Challenging the Need for Deep Seabed Mining From the Perspective of Metal Demand, Biodiversity, Ecosystems Services, and Benefit Sharing, <https://doi.org/10.3389/fmars.2021.706161>.

### D. Compensation and Liability Considerations in a State's EEZ

Were a state to undertake or allow DSM in its own EEZ, any harm could affect several industries including tourism and fisheries, both which rely on a healthy ocean ecosystem. International civil society has spoken loudly against DSM.

### E. Deep Ocean Restoration Has Been Estimated at Billions of Dollars

To put numbers to the liability risk discussed above, a recent study found that restoring only 10% of the 500,000 km<sup>2</sup> that may ultimately be mined in the Pacific would cost US\$50 billion, using conservative estimates.<sup>73</sup> The concept of natural capital is a tool to weigh the benefits that the complex deep ocean ecosystems provide to humanity. This concept takes into account not only ecosystem services but also effects on other uses of the deep ocean.<sup>74</sup>

## VI. ISA Related Considerations

There are four primary categories of risk associated with the ISA: regulatory risk (whether the ISA will approve regulations, or allow mineral exploitation under those regulations); financial risk (how the royalty or other financial regime approved by the ISA will affect the monies available to countries, including Sponsoring States, from DSM); reputational risk (legacy newspapers have reported on transparency issues at the ISA); and liability risk (discussed in Section V). These considerations are directly applicable to DSM in the Area, but may well have indirect effects (including reputational) on the feasibility DSM within a state's own EEZ.

### A. Regulatory Considerations

In June 2021, the Republic of Nauru invoked a legal provision sometimes called the “two year rule” which some allege requires the Council of the ISA to finish the mineral exploitation rules or otherwise approve mining contracts within two years (by July 2023).<sup>75</sup>

At ISA 27-III and ISA 28-I, a minority of states continued to call for moving ahead to finish the regulations by July 2023. Many states noted the vast amount of work yet to be done on the regulations. Belgium (a Sponsoring State), called “the likelihood that regulations, let alone the standards and guidelines or the royalty mechanism, would be finalized [by July 2023] is close to zero.”<sup>76</sup> Adoption of DSM exploitation regulations requires consensus in the council.<sup>77</sup> That consensus does not exist.

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<sup>73</sup> Amon, D.J., Levin, L.A., Metaxas, A., Mudd, G.M., Smith, C.R., Heading to the deep end without knowing how to swim: Do we need deep-seabed mining? *One Earth*. <https://doi.org/10.1016/j.oneear.2022.02.013>

<sup>74</sup> See, e.g., <https://naturalcapitalproject.stanford.edu/>; Thiele T., Damian H.-P., Singh P.: A Comprehensive Approach to the Payment Mechanism for Deep Seabed Mining, IASS Policy Brief (January 2021), Potsdam, DOI: 10.48440/iass.2021.004, p. 6.

<sup>75</sup> See, e.g., Singh, P. A. (2021). What Are the Next Steps for the International Seabed Authority after the Invocation of the ‘Two-year Rule’?, *The International Journal of Marine and Coastal Law*, 37(1), 152-165. doi: <https://doi.org/10.1163/15718085-bja10078>

<sup>76</sup> Statement by Belgium at ISA 27-III, 4 Nov., 2022.

<sup>77</sup> [https://isa.org.jm/files/files/documents/isba2-c-12\\_0.pdf](https://isa.org.jm/files/files/documents/isba2-c-12_0.pdf) Rules of Procedure of the Council of the International Seabed Authority, Rule 58; UNCLOS Art. 162(o).

In fact, the March 2023 ISA 28-I ended with 14 countries having made calls for DSM to be stopped. These include: Palau, Fiji, Samoa, Federated States of Micronesia (which have formed the Moratorium Alliance); New Zealand (which supports a conditional moratorium); Chile, Costa Rica, Dominican Republic, Ecuador, Spain, Panama, Germany, Vanuatu (which support a precautionary pause); and France (which has called for a total ban). Many more countries stated that they would not approve a mining application until the regulations were finished.<sup>78</sup>

There are legal bases for a moratorium on seabed mining. The various methods available under UNCLOS have been detailed in peer reviewed policy journals.<sup>79</sup> A recent legal opinion by Matrix Chambers found that the deferral of commercial DSM “is not only consistent with UNCLOS, it is actually required by it.”<sup>80</sup> The legal bases for not rushing to finalize the regulations, not approving a mining license without proper regulations, for a moratorium, and even for a ban were the topic of much discussion at ISA 27-III and ISA 28-I. On 4 November, 2022 the ISA Council had a formal session on the “what if” scenario (“what if” regulations are not finalized by July 2023 and an application for exploitation is presented by NORI). Various countries presented legal avenues available under UNCLOS.<sup>81</sup> At ISA 28-I, “[d]espite efforts to reach consensus on a decision addressing this scenario, the final outcome did not leave everyone satisfied. The decision to continue the intersessional dialogue without reaching consensus on a provision that the Council shall provide guidance to the Legal and Technical Commission (LTC) with respect to a potential application, illustrated the diverging opinions on the issue.”<sup>82</sup> Intersessional work is continuing in advance of the next ISA session in July 2023 to develop and refine the legal options available to countries that wish to guarantee no exploitation is approved until the preservation of the marine environment can be ensured. This work includes a three hour intersessional meeting, and the allocation of at least two half-day sessions to discuss the outcome thereof at ISA 28-II in July 2023.<sup>83</sup>

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<sup>78</sup> ISA Daily Bulletin November 4, 2022 <https://mailchi.mp/86798eb744fc/27th-session-part-iii-bulletin-council-meetings-day-5> (“Many delegations also emphasized the importance of the precautionary approach and indicated that their respective countries were of the view that commercial mining should not commence until the legal framework for mining has been finalized through the completion and adoption of the exploitation regulations and the relevant accompanying standards and guidelines, especially environmental standards and guidelines.”) See also <https://www.savethehighseas.org/isa-tracker/category/country-positions/> (Spain, Russia, Canada, Portugal). Note: Because the ISA does not offer an official reporting service and its Daily Bulletins do not provide detail, the best resource to explore the positions expressed at the ISA is the Deep Sea Conservation Coalition’s Negotiation Tracker. (The IISD Earth Negotiations Bulletin returned to the ISA for session 28-I; their summary can be found here: <https://enb.iisd.org/international-seabed-authority-isa-council-28-summary>.)

<sup>79</sup> Singh, P. A. (2021). What Are the Next Steps for the International Seabed Authority after the Invocation of the ‘Two-year Rule’?, *The International Journal of Marine and Coastal Law*, 37(1), 152-165. doi: <https://doi.org/10.1163/15718085-bja10078>; Singh, P. A. (2022). The Invocation of the ‘Two-Year Rule’ at the International Seabed Authority: Legal Consequences and Implications, *The International Journal of Marine and Coastal Law*, 37(3), 375-412. doi: <https://doi.org/10.1163/15718085-bja10098>

<sup>80</sup> Matrix Chambers, IN THE MATTER OF A PROPOSED MORATORIUM OR PRECAUTIONARY PAUSE ON DEEP-SEA MINING BEYOND NATIONAL JURISDICTION.

<sup>81</sup> Statements of New Zealand, Costa Rica, Canada, Spain, France, and others at ISA 27-III, 4 Nov., 2022.

<sup>82</sup> IISD Earth Negotiations Bulletin ISA Council 28 (Part 1) Summary, <https://enb.iisd.org/international-seabed-authority-isa-council-28-summary>

<sup>83</sup> <https://www.isa.org.jm/wp-content/uploads/2023/04/2306127E.pdf>



### **B. Financial Considerations**

TMC's financial projections are based on models commissioned by the ISA Secretariat and undertaken by the Massachusetts Institute of Technology.<sup>84</sup> These models have been criticized for not addressing key issues, namely: the taxation of transfer of rights, additional royalty in lieu of Sponsoring State income tax, fiscal stability, valuation of manganese, and royalty rates<sup>85</sup> by the African Group, which suggested alternative text for the payment regime.<sup>86</sup> At ISA 27-III, Dr. Roth, the leader of the MIT model study, noted that the model was just a starting point for a conversation and confirmed that the model was designed to incentivize mining.<sup>87</sup> The African Group proposal could change the money available to Sponsoring States and to corporations. Importantly, the discussion of the royalty regimes and benefit sharing is far from complete, and there is little consensus. This is another important area where much uncertainty remains.

### **C. Reputational Considerations**

The ISA has come under scrutiny for a host of internal practices from bullying to excessive spending in two major newspapers, the Los Angeles Times<sup>88</sup> and the New York Times.<sup>89</sup> ISA Secretary General Michael Lodge is reported to have given confidential information, available only to developing nations, regarding the areas with the highest nodule concentration, directly to TMC's predecessors.<sup>90</sup> The Los Angeles Times accompanied their reporting with a question and answer with an attorney for the ISA.<sup>91</sup> The New York Times accompanied their recent reporting with the release of source documents.<sup>92</sup> The New York Times Daily Podcast, with over 5 million daily listeners, also covered the ISA's transparency issues.<sup>93</sup> This is relevant because it creates reputational, and investment, risk. If the ISA did give TMC an unfair advantage, it makes the company, which has thus far been a losing bet for investors, even less attractive. This reporting, especially in conjunction with concerns about TMC's ethics, may continue to discourage all but the most risk-tolerant investors from DSM.

### **D. Liability Considerations**

Liability is discussed in Section III.

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<sup>84</sup> See, e.g., [https://isa.org.jm/files/files/documents/Financial\\_Model\\_November\\_2022.pptx](https://isa.org.jm/files/files/documents/Financial_Model_November_2022.pptx)

<sup>85</sup> [https://isa.org.jm/files/files/documents/Payment\\_Regime\\_African\\_Group\\_TextPaymentRegime.pdf](https://isa.org.jm/files/files/documents/Payment_Regime_African_Group_TextPaymentRegime.pdf)

<sup>86</sup> <https://isa.org.jm/files/files/documents/AGSubmissionPRFinal.pdf>

<sup>87</sup> Statement by Dr. Roth, MIT at ISA 27-III, November 4, 2022.

