

12-1-2021

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Recommended Citation

Blanco, Sebastian (2021) "The Mar-Portugal Plan: How Portugal's Action Plan to Transition into a Maritime Economy May Prove Challenging withn the Current International Regulatory Framework for Deep Sea Mining," *Journal of International Business and Law*. Vol. 21: Iss. 1, Article 5.

Available at: <https://scholarlycommons.law.hofstra.edu/jibl/vol21/iss1/5>

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THE MAR-PORTUGAL PLAN: HOW PORTUGAL'S ACTION PLAN TO TRANSITION INTO A MARITIME ECONOMY MAY PROVE CHALLENGING WITHIN THE CURRENT INTERNATIONAL REGULATORY FRAMEWORK FOR DEEP SEA MINING.

By: Sebastian Blanco

I. INTRODUCTION

In a time where many States look to exploit outer space for its economic potential, the small country of Portugal instead looks to the sea and its unexplored seabed.¹ Portugal is in the midst of a legal claim which could vastly increase the size of its maritime territory and potentially propel it into newfound economic prosperity.² The Mar-Portugal Plan (“MPP”) is an action plan aimed at revitalizing Portugal’s historical identity as a seafaring nation through the social and industrial development of its maritime economy.³ The success of the MPP is contingent on Portugal’s submission to the Commission on the Limits of the Continental Shelf (“CLCS”).⁴ Portugal has spent the last ten years or so investing in the oceanic research of the continental shelf on which its territories sit.⁵ Portugal’s scientific research has shown that its continental shelf is rich in valuable minerals and rare earth metals.⁶ If the CLCS finds that Portugal has the exclusive right to the seabed of its extended continental shelf, Portugal would be in a unique position as having one of the largest maritime jurisdictions in the world.⁷ Furthermore, Portugal would have the exclusive right to mine the approximate 4,000,000 km² of seabed for minerals.⁸

Deep Seabed Mining, or DSM (“DSM”), is the process of extracting mineral deposits from the ocean floor below the depth of 200 meters.⁹ DSM has become a hotly debated topic on a global level.¹⁰ On one hand, industrialist and world leaders see it as an

¹ See GOVERNO DE PORTUGAL, National Ocean Strategy 2013-2020 1, 13 (2014); see also Nicolas Rapp and Brian O’Keefe, *50 Years After the Moon Landing, Money Races into Space*, FORTUNE (July 22, 2019), <https://fortune.com/longform/space-program-spending-by-country/>.

² See GOVERNO DE PORTUGAL, *supra* note 1 at 3.

³ See *id.* at 55, 56.

⁴ See *id.* at 17.

⁵ See *id.*

⁶ See *id.* at 47.

⁷ See David Figueira Bourton, *Beyond the Horizon: Portugal’s Plan for Atlantic Expansion*, BLOOMSBURY GEOGRAPHER (May 30, 2020), <https://bloombsurygeographer.com/2020/05/30/beyond-the-horizon-portugals-plan-for-atlantic-expansion/>.

⁸ See GOVERNO DE PORTUGAL, *supra* note 1 at 16, 17; Bourton, *supra* note 7; *Background to UNCLOS*, GRID ARENDAL (last visited Sep. 14, 2020), <http://www.continentalshelf.org/about/1143.aspx>.

⁹ *Issues Brief: Deep-sea mining*, IUCN (last visited Nov. 7, 2020), <https://www.iucn.org/resources/issues-briefs/deep-sea-mining>.

¹⁰ See John Alton Duff, *UNCLOS and the New Deep Seabed Mining Regime: The Risks of Refuting the Treaty*, 19 SUFFOLK TRANSNAT’L L. REV. 1 (1995); Waseem Ahmad Qureshi, *Marine Biodiversity Conservation: The International Legal Framework and Challenges*, 40 HOUSE. J. INT’L. L. 845 (2018); Jason C. Nelson, *The Contemporary Seabed Mining Regime: A Critical Analysis of the Mining Regulations Promulgated by the*

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inevitable future as the global demand for rare earth metals and minerals, such as cobalt, increase.¹¹ On the other hand, environmentalist groups and developing nations that depend on terrestrial mining view the practice as unnecessary and harmful.¹² In light of this, DSM has yet to be implemented on a commercial scale.¹³ The extraction of mineral resources in the deep sea has been tested by Japan; but, the closest attempt to seabed mining on a commercial level was Solwara 1 in Papua New Guinea and was a complete failure.¹⁴ The lack of commercial DSM is attributed to expensive research, financial costs, its unknown environmental impact and its vague international regulatory framework.¹⁵

Portugal has made it clear that it wishes to be a major player in DSM.¹⁶ When the CLCS issues their recommendation on Portugal's extended continental shelf claim, the country may be given exclusive sovereignty over a large region rich in mineral resources.¹⁷ However, Portugal has some serious legal hurdles it must address if it wishes to be at the forefront of what some consider the future of the global mineral and rare earth element supply.¹⁸ These legal challenges can be divided into two categories, the first of which pertains to the reconciliation of environmental protection with realistic mining expectations.¹⁹ Second, Portugal must address the current regime governing DSM, its lack of standards, and the uncertain future regarding multiple layers of international law.²⁰ Since Portugal is a party to both the European Union ("EU") and United Nation Convention on the Law of the Sea

International Seabed Authority, 16 COLO. J. INT'L ENVTL. L. & POL'Y 27 (2005); Catherine Danley, *Diving to New Depths: How Green Energy Markets Can Push Mining Companies into the Deep Sea, and Why Nations Must Balance Mineral Exploitation with Marine Conservation*, 44 WM. & MARY ENVTL. L. & POL'Y REV. 219 (2019).

¹¹ See *Essential Points: Main Proposals for the Economic Recovery Plan*, THE PORTUGAL NEWS (July 21, 2020), <https://www.theportugalnews.com/news/essential-points-main-proposals-for-the-economic-recovery-plan/54946>; Elizabeth Claire Alberts, *Deep-Sea Mining: An Environmental Solution or Impending Catastrophe?*, MONGABAY (June 16, 2020), <https://news.mongabay.com/2020/06/deep-sea-mining-an-environmental-solution-or-impending-catastrophe/>.

¹² See *Deep Sea mining-A Sustainable Choice for Portugal?*, DEEPSEA CONSERVATION COALITION (Nov. 2, 2017), <http://www.savethehighseas.org/2017/11/02/deep-sea-mining-sustainable-choice-portugal/>; James Dacey, *Deep-Sea Mining May Have Deep Economic, Environmental Impacts*, EOS (Aug. 3, 2020), <https://eos.org/articles/deep-sea-mining-may-have-deep-economic-environmental-impacts>.

¹³ See Michelle Allsopp et. al., *Review of the Current State of Development and the Potential for Environmental Impacts of Seabed Mining Operations*, GREENPEACE RESEARCH LABORATORIES TECHNICAL REPORT 1 (2013).

¹⁴ See Colin Filer et. al., *How PNG Lost US\$120 Million and the Future of Deep-Sea Mining*, DEVPOLICY (Apr. 28, 2020), <https://devpolicy.org/how-png-lost-us120-million-and-the-future-of-deep-sea-mining-20200428/>; *JOGMEC Harvests Cobalt and Nickel from the Seafloor*, OCEAN MINING INTEL (Aug. 28, 2020), <https://oceanminingintel.com/news/industry/jogmec-harvesting-cobalt-and-nickel-from-the-seafloor>.

¹⁵ See IUCN, *supra* note 9, at 4.

¹⁶ See GOVERNO DE PORTUGAL, *supra* note 1; see Bourton, *supra* note 7.

¹⁷ See GOVERNO DE PORTUGAL, *supra* note 1.

¹⁸ See Danley, *supra* note 10.

¹⁹ See Luz Danielle O. Bolong, *Into the Abyss: Rationalizing Commercial Deep Seabed Mining Through Pragmatism and International Law*, 25 TUL. J. INT'L & COMP. L. 127, 166 (2016).

²⁰ See Michael W. Lodge, *International Seabed Authority Mining Standards*, in 17 THE REGULATION ON CONTINENTAL SHELF DEVELOPMENT: RETHINKING INTERNATIONAL STANDARDS 79 (Myron H. Nordquist et al. eds., 2013) (ebook).