<sup>88</sup> <https://www.latimes.com/politics/story/2022-04-19/gold-rush-in-the-deep-sea-raises-questions-about-international-seabed-authority>

<sup>89</sup> <https://www.nytimes.com/2022/08/29/world/deep-sea-mining.html>

<sup>90</sup> <https://www.nytimes.com/2022/08/29/world/deep-sea-mining.html>;

<https://www.nytimes.com/2022/08/29/insider/mining-investigation.html>

<sup>91</sup> <https://www.latimes.com/environment/story/2022-04-19/statements-provided-by-attorney-for-international-seabed-authority>

<sup>92</sup> <https://www.documentcloud.org/documents/22266044-seabed-mining-selected-documents-2022>

<sup>93</sup> <https://www.nytimes.com/2022/09/16/podcasts/the-daily/electric-cars-sea-mining-pacific-ocean.html>

### VII. Partnership Considerations

TMC, DeepGreen Metals (Deep Green), DSMF, and Nautilus Minerals, Inc. (Nautilus) are all related. On March 31, 2020, DeepGreen acquired Tonga Offshore Mining Ltd. (TOML) from DSMF (which was overseeing Nautilus's restructuring) for \$32 million.<sup>94</sup>

#### A. TMC, DeepGreen, DSMF, and Nautilus All Have a History of Suspect Business Dealings

The organizational chart for each of the TMC above-listed entities overlaps, with many of the same people (Gerard Barron, David and Robert Heydon). The funding behind these entities is also intertwined. Two major shareholders, allegedly each with 50% ownership of DSMF,<sup>95</sup> are Russian company Metalloinvest and Omani company MB Holding group. Metalloinvest is controlled by oligarch Alisher Usmanov, who has been sanctioned in the UK,<sup>96</sup> Europe,<sup>97</sup> and the United States<sup>98</sup> because "Usmanov is known to be close to Putin as well as Dmitry Medvedev, the Deputy Chairman of the Security Council of Russia and former President and Prime Minister of Russia. Usmanov and Putin allegedly have financial ties."<sup>99</sup> (Metalloinvest has not been sanctioned.)<sup>100</sup> MB Holding Group and its founder and Chairman Dr. Mohammed al Barwani have been implicated in the infamous 1MDB scandal.<sup>101</sup> DSMF insiders have also been found to be connected with the Panama Papers, money laundering, and insider trading.<sup>102</sup>

#### B. Unsavory Business Practices

Many examples of questionable business practices by TMC, DSMF and their predecessors exist:

The financial firm Bonitas Research believes that: "TMC siphoned US\$ 43 million in cash and stock to undisclosed insiders by overpaying for TOML [after...] the TOML license was shopped around to ~300 prospective investors [and] no interest was found for the TOML license from independent parties."<sup>103</sup> If this is true, it could raise liability for financial crimes, further

<sup>94</sup> TMC 10Q/A (Amendment No. 1), Nov 2022, p. 33, <https://investors.metals.co/static-files/498c83c2-c66b-4802-b7ba-e89ccda34d4f>. (hereinafter TMC 10Q/A Nov. 2022).

<sup>95</sup> <https://www.offshore-energy.biz/nautilus-inks-funding-mandate-deal-with-dsmf/>;  
<https://s3.documentcloud.org/documents/21014786/cfa-letter-sec-sustainable-opportunities-acquisition-corp-and-deepgreen-metals-inc.pdf>.

<sup>96</sup> <https://www.gov.uk/government/news/government-announces-sanctions-against-russian-oligarchs-alisher-usmanov-and-igor-shuvalov>

<sup>97</sup> <https://www.theguardian.com/business/2022/jun/08/eu-sanctions-alisher-usmanov-sisters-could-be-lifted-ecj-putin>

<sup>98</sup> <https://home.treasury.gov/news/press-releases/jy0628>

<sup>99</sup> <https://home.treasury.gov/news/press-releases/jy0628>

<sup>100</sup> [https://www.metalloinvest.com/en/media/press-releases/638385/?utm\\_source=google.com&utm\\_medium=organic&utm\\_campaign=google.com&utm\\_referrer=google.com](https://www.metalloinvest.com/en/media/press-releases/638385/?utm_source=google.com&utm_medium=organic&utm_campaign=google.com&utm_referrer=google.com)

<sup>101</sup> <https://catchourdrift.org/episode10deepseamining> (min 29); <https://www.sarawakreport.org/2015/07/going-rogue-brian-lord-and-protection-group-international/>

<sup>102</sup> Bonitas Research, Short The Metals Company. [https://www.bonitasresearch.com/wp-content/uploads/dlm\\_uploads/2021/10/BonitasResearch-Short-TMCthemetalsco-Nasdaq-TMC-Oct-6-2021.pdf?nocookies=yes](https://www.bonitasresearch.com/wp-content/uploads/dlm_uploads/2021/10/BonitasResearch-Short-TMCthemetalsco-Nasdaq-TMC-Oct-6-2021.pdf?nocookies=yes), p. 2.

<sup>103</sup> [https://www.bonitasresearch.com/wp-content/uploads/dlm\\_uploads/2021/10/BonitasResearch-Short-TMCthemetalsco-Nasdaq-TMC-Oct-6-2021.pdf?nocookies=yes](https://www.bonitasresearch.com/wp-content/uploads/dlm_uploads/2021/10/BonitasResearch-Short-TMCthemetalsco-Nasdaq-TMC-Oct-6-2021.pdf?nocookies=yes). P. 1

endangering TMC's solvency and reputation. TMC reports that it "has received letters from the SEC notifying us of an investigation and requesting the voluntary production of documents and information regarding the Company's March 31, 2020 acquisition of Tonga Offshore Mining Limited from Deep Sea Mining Finance Ltd. and the business combination, completed September 9, 2021, between DeepGreen Metals Inc. and Sustainable Opportunities Acquisition Corporation that led to the Company's formation."<sup>104</sup>

When Nautilus Minerals went bankrupt, it left the country of Papua New Guinea with a loss of an estimated 375m Kina (more than \$1m USD at current rates).<sup>105</sup> Current TMC CEO Gerard Barron exited Nautilus with \$30m, having only invested a fraction of that amount.<sup>106</sup> Former Papua New Guinea PMs have called the venture, Solwara 1, a failed project and indicated support for Fiji's calls for a moratorium in 2019.<sup>107</sup> Recently, DSMF has formed a joint venture with Sustainable Mining Solutions and the joint venture has, since May 2022, reportedly been meeting with the government in PNG in an attempt to revitalize the Solwara 1 Project.<sup>108</sup>

### C. TMC Misleading Statements to Investors

In 2021, TMC was founded through a merger of DeepGreen and the Sustainable Opportunities Acquisition Corporation (SOAC), entering the U.S. stock market by filing a registration with the U.S. Securities and Exchange Commission (SEC). Civil society noticed that the S-1 downplayed major risks and glossed over the difficulties and unknowns surrounding DSM.<sup>109</sup> The SEC agreed with the critique, and required TMC to file an updated S-1.

Commercial DSM has never before occurred and major scientific gaps remain in global understanding of the deep sea and its ecosystems.<sup>110</sup> However, TMC's website presents "plans to lift polymetallic nodules to the surface, take them to shore, and process them with near-zero solid waste, no tailings or deforestation, and with careful attention not to harm the integrity of the deep-ocean ecosystem."<sup>111</sup> TMC indicates that, "no seafloor polymetallic nodule deposit has ever been commercially collected, and our offshore collection technology and development plans and processes may not be sufficient to accomplish our objectives."<sup>112</sup>

Recent TMC statements regarding ISA negotiations grossly downplay the controversy ongoing at the ISA. On November 16, 2022, CEO Gerard Barron stated that TMC was not worried about calls for a moratorium or ban on DSM because, UNCLOS "mandates the [ISA] and its Council to

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<sup>104</sup> TMC 10Q/A, Nov. 2022, p. 33.

<sup>105</sup> <https://www.theguardian.com/world/2019/sep/16/collapse-of-png-deep-sea-mining-venture-sparks-calls-for-moratorium>

<sup>106</sup> <https://www.bloomberg.com/news/articles/2021-06-24/a-mining-startup-s-rush-for-underwater-metals-comes-with-deep-risks?leadSource=verify%20wall>

<sup>107</sup> <https://postcourier.com.pg/marape-leaning-towards-moratorium-deep-sea-mining/>

<sup>108</sup> <https://dsm-campaign.org/2022/11/14/deep-sea-miner-wants-to-push-ahead-with-solwara-1-project/>

<sup>109</sup> <https://s3.documentcloud.org/documents/21014786/cfa-letter-sec-sustainable-opportunities-acquisition-corp-and-deepgreen-metals-inc.pdf>; <https://www.greenpeace.org/usa/wp-content/uploads/2021/07/SEC-letter.pdf>;

<sup>110</sup> Amon, D.J., Gollner, S., Morato, T., Smith, C.R., Chen, C., Christensen, S., Currie, B., Drazen, J.C., T F, Gianni, M., et al. (2022). Assessment of scientific gaps related to the effective environmental management of deep-seabed mining. *Mar. Policy*. <https://doi.org/10.1016/j.marpol.2022.105006>.

<sup>111</sup> TMC Nodules Page, <https://metals.co/nodules/>

<sup>112</sup> TMC S-1 Apr. 2022, p. 66

put in place exploration and exploitation regulations...”<sup>113</sup> As detailed in Section VI.A, there are many legal bases for a moratorium, those avenues were explored fulsomely at ISA 27-III, and conversations continue in advance of the next ISA session in July 2023.