(“UNCLOS”), it does not enjoy the autonomy that some other states have in this industry.²¹ It can be argued that Portugal may benefit from waiting for DSM’s international regulations to be developed before beginning DSM.²²

First, this note aims to present the legal challenges Portugal faces in the implementation of the Mar-Portugal Plan, specifically in the scope of DSM.²³ Second, it will be shown that the legal problems in respect to UNCLOS and the International Seabed Authority (“ISA”) and their failure in reducing the economic and environmental risks that plague the DSM industry.²⁴

Cobalt plays a critical role in the development of ‘green’ technology, however, most of the world’s cobalt supply comes from an unstable region of the Democratic Republic of Congo (“DRC”).²⁵ Electric vehicle manufacturers rely heavily on cobalt to produce batteries.²⁶ Given the current trends in the international market, the demand for cobalt is ever increasing as electric vehicles skyrocket in popularity.²⁷

The DRC’s current mining industry has been under much scrutiny by both environmentalist and human rights advocates.²⁸ Therefore, an argument can be made that DSM is an important next step for global cobalt production. Nonetheless, the environmental concerns in respect to DSM are not to be taken lightly and the development of sustainable

²¹ See Finn Arnesen et al., *European Union Law and the Seabed*, in 90 THE LAW OF THE SEABED 315 (Catherine Banet ed. 2020) (ebook) (explaining that the EU limits its member states from regulating seabed mining independently).

²² *Id.* (explaining that the EU intends to be an active participant in DSM).

²³ See GOVERNO DE PORTUGAL, *supra* note 1.

²⁴ See Achin Vanaik, *The UNCLOS Isn’t Perfect and It’s Time We Acknowledge That*, TRANSNATIONAL INSTITUTE (Aug. 12, 2020), <https://www.tni.org/en/article/the-unclos-isnt-perfect-and-its-time-we-acknowledge-that>.

²⁵ See Amanda Kay, *5 Top Cobalt-mining Companies*, INVESTING NEWS (July 18, 2018), <https://investingnews.com/daily/resource-investing/battery-metals-investing/cobalt-investing/top-cobalt-producing-companies/>; *Fincantieri and Saipem: Deep-Seabed Mining Agreement*, OCEAN MINING INTEL (Aug. 17, 2020), <https://oceanminingintel.com/news/industry/fincantieri-and-saipem-deep-seabed-mining-agreement>; *Harvesting the Deep for the Green Transition*, OCEAN MINING INTEL (June 3, 2020), <https://oceanminingintel.com/news/industry/harvesting-the-deep-for-the-green-transition>; *Deep-Sea Miners*; *See Tesla Growth as Signal to Pluck Cobalt*, OCEAN MINING INTEL (May 8, 2020), <https://oceanminingintel.com/news/industry/deep-sea-miners-see-tesla-growth-as-signal-to-pluck-cobalt>.

²⁶ See *BGS Report Offers Insight into Cobalt Global Supply Chain as Demand Rises*, OCEAN MINING INTEL (Dec. 2, 2020), <https://oceanminingintel.com/news/industry/bgs-report-offers-insight-into-cobalt-global-supply-chain-as-demand-rises>.

²⁷ See *Harvesting the Deep for the Green Transition*, OCEAN MINING INTEL (June 3, 2020), <https://oceanminingintel.com/news/industry/harvesting-the-deep-for-the-green-transition>; *Deep-Sea Miners*; *See Tesla Growth as Signal to Pluck Cobalt*, OCEAN MINING INTEL (May 8, 2020), <https://oceanminingintel.com/news/industry/deep-sea-miners-see-tesla-growth-as-signal-to-pluck-cobalt>; *BGS Report Offers Insight into Cobalt Global Supply Chain as Demand Rises*, OCEAN MINING INTEL (Dec. 2, 2020), <https://oceanminingintel.com/news/industry/bgs-report-offers-insight-into-cobalt-global-supply-chain-as-demand-rises>.

²⁸ See James Gordon, *Cobalt: The Dark Side of a Clean Future*, RACONTEUR (June 4, 2019), <https://www.raconteur.net/corporate-social-responsibility/cobalt-mining-human-rights/> (explaining the major human rights violations occurring in the cobalt mines of the DRC such as child labor).

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DSM practices have been challenging.²⁹ This note will provide potential solutions to the many issues concerning both Portugal and the DSM industry as a whole.

II. THE LAW OF THE SEA AND THE DSM REGIME

The development of the law of the sea stems from a series of international conventions that took place in the latter half of the twentieth century.³⁰ UNCLOS, or the Law of the Sea, is the current framework for the international regulation of the ocean and its codified law.³¹ Within UNCLOS are various definitions and rules that are critical to the understanding of the MPP and the potential issues arising from its implementation.³² Therefore, it is imperative to have a general understanding of UNCLOS, its history, key terms and regulatory bodies to see where its limitations may prevent Portugal from DSM in the foreseeable future.