### D. Litigation Considerations

There is ongoing litigation against TMC. Two separate class action lawsuits have been filed, alleging that TMC and/or personnel including CEO Gerard Barron made false or misleading statements or failed to disclose material information to investors. The cases have been consolidated, and - as of November 15, 2022 - TMC reports they are pending.<sup>114</sup> A new lawsuit was filed against TMC by an investor on January 23, 2023, seeking compensable damages and alleging TMC breached the covenant of good faith and fair dealing.<sup>115</sup>

### E. Solvency Considerations

TMC’s stock price fell immediately after DeepGreen and a Special Purpose Acquisition Company (SPAC) named Sustainable Opportunities Acquisition Corp. (SOAC) became TMC; much of the originally promised investment pulled out.<sup>116</sup> In November 2022 a market analyst found that “TMC... is jam-packed with risk. ... A lot of the biological impacts remain unknown yet increasingly, governments are starting to shy away from the benefits of deep-sea mining. A lot remains to be explained regarding project financials...”<sup>117</sup> Various times TMC has nearly begun the process of delisting from the NASDAQ because it traded under \$1 for more than 30 days. On December 5, 2022 TMC received such a delisting notice:

“On December 5, 2022, TMC the metals company Inc. (the “Company”) received a written notice from The Nasdaq Stock Market LLC (“Nasdaq”) notifying the Company that the average closing price of the Company’s common shares (the “Common Shares”) over the 30 consecutive trading days from October 21, 2022 through December 2, 2022 had fallen below \$1.00 per share, which is the minimum closing bid price required to maintain listing on the Nasdaq Stock Market.”<sup>118</sup>

According to the Wall Street Journal, “The notice was removed in February after the stock traded above \$1 for 10 days, but a fresh one was issued in April for the same reason as in December.”<sup>119</sup> TMC has 180 days to raise the stock price over \$1, but the enduringly low stock price is an indication that the market does not have faith in TMC. Shipping industry leader A.P.

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<sup>113</sup> [https://www.watertowerresearch.com/calendar\\_events/tmc-the-metals-company-inc-nasdaq-tmc-chairman-ceo-gerard-barron-and-cfo-craig-shesky](https://www.watertowerresearch.com/calendar_events/tmc-the-metals-company-inc-nasdaq-tmc-chairman-ceo-gerard-barron-and-cfo-craig-shesky)

<sup>114</sup> TMC 10Q/A, Nov. 2022, pp. 39-40.

<sup>115</sup> <https://www.sec.gov/ix?doc=/Archives/edgar/data/0001798562/000110465923037110/tmc-20221231x10k.htm>, p. 94.

<sup>116</sup> <https://www.bloomberg.com/opinion/articles/2021-09-13/tmc-500-million-cash-shortfall-is-tale-of-spac-disappointment-greenwashing>

<sup>117</sup> [https://seekingalpha.com/article/4559621-tmc-the-metals-company-continues-taking-on-water?mailingid=29766096&messageid=2800&serial=29766096.482&utm\\_campaign=rta-stock-article&utm\\_medium=email&utm\\_source=seeking\\_alpha&utm\\_term=29766096.482](https://seekingalpha.com/article/4559621-tmc-the-metals-company-continues-taking-on-water?mailingid=29766096&messageid=2800&serial=29766096.482&utm_campaign=rta-stock-article&utm_medium=email&utm_source=seeking_alpha&utm_term=29766096.482)

<sup>118</sup> TMC Form 8-K, 5 Dec., 2022.

[https://www.sec.gov/ix?doc=/Archives/edgar/data/0001798562/000110465922124759/tm2232041d2\\_8k.htm](https://www.sec.gov/ix?doc=/Archives/edgar/data/0001798562/000110465922124759/tm2232041d2_8k.htm)

<sup>119</sup> <https://www.wsj.com/articles/shipping-giant-maersk-drops-deep-sea-mining-investment-c226df39>

Moller Maersk confirmed it is selling all of its shares in TMC, having been paid for shipping services in shares.<sup>120</sup>

## VIII. Environmental Considerations

Environmental considerations are divided into four categories: activities or results that affect the environment, susceptible resources, scale of the unknowns, and sustainability of DSM versus terrestrial mining. Many of these considerations are the same for DSM in the Area or in a state's EEZ. Specific relevance to resources important to some states such as whales and corals as well as considerations primarily applicable to either the Area or a state's own EEZ have been indicated.

### A. Activities or Results that Affect the Environment

#### 1. Plumes (Collector and Midwater)

There will be two plumes from any polymetallic nodule mining endeavor – the seafloor mining vehicle plume and the midwater discharge sediment plume, created by the discharge of the dewatering of the ore and released into the midwater column.<sup>121</sup> The seafloor plume will affect the seabed in the immediately adjacent area; elevated levels of sediment can harm, and even kill suspension and filter feeding fauna<sup>122</sup> thereby expanding the footprint of environmental effects outside of the mining area itself.

The midwater discharge plume which has the potentially to affect a massive area of both seabed and midwater column (mesopelagic). Were DSM to proceed at scale, the volume of this discharge plume is estimated at 500,000,000 meters-cubed over the lifetime of one operation.<sup>123</sup> There is much uncertainty about how far the plume could travel; dispersal depends on currents, mining method, and other factors.<sup>124</sup>

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<sup>120</sup> <https://www.wsj.com/articles/shipping-giant-maersk-drops-deep-sea-mining-investment-c226df39>

<sup>121</sup> Drazen et. al, Midwater ecosystems must be considered when evaluating environmental risks of deep-sea mining; <https://www.pnas.org/doi/10.1073/pnas.2011914117>.

<sup>122</sup> Carreiro-Silva, Marina; Martins, Ines; Riou, Virginie; Raimundo, Joana; Caetano, Miguel; Bettencourt, Raul; Rakka, Maria; Cerqueira, Teresa; Godinho, Antonio; Morato, Telmo; Colaço, Ana (2022): Mechanical and toxicological effects of deep-sea mining sediment plumes on a habitat-forming cold-water octocoral. *Frontiers in Marine Science*, 9, 915650, <https://doi.org/10.3389/fmars.2022.915650>

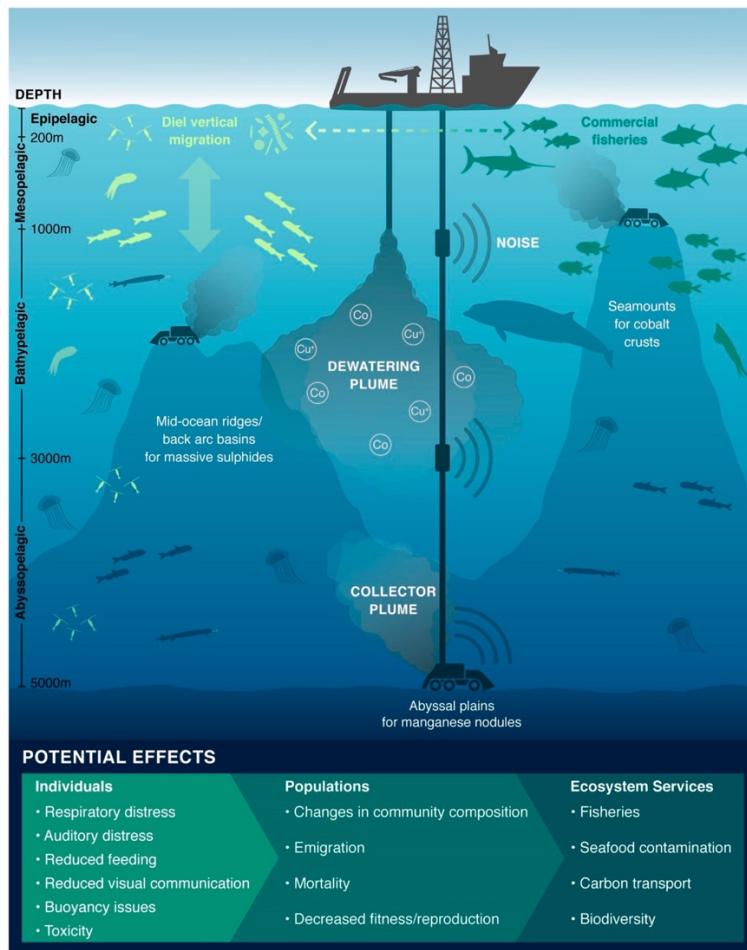
<sup>123</sup> Drazen et. al, Midwater ecosystems must be considered when evaluating environmental risks of deep-sea mining; <https://www.pnas.org/doi/10.1073/pnas.2011914117>. (“A single polymetallic-nodule mining operation is estimated to discharge 50,000 meters-cubed of sediment, broken mineral fines, and seawater per day (~8 kilograms per meter-cubed solids) ...continuously for up to 30 years, producing 500,000,000 meters-cubed of discharge over the lifetime of one operation.”)

<sup>124</sup> Drazen et. al, Midwater ecosystems must be considered when evaluating environmental risks of deep-sea mining; <https://www.pnas.org/doi/10.1073/pnas.2011914117>.



# THE OCEAN FOUNDATION

## Deep Seabed Mining (DSM) Risk and Liability Considerations



Mining-generated sediment plumes and noise have a variety of possible effects on pelagic taxa. (Organisms and plume impacts are not to scale.) Image credit: Amanda Dillon (graphic artist).<sup>125</sup>

Environmentally detrimental plumes from seabed mining could spread for up to hundreds or even thousands of kilometers from the mining site.<sup>126</sup> Plumes containing sediment, wastewater and fine particles of nodule ore discharged from mining ships could travel up to 900 miles/1,400

<sup>125</sup> Drazen et. al, Midwater ecosystems must be considered when evaluating environmental risks of deep-sea mining; <https://www.pnas.org/doi/10.1073/pnas.2011914117>.