A. The UN Convention on the Law of the Sea

Following World War II, states began to put pressure on the United Nations to codify the existing laws pertaining to the ocean.³³ Heading to the requests of the international community, the First United Nations Conference on the Law of the Sea, UNCLOS I, began on February 24, 1958 and lasted roughly two months.³⁴ UNCLOS I adopted four conventions commonly referred to as the 1958 Geneva Conventions.³⁵ The conventions adopted were: the Convention on the Territorial Sea and Contiguous Zone; the Convention on the High Seas; the Convention on Fishing and Conservation of the Living Resources of the High Seas; and the Convention on the Continental Shelf.³⁶ The following conference, UNCLOS II, began on March 17, 1960 and lasted approximately one month.³⁷ This conference was largely unsuccessful because it failed to create any international agreement or establish any consensus on sovereign fishing rights.³⁸ On the other hand, UNCLOS III, began in 1973 and lasted for nine years. This conference garnered participation from over 160 nations and came into force on November 14, 1994.³⁹ UNCLOS III was successful in creating definitions of key terms including: territorial sea; maritime zone; exclusive economic zone; the continental

²⁹ See Marta Chantal Ribeiro et al., *Scientific, Technical and Legal Challenges of Deep Sea Mining. A Vision for Portugal—Conference Report*, MARINE POLICY 114 (2020) (explaining the difficulties for the DSM industry).

³⁰ See GRID ARENDAL, *supra* note 8; *What is the Law of the Sea?*, NAT'L OCEAN SERV. (last updated April 22, 2020), <https://oceanservice.noaa.gov/facts/lawofsea.html>.

³¹ See GRID ARENDAL, *supra* note 8; see NAT'L OCEAN SERV *supra* note 30.

³² U.N. Convention on the Law of the Sea, *Opened for Signature*, Dec. 10, 1982, 1833 U.N.T.S. 397 (entered into force Nov. 16, 1994).

³³ See GRID ARENDAL, *supra* note 8.

³⁴ *See id.*

³⁵ *See id.*

³⁶ *See id.*

³⁷ *See id.*

³⁸ *See id.*

³⁹ *See id.*

shelf; the high sea; international seabed; and archipelagic waters.⁴⁰ The convention also made provisions regarding the protection of the marine environment, freedom of scientific research, and exploitation of resources.⁴¹

Currently 168 countries have ratified UNCLOS, and although the United States has signed the treaty, they have not ratified it.⁴² Therefore, the United States is not bound by UNCLOS.⁴³ The United States main reason for not ratifying the treaty is the continental shelf and seabed rights portion of it.⁴⁴ Nonetheless, the United States respects UNCLOS as the customary international law of the sea and has enjoyed some benefits in respect to its autonomy to regulate deep sea exploration separate from the ISA.⁴⁵ Despite UNCLOS' lack of universal backing, many of its provisions have been universally accepted from both members and nonmembers, in particular, the territorial rights to the ocean.⁴⁶

B. The Exclusive Economic Zone.

The Law of the Sea defines the Exclusive Economic Zone ("EEZ") as an area beyond and adjacent to a coastal states territorial water that is not to exceed 200 nautical miles from the baseline of its territorial sea.⁴⁷ Within this area, nations have "sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living...and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds."⁴⁸

Essentially, the EEZ is an area beyond the territorial sea where a state has exclusive economic sovereignty from the seabed up to the surface of the water. States also enjoy the exclusive right to construct and regulate the operation of artificial islands and other offshore infrastructure installations within this zone.⁴⁹ Within the EEZ, states enjoy the rights to the mineral resources of the seabed.⁵⁰ Although few states have access to resources worth mining in the EEZ, another layer of territorial water, beyond the 200nm of the EEZ, has been of increasing interest to coastal states across the globe.⁵¹

⁴⁰ *See id.*

⁴¹ *See id.*; *see also* U.N. Convention on the Law of the Sea, *supra* note 32.

⁴² *See* U.N. Convention on the Law of the Sea, *supra* note 32.

⁴³ *See* Steven Groves, *The U.S Can Mine the Deep Seabed Without Joining the U.N. Convention on the Law of the Sea*, THE HERITAGE FOUND. (Dec. 4, 2012), <https://www.heritage.org/report/the-us-can-mine-the-deep-seabed-without-joining-the-un-convention-the-law-the-sea>.

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ *Id.*

⁴⁷ *See* U.N. Convention on the Law of the Sea, *supra* note 32.

⁴⁸ *See id.*

⁴⁹ *See id.*

⁵⁰ *See id.*

⁵¹ *See* Allsopp, *supra* note 13.

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C. The Continental Shelf and the CLCS.