<sup>126</sup> Drazen et. al, Midwater ecosystems must be considered when evaluating environmental risks of deep-sea mining; <https://www.pnas.org/doi/10.1073/pnas.2011914117>; B. Gillard et al., Physical and hydrodynamic properties of deep sea mining-generated, abyssal sediment plumes in the Clarion Clipperton Fracture Zone (eastern-central Pacific). *Elementa* 7, 5 (2019), <https://online.ucpress.edu/elementa/article/doi/10.1525/elementa.343/112485/Physical-and-hydrodynamic-properties-of-deep-sea> ; D. Aleynik, M. E. Inall, A. Dale, A. Vink, Impact of remotely generated eddies on plume dispersion at abyssal mining sites in the Pacific. *Sci. Rep.* 7, 16959 (2017) <https://www.nature.com/articles/s41598-017-16912-2>; H. U. Oebius, H. J. Becker, S. Rolinski, J. A. Jankowski, Parametrization and evaluation of marine environmental impacts produced by deep-sea manganese nodule mining. *Deep Sea Res. Part II Top. Stud. Oceanogr.* 48, 3453–3467 (2001), <https://www.sciencedirect.com/science/article/abs/pii/S0967064501000522>.

kilometers across the Pacific before settling back down on the ocean bottom.<sup>127</sup> Over the course of a 20 year commercial operation, a plume's sediment and fine particulate matter could settle over a few million square kilometers.<sup>128</sup>

A 2022 study simulated the midwater plume as waste discharged from the a licensed area in CCZ.<sup>129</sup> A simulation based on horizontal currents and sedimentation rates found that within three months, the discharge plume from DSM activities in the area would reach the waters of Hawai'i as well as the Northern Line Islands of Kiribati and the United States.<sup>130</sup> Such studies are important aides for thinking through the issues of Liability for potential Sponsoring Sttates discussed in Section V especially as the United States directly addressed this possibility at ISA 27-III, stating, that the country's EEZ & continental shelf are "immediately adjacent" to the CCZ and that broad interests "have the potential to be directly impacted by negative impacts and effects from exploitation activities in the Area."<sup>131</sup>

### 2. Direct Habitat Loss

To remove nodules is to directly remove animal habitat; the nodules form the hard substrate that supports unique fauna.<sup>132</sup> In the Area, polymetallic nodules form over millions of years.

### 3. Noise and Light

Noise and light from DSM operations are both understudied, although impacts are beginning to receive more scientific attention.<sup>133</sup> "Many marine species, such as fish, mammals, and invertebrates, are physiologically sensitive to acoustics and lighting" and potential adverse effects could be seen via "behavior changes, reduced communication ranges and foraging ability, decreased predator prevention, and habitat avoidance."<sup>134</sup> Light could affect bioluminescent of deep sea species.<sup>135</sup> A 2022 study found that noise from one mine alone could travel approximately 500 kilometers.<sup>136</sup>

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<sup>127</sup> Muñoz-Royo, C., Peacock, T., Alford, M.H. *et al.* Extent of impact of deep-sea nodule mining midwater plumes is influenced by sediment loading, turbulence and thresholds. *Commun Earth Environ* 2, 148 (2021). <https://doi.org/10.1038/s43247-021-00213-8>

<sup>128</sup> Muñoz-Royo, C., Peacock, T., Alford, M.H. *et al.* Extent of impact of deep-sea nodule mining midwater plumes is influenced by sediment loading, turbulence and thresholds. *Commun Earth Environ* 2, 148 (2021). <https://doi.org/10.1038/s43247-021-00213-8>

<sup>129</sup> Blue Peril website. <https://dsm-campaign.org/blue-peril/>

<sup>130</sup> Dr. John Luick, Technical Note: Oceanographic Modelling of Benthic and Midwater Plumes Predicted for Deep Mining Planned by The Metals Company in the Clarion Clipperton Zone of the Pacific Ocean, <https://dsm-campaign.org/wp-content/uploads/2022/09/Blue-Peril-Technical-Paper.pdf>

<sup>131</sup> Statement of the United States at ISA 27-III, November 4, 2022.

<sup>132</sup> Levin, L.A., Amon, D.J., and Lily, H. (2020)., Challenges to the sustainability of deep seabed mining. *Nat. Sustain.* 3, 784–794. <https://doi.org/10.1038/s41893-020-0558-x>.

<sup>133</sup> R. Williams, C. Erbe, A. Duncan, K. Nielsen, T. Washburn, C. Smith, Noise from deep-sea mining may span vast ocean areas, *Science*, 377 (2022), <https://www.science.org/doi/10.1126/science.abo2804>.

<sup>134</sup> Leal Filho, W.; Abubakar, I.R.; Nunes, C.; Platje, J.; Ozuyar, P.G.; Will, M.; Nagy, G.J.; Al-Amin, A.Q.; Hunt, J.D.; Li, C. Deep Seabed Mining: A Note on Some Potentials and Risks to the Sustainable Mineral Extraction from the Oceans. *J. Mar. Sci. Eng.* 2021, 9, 521. <https://doi.org/10.3390/jmse9050521>.

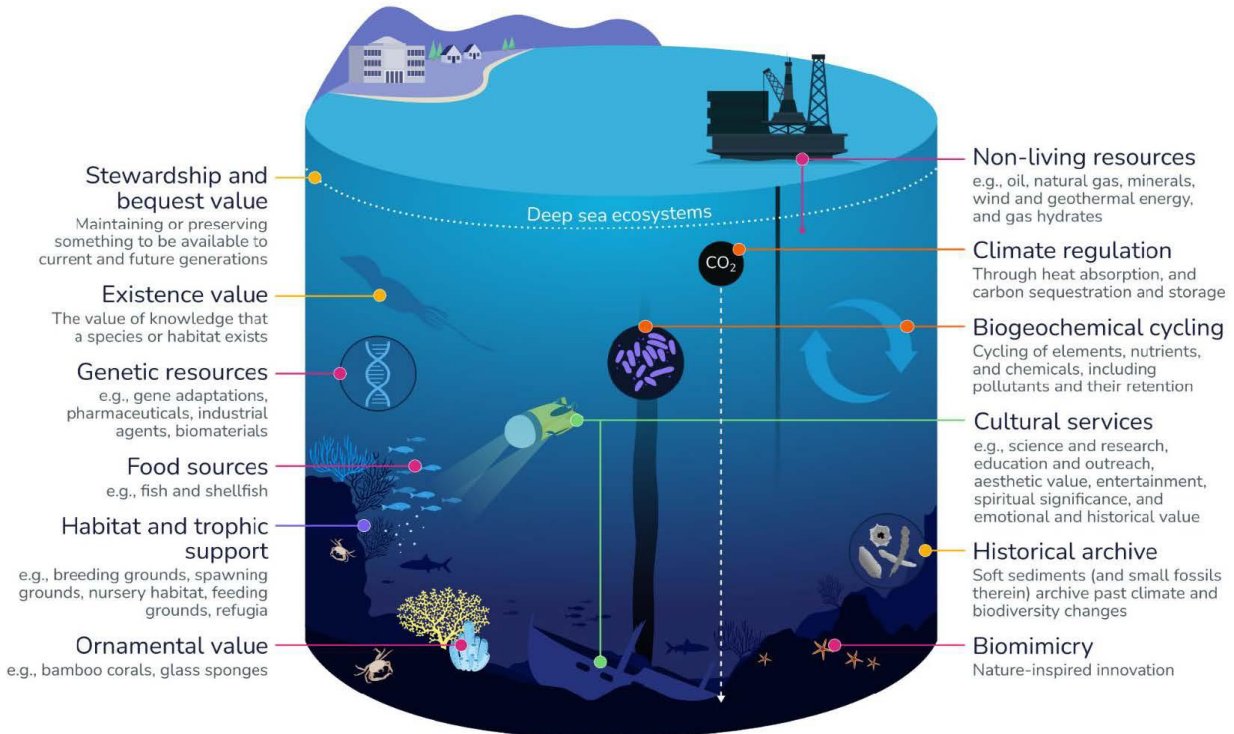
<sup>135</sup> Leal Filho, W.; Abubakar, I.R.; Nunes, C.; Platje, J.; Ozuyar, P.G.; Will, M.; Nagy, G.J.; Al-Amin, A.Q.; Hunt, J.D.; Li, C. Deep Seabed Mining: A Note on Some Potentials and Risks to the Sustainable Mineral Extraction from the Oceans. *J. Mar. Sci. Eng.* 2021, 9, 521. <https://doi.org/10.3390/jmse9050521>.

<sup>136</sup> R. Williams, C. Erbe, A. Duncan, K. Nielsen, T. Washburn, C. Smith, Noise from deep-sea mining may span vast ocean areas, *Science*, 377 (2022), <https://www.science.org/doi/10.1126/science.abo2804>.

### B. Susceptible Resources

#### 1. Ecosystem Services

The deep ocean provides many critical ecosystem services, such as fish and shellfish for food; products from organisms that can be used for medicines; climate regulation; and historical, cultural, social, educational, and scientific value for people worldwide.<sup>137</sup> Certain of these are discussed below individually.



#### KEY

- Provisioning services: result in tangible goods and/or products
- Regulating services: contribute to the natural production and resilience of habitats and ecosystem processes
- Supporting services: underlying ecosystem functions that are essential to produce other services
- Cultural services: non-material benefits deriving from nature
- Biodiversity values: biodiversity has intrinsic value, but is also the source of most ecosystem services

DOSI's Deep-Ocean-Ecosystem-Services-Brief Figure 1, Categories of ecosystem services and deep-ocean examples of each category. Illustrated by Stacey McCormack illustrates how the deep ocean provisions humanity.

#### 2. Biodiversity

TMC's Impact Report states that only 3% of biomass lives in ocean, but that biodiversity is more complex than biomass and that "uncertainties regarding the potential impact of commercial-scale nodule-collection operations on the biodiversity and ecosystem function of the CCZ

<sup>137</sup> Deep Ocean Stewardship Initiative, Ecosystem Services Brief, <https://www.dosi-project.org/wp-content/uploads/Deep-Ocean-Ecosystem-Services-Brief.pdf>.

abyssal seafloor and overlying water column.”<sup>138</sup> The deep ocean (the water column and seabed greater than 200 meters water depth) provides over 95 percent of Earth's living space.<sup>139</sup> In the area where nodules would be mined, “the abyssal plains, biodiversity is high, while productivity and biomass are low.”<sup>140</sup> Microbial communities in the deep ocean and midwater generate essential nutrients for the ocean ecosystem and these communities may change either in function or structure because of increased sedimentation.<sup>141</sup> Aside from direct impact to biodiversity, DSM poses the risk of forced species migrations, and loss of connectivity that could lead to species extinctions in the deep ocean.”<sup>142</sup>

### a) Corals

A recent study of the effects of DSM sediments plumes on corals showed coral mortality related to polymetallic sulfide mining which may have resulted from the combined and potentially synergistic mechanical and toxicological effects of the particles.<sup>143</sup> This particular study focused on cold water corals and on the effects of seafloor massive sulfite (SMS) deposits.<sup>144</sup> Other studies of warm water corals have found that high sedimentation rates can smother and bury coral polyps, slowing growth and causing coral death.<sup>145</sup>

### b) Whales

Whale watching is a multimillion-dollar industry.<sup>146</sup> A 2023 study found that noise from commercial DSM could travel at least several hundred kilometers through the ocean.<sup>147</sup> If approved, deep sea mining would operate 24 hours a day, creating noise that overlaps with the

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<sup>138</sup> TMC Impact Report, [https://metals.co/wp-content/uploads/2022/05/Final\\_MetalsCo\\_ImpactReport\\_052522.pdf](https://metals.co/wp-content/uploads/2022/05/Final_MetalsCo_ImpactReport_052522.pdf), p. 41.

<sup>139</sup> Deep Ocean Stewardship Initiative, Ecosystem Services Brief, <https://www.dosi-project.org/wp-content/uploads/Deep-Ocean-Ecosystem-Services-Brief.pdf>.

<sup>140</sup> Paulus Eva, Shedding Light on Deep-Sea Biodiversity—A Highly Vulnerable Habitat in the Face of Anthropogenic Change, *Frontiers in Marine Science*, <https://www.frontiersin.org/articles/10.3389/fmars.2021.667048>; Glover, A., & Smith, C. (2003). The deep-sea floor ecosystem: Current status and prospects of anthropogenic change by the year 2025. *Environmental Conservation*, 30(3), 219-241. doi:10.1017/S0376892903000225

<sup>141</sup> B. N. Orcutt et al., Impacts of deep-sea mining on microbial ecosystem services. *Limnol. Oceanogr.* <https://doi.org/10.1002/lno.11403> (2020); see also Beth's webinar with HI.

<sup>142</sup> Levin, L.A., Amon, D.J., and Lily, H. (2020)., Challenges to the sustainability of deep seabed mining. *Nat. Sustain.* 3, 784–794. <https://doi.org/10.1038/s41893-020-0558-x>.

<sup>143</sup> Carreiro-Silva, Marina; Martins, Ines; Riou, Virginie; Raimundo, Joana; Caetano, Miguel; Bettencourt, Raul; Rakka, Maria; Cerqueira, Teresa; Godinho, Antonio; Morato, Telmo; Colaço, Ana (2022): Mechanical and toxicological effects of deep-sea mining sediment plumes on a habitat-forming cold-water octocoral. *Frontiers in Marine Science*, 9, 915650, <https://doi.org/10.3389/fmars.2022.915650>

<sup>144</sup> Carreiro-Silva, Marina; Martins, Ines; Riou, Virginie; Raimundo, Joana; Caetano, Miguel; Bettencourt, Raul; Rakka, Maria; Cerqueira, Teresa; Godinho, Antonio; Morato, Telmo; Colaço, Ana (2022): Mechanical and toxicological effects of deep-sea mining sediment plumes on a habitat-forming cold-water octocoral. *Frontiers in Marine Science*, 9, 915650, <https://doi.org/10.3389/fmars.2022.915650>

<sup>145</sup> Responses of coral reefs and reef organisms to sedimentation. *Mar. Ecol. Progr. Ser.* 62 (1), 185–202. doi: 10.3354/meps062185; Fabricius K. E., Wolanski E. (2000). Rapid smothering of coral reef organisms by muddy marine snow. *Estuar. Coast. Shelf. Sci.* 50 (1), 115–120. doi: 10.1006/ecss.1999.0538; Jones R., Ricardo G. F., Negri A. P. (2015). Effects of sediments on the reproductive cycle of corals. *Mar. pollut. Bull.* 100, 13–33. doi: 10.1016/j.marpolbul.2015.08.021

<sup>146</sup> See, e.g., International Whaling Commission, Case Study: Tonga. <https://wwhandbook.iwc.int/en/case-studies/tonga>.

<sup>147</sup> Thompson Kirsten F., Miller Kathryn A., Wacker Jake, Derville Solène, Laing Christopher, Santillo David, Johnston Paul, Urgent assessment needed to evaluate potential impacts on cetaceans from deep seabed mining, *Frontiers in Marine Science*, <https://www.frontiersin.org/articles/10.3389/fmars.2023.1095930>



frequencies cetaceans use to communicate and navigate across the global oceans. This noise could mask the calls between mothers and calves, or mating partners and could cause behaviour change in marine mammals.<sup>148</sup>

### c) The Mesopelagic Zone & Commercially Important Fish

The mesopelagic, or midwater column is vitally important to global food security, the biomass of mesopelagic fishes at depths of 200 to 1,000 meters is estimated to be two orders of magnitude higher the global annual fish catch.<sup>149</sup> The mesopelagic food webs provide for marine mammals, octopus, and commercially important fish including tunas.<sup>150</sup> “Deep-sea mining poses significant risks to midwater ecosystems”<sup>151</sup> and plumes can affect all life in the mesopelagic zone, up the food chain. Tuna, for example, have been shown to avoid turbid water.<sup>152</sup> A 2021 study shows the potential intersection between DSM plumes and fisheries.<sup>153</sup>

The base of the food web in the mesopelagic and deep ocean is made of organisms that rely heavily on small organic matter and will suffer if inorganic particulates (like those from a plume) dilute their food source.<sup>154</sup> In the presence of a sediment plume, suspension feeders could have their mucous filter nets clogged, and gelatinous plankton would become less buoyant if sediment adhered to them.<sup>155</sup> “Because of the low natural [suspended sediment concentrations] in deep sea environments, very small increases in absolute [sediment] could result in acute effects.”<sup>156</sup>

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<sup>148</sup> Thompson Kirsten F., Miller Kathryn A., Wacker Jake, Derville Solène, Laing Christopher, Santillo David, Johnston Paul, Urgent assessment needed to evaluate potential impacts on cetaceans from deep seabed mining, *Frontiers in Marine Science*, <https://www.frontiersin.org/articles/10.3389/fmars.2023.1095930>

<sup>149</sup> X. Irigoien et al., Large mesopelagic fishes biomass and trophic efficiency in the open ocean. *Nat. Commun.* 5, 3271 (2014); Drazen et. al, Midwater ecosystems must be considered when evaluating environmental risks of deep-sea mining; <https://www.pnas.org/doi/10.1073/pnas.2011914117>.

<sup>150</sup> J. C. Drazen, T. T. Sutton, Dining in the deep: The feeding ecology of deep-sea fishes. *Annu. Rev. Mar. Sci.* 9, 337–366 (2017); Drazen et. al, Midwater ecosystems must be considered when evaluating environmental risks of deep-sea mining; <https://www.pnas.org/doi/10.1073/pnas.2011914117>.

<sup>151</sup> Drazen et. al, Midwater ecosystems must be considered when evaluating environmental risks of deep-sea mining; <https://www.pnas.org/doi/10.1073/pnas.2011914117>.

<sup>152</sup> Ramirez-Llodra E, Trannum HC, Evensen A, Levin LA, Andersson M, Finne TE, et al. Submarine and deep-sea mine tailing placements: a review of current practices, environmental issues, natural analogs and knowledge gaps in Norway and internationally. *Marine pollution bulletin.* 2015;97(1-2):13-35.

<sup>153</sup> Potential spatial intersection between high-seas fisheries and deep-sea mining in international waters, <https://doi.org/10.1016/j.marpol.2021.104564>

<sup>154</sup> K. R. Conley, F. Lombard, K. R. Sutherland, Mammoth grazers on the ocean’s minuteness: A review of selective feeding using mucous meshes. *Proc. Biol. Sci.* 285, 20180056 (2018) <https://doi.org/10.1098/rspb.2018.0056>; K. Gloeckler et al., Amino acid – compound specific stable isotope analysis of micronekton around Hawaii reveals the importance of suspended particles as an important nutritional source in the meso/bathypelagic. *Limnol. Oceanogr.* 63, 1168–1180 (2018) <https://aslopubs.onlinelibrary.wiley.com/doi/10.1002/lno.10762>; V. J. H. Hu, Ingestion of deep-sea mining discharge by five species of tropical copepods. *Water Air Soil Pollut.* 15, 433–440 (1981) <https://www.pnas.org/doi/10.1073/pnas.2011914117>; Drazen et. al, Midwater ecosystems must be considered when evaluating environmental risks of deep-sea mining; <https://www.pnas.org/doi/10.1073/pnas.2011914117>.

<sup>155</sup> V. J. H. Hu, Ingestion of deep-sea mining discharge by five species of tropical copepods. *Water Air Soil Pollut.* 15, 433–440 (1981) <https://link.springer.com/article/10.1007/BF00279425>; Drazen et. al, Midwater ecosystems must be considered when evaluating environmental risks of deep-sea mining; <https://www.pnas.org/doi/10.1073/pnas.2011914117>.