Article 76 of the Law of the Sea provides that the continental shelf of a coastal state is the seabed and subsoil of the submarine area beyond a state's territorial sea.⁵² This area may reach the outer edge of the continental margin or a distance of 200 nautical miles from the baseline of the territorial sea.⁵³ Within this area, a state has sovereign rights to the continental shelf for the purpose of exploration and exploitation of natural resources.⁵⁴ However, distinct from the EEZ, the sovereign rights within this zone are limited to mineral and non-living resources of the seabed and subsoil.⁵⁵ When a coastal state, such as Portugal, wishes to extend the limits of their continental shelf beyond 200 nautical miles, they must submit their claim to the CLCS.⁵⁶ The CLCS is a commission that deals exclusively with continental shelf claims.⁵⁷ The Commission evaluates the information submitted by a coastal state and then issues its recommendations for the establishment of the outer limits of the state's continental shelf.⁵⁸ The recommendation by the CLCS is deemed final and binding.⁵⁹ Portugal submitted their claim and research to the CLCS and are awaiting a recommendation.⁶⁰ It is anticipated that the CLCS will issue their recommendation sometime in the near future.⁶¹ If the CLCS's recommendation to Portugal's submission grants them the limits they seek for the continental shelf, they would have exclusive sovereign rights over a multitude of valuable mineral resources within their seabed.⁶² These sovereign rights may not be as fruitful as Portugal anticipated, given the nature of the DSM industry and the various levels of international regulation that Portugal is at mercy to.⁶³

D. The ISA's Role in Governing DSM

The ISA, also known as the Authority, is the body created by the United Nations Conventions on the Law of the Sea ("UNCLOS") that regulates mining in the seabed and subsoil beyond a state's jurisdiction.⁶⁴ The Authority has a broad range of responsibilities that include: 1) issuing contracts to entities that wish to mine the seabed; 2) establishing rules and conditions on how the mining activities are conducted; and 3) elaborating on the rules and regulations already set out in the Convention.⁶⁵ It is important to note that ISA does not

⁵² See U.N. Convention on the Law of the Sea, *supra* note 32.

⁵³ See *id.*

⁵⁴ See *id.*

⁵⁵ See *id.*

⁵⁶ See *id.*

⁵⁷ See *id.*

⁵⁸ See *id.*

⁵⁹ *CORDIS, Cobalt – A Potential Bottleneck in the Transition to Electric Mobility*, PHYS ORG (Nov. 13, 2018), <https://phys.org/news/2018-11-cobalt-potential-bottleneck-transition-electric.html>.

⁶⁰ See United Nations Convention on the Law of the Sea, *supra* note 32, 1833 U.N.T.S. at 397.

⁶¹ Commission on the Limits of the Continental Shelf, *Progress of Work in the Commission on the Limits of the Continental Shelf*, U.N. Doc. CLCS/52/2 (Mar. 25, 2020) <https://undocs.org/en/clcs/52/2>.

⁶² See GOVERNO DE PORTUGAL, *supra* note 1, at 16.

⁶³ See Amesén, *supra* note 21.

⁶⁴ See LODGE, *supra* note 20, at 79.

⁶⁵ See *id.* at 79-80.

regulate mining practices of the continental shelf within a state's jurisdiction.⁶⁶ However, member States are subject to pay ISA a fee for the extraction of the resources in the seabed of the continental shelf beyond 200 nautical miles, even if it is in their own jurisdiction.⁶⁷ With that being said, ISA is a critical player in the DSM industry as most research and exploration is governed under this body's regulation.⁶⁸

ISA is divided up into five main organs: the Assembly; the Council; the Legal and Technical Commission ("LTC"); the Finance Committee; and the Secretariat.⁶⁹ Accordingly, the main mission of the ISA is "to promote the orderly, safe and responsible management and development of the resources of the Area for the benefit of mankind as a whole . . . by ensuring the effective protection of the marine environment in accordance with sound principles of conservation and contributing to agreed international objectives and principles."⁷⁰ Essentially, the Area is "the common heritage of all mankind,"⁷¹ meaning that in the area beyond national jurisdiction the seabed belongs to all nations collectively.⁷² The ISA's role is to create an intricate and unitary system of rights, obligations and responsibilities for activities conducted in the Area.⁷³ Article 143 (2) of UNCLOS mandates that the ISA promote and encourage the conduct of marine scientific research in the Area and share scientific findings with the world.⁷⁴

The ISA is currently drafting a Mining Code ("Code")—which would be the first international regulatory framework for mineral exploitation in the Area since the birth of the ISA.⁷⁵ The Code is reportedly in its final stages but it is unlikely that it will be released within the next year.⁷⁶ The Code is essential for the commercial DSM industry since it will be the first time an international regulation for commercial DSM will be established.⁷⁷

Although the Code would not be binding on a coastal state mining within its own continental shelf, it would set a standard on which coastal states may build their own legislation upon.⁷⁸ In fact, a reason many states have not actively created legislation for the

⁶⁶ See *id.* at 79.