<sup>156</sup> J.M.A. van der Grient, J.C. Drazen, Evaluating deep-sea communities’ susceptibility to mining plumes using shallow-water data, *Science of The Total Environment*, <https://doi.org/10.1016/j.scitotenv.2022.158162>.



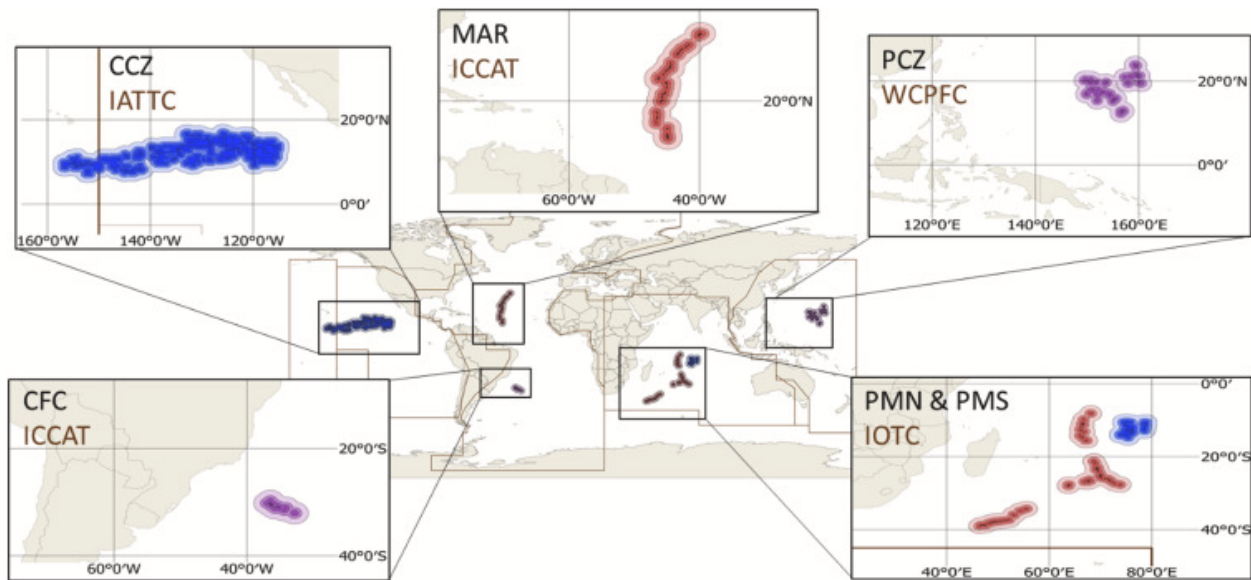


Fig. 1. Global high-seas mining areas with approved exploration contracts. Colors identify the three different types of deposits: blue = polymetallic nodules, red = polymetallic sulfides, and purple = cobalt-rich ferromanganese crusts.<sup>157</sup>

### d) Environmental Concerns Specific to Hydrothermal Vents

Hydrothermal vents are unusual ecosystems in that they rely on chemical energy and not energy directly from the sun/photosynthesis. The unique and often endemic creatures that live there are known as ‘extremophiles.’<sup>158</sup> These extremophiles may help humanity solve challenges including: an enzyme that formed the basis of the COVID-19 test, potential artificial blood based on tubeworms, and stronger materials based on vent-dwelling snails with iron scales.<sup>159</sup> TMC states that they will not mine seafloor massive sulfide systems because those hydrothermal vent ecosystems have 100 times the biomass of the abyssal plain, contain abundant food supplied by unique chemoautotrophic bacteria.<sup>160</sup>

### 3. Climate Related Ecosystem services

The deep ocean plays a key role in regulating our climate; the relationship between the deep ocean and climate change was highlighted at UNFCCC COP27. In 2010, it was estimated that the ocean stores up to 155 billion tonnes of anthropogenic carbon.<sup>161</sup> “Deep midwaters also

<sup>157</sup> J.M.A. van der Grient, J.C. Drazen, Potential spatial intersection between high-seas fisheries and deep-sea mining in international waters, *Marine Policy*, <https://doi.org/10.1016/j.marpol.2021.104564>.

<sup>158</sup> Deep Ocean Stewardship Initiative, *Ecosystem Services Brief*, <https://www.dosi-project.org/wp-content/uploads/Deep-Ocean-Ecosystem-Services-Brief.pdf>.

<sup>159</sup> Deep Ocean Stewardship Initiative, *Ecosystem Services Brief*, <https://www.dosi-project.org/wp-content/uploads/Deep-Ocean-Ecosystem-Services-Brief.pdf>.

<sup>160</sup> TMC Impact Report, p. 32.

<sup>161</sup> Rhein M, S.R. Rintoul, S. Aoki, E. Campos, D. Chambers, R.A. Feely, S. Gulev, G.C. Johnson, S.A. Josey, A. Kostianoy, C. Mauritzen DR, L.D. Talley and F. Wang, Observations: Ocean. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, United Kingdom and New York, NY, USA.:

strongly connect to life on the rest of the planet” via biogeochemical cycling and carbon sequestration.<sup>162</sup>

Climate change is occurring faster in the deep ocean than elsewhere. For instance, “climate velocity in the abyssopelagic layer (depths greater than 4000 m, where nodule mining is predicted to take place) is projected to reach 5.5 times the rates currently experienced at the surface by the end of the century.”<sup>163</sup> “The deep ocean is a major active sink and reservoir of heat and CO<sub>2</sub>, but its sequestration capacity is not unlimited and removal rates of anthropogenic carbon from the atmosphere depend on the capacity of deep-ocean ecosystems to maintain their functions.”<sup>164</sup>

Mining will resuspend seabed sediments, reducing seabed carbon storage.<sup>165</sup> New research in genomics is showing that microbial processes that occur in nodule-rich DSM areas “will likely disrupt ecological processes” when they interact with climate-induced change.<sup>166</sup> Mining could disrupt carbon fixation that happens without light in the deep water, sediments, or nodules.<sup>167</sup>

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Cambridge University Press; 2013,

[https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5\\_Chapter03\\_FINAL.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter03_FINAL.pdf).

- <sup>162</sup> P. W. Boyd, H. Claustre, M. Levy, D. A. Siegel, T. Weber, Multi-faceted particle pumps drive carbon sequestration in the ocean. *Nature* 568, 327–335 (2019) <https://www.nature.com/articles/s41586-019-1098-2>; P. C. Davison, D. M. Checkley Jr, J. A. Koslow, J. Barlow, Carbon export mediated by mesopelagic fishes in the northeast Pacific Ocean. *Prog. Oceanogr.* 116, 14–30 (2013) <https://doi.org/10.1016/j.pocean.2013.05.013>; D. K. Steinberg, M. R. Landry, Zooplankton and the ocean carbon cycle. *Annu. Rev. Mar. Sci.* 9, 413–444 (2017) <https://www.annualreviews.org/doi/full/10.1146/annurev-marine-010814-015924>.
- <sup>163</sup> Undisturbed <http://www.stateoftheocean.org/wp-content/uploads/2022/11/DeepSea-Synthesis-31oct-high.pdf>, citing Brito-Morales, I., Schoeman, D.S., García Molinos, J., Burrows, M.T., Klein, C.J., Arafteh-Dalmau, N., Kaschner, K., Garilao, C., Kesner-Reyes, K. & Richardson, A.J. (2020), ‘Climate velocity reveals increasing exposure of deep-ocean biodiversity to future warming’, *Nature Climate Change* 10, 576-571. <https://doi.org/10.1038/s41558-020-0773-5>.
- <sup>164</sup> Deep Ocean Stewardship Initiative, Climate and Biodiversity Beyond the Limits of National Jurisdiction, <http://dosi-project.org/wp-content/uploads/2018/05/Climate-Policy-Prief-Climite-2018.pdf>.
- <sup>165</sup> Levin, LA, Wei, C-L, Dunn, DC, et al. Climate change considerations are fundamental to management of deep-sea resource extraction. *Glob Change Biol.* 2020; 26: 4664– 4678. <https://doi.org/10.1111/gcb.15223>; Atwood, T. B., Witt, A. W., Mayorga, J., Hammill, E., & Sala, E. (2020). Global patterns in marine sediment carbon stocks. *Frontiers in Marine Science*, 7, 1. <https://doi.org/10.3389/fmars.2020.00165>; Legge, O., Johnson, M., Hicks, N., Jickells, T., Diesing, M., Aldridge, J., ... Williamson, P. (2020). Carbon on the Northwest European shelf: Contemporary budget and future influences. *Frontiers in Marine Science*, 7, 143. <https://doi.org/10.3389/fmars.2020.00143>.
- <sup>166</sup> Levin, LA, Wei, C-L, Dunn, DC, et al. Climate change considerations are fundamental to management of deep-sea resource extraction. *Glob Change Biol.* 2020; 26: 4664– 4678. <https://doi.org/10.1111/gcb.15223>; citing Gillard, B., Chatzievangelou, D., Thomsen, L., & Ullrich, M. S. (2019). Heavy-metal-resistant microorganisms in deep-sea sediments disturbed by mining activity: An application toward the development of experimental in vitro systems. *Frontiers in Marine Science*, 6, 462. <https://doi.org/10.3389/fmars.2019.00462>
- <sup>167</sup> Levin, LA, Wei, C-L, Dunn, DC, et al. Climate change considerations are fundamental to management of deep-sea resource extraction. *Glob Change Biol.* 2020; 26: 4664– 4678. <https://doi.org/10.1111/gcb.15223>; citing Sweetman, A. K., Smith, C. R., Shulse, C. N., Maillot, B., Lindh, M., Church, M. J., ... Gooday, A. J. (2019). Key role of bacteria in the short-term cycling of carbon at the abyssal seafloor in a low particulate organic carbon flux region of the eastern Pacific Ocean. *Limnology and Oceanography*, 64(2), 694– 713. <https://doi.org/10.1002/lno.11069>.

### 4. Other Marine Users (Submarine Cables and Underwater Cultural Heritage)

DSM operators owe rights of “due regard” and “reasonable regard” under UNCLOS to other marine users.<sup>168</sup> The International Cable Protection Committee has Observer status at the ISA, and regularly attends meetings. The ISA conducted a technical study on practical options for DSM and submarine cables, in an attempt to move forward on non-regulatory solutions to existing and potential disputes.<sup>169</sup>

The deep ocean is also important as a place of underwater cultural heritage (UCH). DSM operations that interact with tangible UCH will destroy such heritage (shipwrecks, human remains, or archaeological artefacts) by removing it from the seafloor and processing it in a machine before discharge. There are an estimated 1,100 wrecks on the seabed from WWI that are UCH and another 7,800 wrecks from WWII that will soon come within UNESCO’s legal definition of UCH.<sup>170</sup> All of these historic wrecks are also threats to the marine environment through potential pollution, especially if disturbed. Additionally, there are an estimated 300,000 Japanese human remains in the waters of the Pacific alongside countless more from other nationalities.<sup>171</sup>

DSM will also affect intangible cultural heritage. In one specific example, noise from DSM has the potential to negatively impact local practices, such as shark calling, as well as the migration of whales— which have cultural importance to many people globally. Concerns have also been raised about DSM’s interactions with some cultures’ understanding of responsibility to the ocean or special regard for the deep ocean, including corals.<sup>172</sup> Pacific methods of ‘wayfinding’ led to inter- and intra-island connections with the sea and coast being seen as a sacred and spiritual place. In the Pacific, the sea is seen by some as both an ancestor itself, and as a resting place for ancestors.<sup>173</sup> (Many Pacific Islanders, including Indigenous Hawai’ian people, hold a direct spiritual and ancestral connection to the ocean and the deep ocean. This connection is recognized in the Kumulipo, the Hawai’ian creation chant that follows the ancestral lineage of the Hawai’ian royal line to the first believed life in the islands, the deep ocean coral polyp.<sup>174</sup>) The ISA and UNESCO have signed a Memorandum of Understanding to promote cooperation<sup>175</sup>, and in 2022 civil society organizations called for further collaboration between the organizations.<sup>176</sup> See Section X.C for the current status of discussion on UCH at the ISA.

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<sup>168</sup> UNCLOS Articles 87(2), 147(1), 147(3).

<sup>169</sup> ISA Technical Study No. 24, <https://isa.org.jm/files/documents/Technical%20Study%2024%20-%20amazon%20jan%202020%20eversion.pdf>.

<sup>170</sup> Monofills 2006

<sup>171</sup> Jeffery, B., McKinnon, J. F. and Van Tilburg, H. (2021). Underwater cultural heritage in the Pacific: Themes and future directions. *International Journal of Asia Pacific Studies* 17 (2): 135–168: <https://doi.org/10.21315/ijaps2021.17.2.6>

<sup>172</sup> <https://www.theguardian.com/environment/2020/aug/26/hawaii-fish-waters-native-commercial-fishers>

<sup>173</sup> <https://sanctuaries.noaa.gov/education/teachers/utilizing-a-biocultural-lens-to-build-to-the-kai-lipo.html>

<sup>174</sup> <https://puke.ulukau.org/ulukau-books/?a=d&d=EBOOK-BECKWIT2.2.1.1&e=-----en-20--1--txt-txPT----->

<sup>175</sup> Memorandum of Understanding Between the Intergovernmental Oceanographic Commission of UNESCO and The International Seabed Authority, <https://isa.org.jm/files/documents/EN/Regs/ISA-IOC-MOU.pdf>.

<sup>176</sup> Request for Sustained Cooperation to Protect Underwater Cultural Heritage, 18 July 2022.

### C. Scale of the Unknowns

Significant knowledge gaps exist to inform environmental baselines and thresholds for DSM.<sup>177</sup> In October 2022 the Deep Ocean Stewardship Initiative produced an information sheet entitled, “Scientific Knowledge is Currently Insufficient for Effective Environmental Management of Deep-Seabed Mining.”<sup>178</sup> Key Findings for the Clarion Clipperton Zone include:

- We have inadequate knowledge. 85% of the scientific topics assessed were dominated by knowledge gaps or had no knowledge
- The majority of species are not even known. Biologists estimate that up to 75% of animal species are yet to be discovered in areas that have been sampled.
- The ecosystem is poorly understood. Many species have only been collected once or twice, which is not enough to draw sound conclusions on their ecological attributes (species abundance, diversity, ranges, relationships with other species, contribution to overall ecosystem function, extinction risks, and vulnerability to and recovery from deep-seabed mining).
- Areas established for conservation are poorly known. The Areas of Particular Environmental Interest (APEIs) are severely under-sampled. Some are located at considerable distances from the contractor areas and their biological communities may have significant differences, leading to questions about their effectiveness.

only 1.1% of scientific categories recently assessed across regions with exploratory deep-sea mining licenses had enough scientific knowledge to enable evidence-based management.<sup>179</sup>

Throughout the ocean, the mesopelagic remains largely unknown. “Despite some existing general knowledge, ecological baselines for midwater ecosystems likely to be impacted do not exist”<sup>180</sup> and data from ISA contractors to date is very limited. For example, during TMC’s recent collector test, scientists did not measure the effects of the plume on fauna, because they do not yet know the toxicity of the plume.<sup>181</sup>

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<sup>177</sup> Muñoz-Royo, C., Peacock, T., Alford, M.H. et al. Extent of impact of deep-sea nodule mining midwater plumes is influenced by sediment loading, turbulence and thresholds. *Commun Earth Environ* 2, 148 (2021). <https://doi.org/10.1038/s43247-021-00213-8>; T. J. Webb, E. Vanden Berghe, R. O’Dor, Biodiversity’s big wet secret: The global distribution of marine biological records reveals chronic under-exploration of the deep pelagic ocean. *PLoS One* 5, e10223 (2010) <https://doi.org/10.1371/journal.pone.0010223>; Smith, C.R., Clark, M.R., Goetze, E., Glover, A.G., and Howell, K.L. (2021). The research topic biodiversity, connectivity and ecosystem function across the Clarion-Clipperton Zone: A regional synthesis for an area targeted for nodule mining. *Front. Mar. Sci.* <https://doi.org/10.3389/fmars.2021.797516>.

<sup>178</sup> Deep-Ocean Stewardship Initiative Information Sheet. “Scientific Knowledge is Currently Insufficient for Effective Environmental Management of Deep-Seabed Mining.” <https://www.dosi-project.org/wp-content/uploads/DSM-Management-Knowledge-Info.pdf>

<sup>179</sup> Amon, D.J., Gollner, S., Morato, T., Smith, C.R., Chen, C., Christensen, S., Currie, B., Drazen, J.C., T F, Gianni, M., et al. (2022). Assessment of scientific gaps related to the effective environmental management of deep-seabed mining. *Mar. Policy.* <https://doi.org/10.1016/j.marpol.2022.105006>

<sup>180</sup> Drazen et. al, Midwater ecosystems must be considered when evaluating environmental risks of deep-sea mining; <https://www.pnas.org/doi/10.1073/pnas.2011914117>; A. Martin et al., The oceans’ twilight zone must be studied now, before it is too late. *Nature* 580, 26–28 (2020) <https://www.nature.com/articles/d41586-020-00915-7>.

<sup>181</sup> NORI and The Metals Company Presentation, 2 Nov., 2022. Kingston, Jamaica.

### D. Little Evidence DSM Will Mean Less Terrestrial Mining

One of the main premises of TMC's marketing and value proposition is that DSM would be less harmful, including to biodiversity, than terrestrial mining. There is little indication that DSM would replace terrestrial mining; there is much evidence that it would not. No terrestrial mining interests have agreed or offered to close or scale back their operations if TMC successfully commercializes DSM. A study commissioned by the ISA found that DSM would not cause overproduction of minerals globally. For example, for nickel, "if production of polymetallic nodules starts in 2027 and increases with the intensity we expect, it will not cause overproduction of nickel even with the minimum expected growth rate of consumption, the commissioning of all currently known projects of new surface mines, and deep sea mining by twelve contractors."<sup>182</sup> The same ISA study found that while seabed mining would not cause overproduction of nickel, it may cause a decline in prices.<sup>183</sup> Prices for cobalt could also drop because of reserves in warehouses on land.<sup>184</sup> Scholars have contended that DSM could end up exacerbating terrestrial mining and its many problems.<sup>185</sup> The concern is, in part, that a "slight decline in prices" could drive down safety and environmental management standards in land-based mining.<sup>186</sup>

### IX. Social License Considerations

In recent years DSM has come to forefront of a conversation about how human beings can survive and thrive on this planet. While some believe DSM can be a robust part of a blue economy, many specifically define blue economy to exclude DSM (see Section V, Blue Economy Considerations).

Fourteen countries now officially opposed DSM in the Area (note that in May 2023, that number was zero). A number of countries including Costa Rica, Chile, the Dominican Republic, Ecuador, Federated States of Micronesia, Fiji, Germany, New Zealand, Palau, Panama, Samoa, Spain, and Vanuatu have called for a precautionary pause or moratorium on deep-sea mining by the ISA and France has called for an outright ban on deep-sea mining.<sup>187</sup> Parliamentarians for Global Action has issued a Global Parliamentary Declaration Calling for a Moratorium on Deep Seabed Mining.<sup>188</sup>

Fisheries bodies are also beginning to speak out against the risks posed to their livelihood and food security by DSM. The Locally Managed Marine Areas network (LMMA) and the African Confederation of Professional Artisanal Fishing Organisations (CAOPA) have called for a ban

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<sup>182</sup> ISA Metals Study, p. 251.

<sup>183</sup> ISA Metals Study, para. 251 (re nickel); paras 296, 299 (re: cobalt)

<sup>184</sup> ISA Metals Study, para. 299

<sup>185</sup> Pradeep Singh, Deep Seabed Mining and Sustainable Development Goal 14, W. Leal Filho et al. (eds.), *Life Below Water*, Encyclopedia of the UN Sustainable Development Goals, [https://doi.org/10.1007/978-3-319-71064-8\\_135-1](https://doi.org/10.1007/978-3-319-71064-8_135-1) p. 10 ("deep seabed mining might end up further exacerbating terrestrial mining activities, resulting in deleterious consequences occurring simultaneously on land and at sea.

<sup>186</sup> TMC, Open Letter, <https://metals.co/open-letter-to-brands-calling-for-a-ban-on-seafloor-minerals/>

<sup>187</sup> <https://www.savethehighseas.org/voices-calling-for-a-moratorium-governments-and-parliamentarians/>

<sup>188</sup> <https://www.pgaction.org/tags.html?tag=ralph+regenvanu>



on DSM<sup>189</sup> and many other fisheries associations have called for a moratorium or similar.<sup>190</sup> In May 2023, first meeting of the Ecosystem and Bycatch Working Group of the Inter American Tropical Tuna Commission (IATTC) included a presentation on DSM and potential fisheries interactions.<sup>191</sup>

Brands including electric vehicle and electronics manufacturers have taken a stance against seabed mining (not to use minerals from the seabed, not to invest in DSM, or both).<sup>192</sup> Eight major EV manufacturers have also pledged not to use minerals from DSM, greatly affecting the market for such minerals.<sup>193</sup>

Banks and investors are also divesting from, or committing not to invest in, DSM. See Section IV.

### **X. Emerging Liabilities**

Any consideration of whether to sponsor DSM activities in the Area or allow them in domestic waters must also be forward looking and consider risks and potential liabilities that are emerging in tandem with current decision making. The below are examples of the increasing amount of unknowns related to the governance and liability issues that surround DSM, as topics for consideration. These considerations are the same for DSM in the Area or in a state's EEZ.

#### **A. Carbon Release and Climate Regulation**

By releasing carbon or upsetting the complex ocean carbon cycle, DSM may make climate change worse (as opposed to being a climate solution); DSM presents a climate amplification risk.<sup>194</sup> This raises many questions of liability – once any carbon release can be measured, how would it be accounted for? Would the carbon be counted under the carbon budget of the Sponsoring State or in its NDC? Would the contractor need to pay for carbon offsets? Regarding the climate amplification risk, it has been suggested that contractors should be reporting on these risks to regulatory agencies, including the U.S. Securities Exchange Commission.<sup>195</sup>

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<sup>189</sup> <https://caopa.org/en/deep-sea-mining-artisanal-fishers-call-for-the-protection-of-their-livelihoods-against-deep-sea-mining/20/07/2022/news/4639/>

<sup>190</sup> <https://www.savethehighseas.org/voices-calling-for-a-moratorium-fishing-sector/>

<sup>191</sup> <https://iattc.org/en-US/Event/DetailMeeting/Meeting-WGEB-01>

<sup>192</sup> <https://dsmobserver.com/2021/04/major-brands-say-no-to-deep-sea-mining-for-the-moment/>; <https://sevenseasmedia.org/major-companies-are-pledging-against-deep-sea-mining/>.

<sup>193</sup> <https://www.racetothetop.app/>

<sup>194</sup> Nature's Newsroom, November 16, 2022 <https://www.wedonthavetime.org/events/cop27-day9>; Observing and understanding climate change and biodiversity from the coast to the deep ocean, November 15, 2022, [https://www.youtube.com/watch?v=7cd\\_ibE\\_YnM](https://www.youtube.com/watch?v=7cd_ibE_YnM).

<sup>195</sup> The Ocean Foundation, Comments on Securities Exchange Commission File Number S7-10-22, the Proposed Rule regarding the Enhancement and Standardization of Climate-Related Disclosures for Investors. <https://www.sec.gov/comments/s7-10-22/s71022-20130988-300287.pdf>

### **B. Human Rights (Rights of Children, Intergenerational Equity, Indigenous Peoples' Rights)**

DSM is increasingly discussed in the context of human rights: intergenerational equity and the rights of children. This issue was raised at COP27,<sup>196</sup> peer reviewed papers are addressing it,<sup>197</sup> and one or more UN Special Rapporteurs for Human Rights are evaluating the intersection of human rights and DSM.<sup>198</sup> The Business and Human Rights Resource Center, in evaluating transition minerals, found that “a just transition requires further scientific study of the environmental impacts of deep-sea mining and the full participation of Indigenous and coastal communities, and civil society organisations to inform more transparent, comprehensive and therefore effective regulations.”<sup>199</sup> A November 2022 peer reviewed paper found that the ISA’s policies and procedures are not inclusive of stakeholders, and do not encourage or facilitate public participation.<sup>200</sup> An April 2023 book chapter found that “the ISA’s incorporation of public participation into its regular processes has yet to meet good and best practices as reflected in international legal instruments and as compiled in the academic literature.”<sup>201</sup>

### **C. Underwater Cultural Heritage**

The potential effects of DSM on underwater cultural heritage are discussed in Section VIII.B.4. Such conversations have not historically found a place in regulatory development at the ISA but, at ISA 27-III, the Federated States of Micronesia and the United States (among others) spoke in favor of further consideration being given to Indigenous and local knowledge, effects on Indigenous and local people, and culture.<sup>202</sup> Nigeria supported Observers who suggested the inclusion of the term Underwater Cultural Heritage.<sup>203</sup> At ISA 28-I, in parallel with the words of the Indigenous voices, conversation around Underwater Cultural Heritage (UCH) was met with intrigue and interest. Many states expressed their commitment to honoring UCH and decided to hold an intersessional workshop to discuss how to include and define it in the

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<sup>196</sup> Key Takeaways for the Ocean at COP27, November 16, 2022 <https://enb.iisd.org/ocean-action-day-cop27; Deep Sea Mining? A Climate Risk>, <https://twitter.com/DeepSeaConserve/status/1592944381258240000> (video excerpt of Sustainable Ocean Alliance’s Mark Haver discussing DSM as an intergenerational justice issue).

<sup>197</sup> Public participation at the International Seabed Authority: An international human rights law analysis Elisa Morgera, Hannah Lily First published: 06 November 2022 <https://doi.org/10.1111/reel.12472>; Hamley, GJ. The implications of seabed mining in the Area for the human right to health. *RECIEL*. 2022; 31( 3): 389- 398. doi:10.1111/reel.12471 (“the human right to health, is dependent on marine biodiversity. On this basis, States are subject to a package of obligations under the right to health concerning the protection of marine biodiversity... Analysis of the draft regime for the exploitation phase of seabed mining suggests that, thus far, States have failed to discharge their responsibilities under the right to health.”)

<sup>198</sup> Authors’ personal correspondence.

<sup>199</sup> [https://media.business-humanrights.org/media/documents/2021\\_TMT\\_deep\\_sea\\_mining.pdf](https://media.business-humanrights.org/media/documents/2021_TMT_deep_sea_mining.pdf)

<sup>200</sup> Public participation at the International Seabed Authority: An international human rights law analysis Elisa Morgera, Hannah Lily First published: 06 November 2022 <https://doi.org/10.1111/reel.12472>, p. 386.

<sup>201</sup> Jeff Ardron, Hannah Lily, and Aline Jaeckel, “Chapter 16: Public participation in the governance of deep-seabed mining in the Area.” *Research Handbook on International Marine Environmental Law*, edited by Rosemary Rayfuse, Aline Jaeckel and Natalie Klein, Edgar, 14 April 2023, 361-384. <https://doi.org/10.4337/9781789909081.00026>

<sup>202</sup> Statement by the Federated States of Micronesia at ISA 27-III. 1 Nov., 2022; Statement by the United States at ISA 27-III, 4 Nov., 2022.

<sup>203</sup> Statement by Nigeria at ISA 27-III. 2 Nov., 2022; Statement by The Ocean Foundation (Observer) at ISA 27-III, 2 Nov., 2022.

regulations.<sup>204</sup> The informal intersessional working group on UCH met three times in April and May 2023.

#### **D. Radioactivity Concerns**

A study published in May 2023 found that in some cases radioactivity of radium-226 in polymetallic nodules exceeds safe limits in German Radiation Protection Ordinance 100-1000-fold.<sup>205</sup> A study author states that “handling manganese nodules without protective gear can pose a health risk.”<sup>206</sup>

#### **XI. Conclusion**

It is undeniably true that many states considering becoming DSM Sponsoring States are in need of new streams of revenue generation, the world is not decarbonizing quickly enough, and those responsible for the climate crisis have not stepped up to the plate. Supporting DSM could seem like a solution to all of those problems. However, DSM is not necessary to transition away from fossil fuels. It is not a smart and sustainable investment. It will not result in the equitable distribution of benefits, and the mark left on the ocean by DSM will not be brief. Vast uncertainties - scientific, legal, and financial - accompany DSM and states have more to lose than to gain. The risks are many, and serious.

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<sup>204</sup> <https://enb.iisd.org/international-seabed-authority-isa-council-28-summary>

<sup>205</sup> Jessica B. Volz, Walter Geibert, Dennis Köhler, Michiel M. Rutgers van der Loeff and Sabine Kasten. Alpha radiation from polymetallic nodules and potential health risks from deep-sea mining. *Sci Rep* 13, 7985 (2023). doi.org/10.1038/s41598-023-33971-w

<sup>206</sup> <https://www.awi.de/en/about-us/service/press/single-view/awi-forschende-weisen-hohe-natuerliche-radioaktivitaet-in-manganknollen-nach.html>