⁶⁷ See *id.* at 79; U.N. Convention on the Law of the Sea, *supra* note 32; *Wealth in the Oceans: Deep Sea Mining on the Horizon?*, UNEP (May, 2014), <https://www.oceanfdn.org/sites/default/files/Wealth%20in%20the%20Oceans%20Deep%20sea%20mining%20on%20the%20horizon%3F.pdf>.

⁶⁸ See Int'l Seabed Auth. [ISA], *Decision of the Assembly of the International Seabed Authority relating to the strategic plan of the Authority for the period 2019–2023*, at 1, 5, ISBA/24/A/10 (July 27, 2018), https://isa.org.jm/files/files/documents/isba24_a10-en.pdf.

⁶⁹ See *Organs of the International Seabed Authority*, ISA (last visited August 26, 2021), <https://isa.org.jm/organs>.

⁷⁰ Int'l Seabed Auth., *supra* note 68, at 4–5.

⁷¹ *The International Legal Framework for Deep Sea Mining: A Primer*, MIDAS (last visited Oct. 25, 2020), https://www.eu-midas.net/legal_framework.

⁷² See *id.*

⁷³ See Int'l Seabed Auth., *supra* note 68, at 3.

⁷⁴ See U.N. Convention on the Law of the Sea, *supra* note 32.

⁷⁵ See Int'l Seabed Auth., *supra* note 68, at 5.

⁷⁶ See Todd Woody, *Covid-19 throws seabed mining negotiations off track*, CHINA DIALOGUE OCEAN (May 7, 2020), <https://chinadialogueocean.net/13685-covid-19-could-throw-seabed-mining-negotiations-off-track.;> *Lockheed subsidiary calls for global agreement on deep sea mining code*, FINANCIAL TIMES (Sep. 10, 2020), <https://www.ft.com/content/e18a3aa7-76d2-429a-b9c8-ec70d24b9700>.

⁷⁷ See FINANCIAL TIMES, *supra* note 76.

⁷⁸ See Kathryn A. Miller et al., *An Overview of Seabed Mining Including the Current State of Development, Environmental Impacts, and Knowledge Gaps*, FRONTIERS IN MARINE SCIENCE (Jan. 10, 2018),

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regulation of DSM is because they have been awaiting the Code's finalization.⁷⁹ Unfortunately, the process has been long and its deadline for finalization keeps getting pushed back.⁸⁰ The delays in activity have harmed private companies that conduct most of the research for DSM. The industry is risky and expensive.⁸¹ Many of the leaders in the research and development of DSM have already incurred huge costs and have seen almost no return on their investment.⁸² Some companies have expressed that if the ISA does not issue the Code by 2022, they will opt out of their sponsorship contracts.⁸³ Although there is huge potential in the industry, as of right now, its success depends on the ISA's action.⁸⁴ To the credit of the ISA, the environmental risk of commercial DSM warrants a meticulous and carefully written Code.⁸⁵ This becomes clear when one understands the actual methods of DSM and what could happen to the ocean if it were implemented on a global scale.

E. The Deep Sea Mining Process and its Environmental Impact

Generally, there are three basic extraction processes that are common among the three mineral types in the seabed that have the greatest mining potential.⁸⁶ The three types of mineral deposits are: 1) sea-floor massive sulphides; 2) polymetallic manganese nodules; and 3) cobalt-rich ferromanganese crusts.⁸⁷ Sea-floor massive sulphides are created by hydrothermal activity occurring near sea vents.⁸⁸ These deposits are commonly found near areas of tectonic activity and contain copper, lead, zinc, silver, gold, barium, nickel, *inter alia*.⁸⁹

<https://www.frontiersin.org/articles/10.3389/fmars.2017.00418/full> (showing that national policies have been developed by coastal states).

⁷⁹ See Todd Woody, *European Parliament Calls for Moratorium on Deep-Sea Mining*, THE NEW HUMANITARIAN (Feb. 1, 2018), <https://deeply.thenewhumanitarian.org/oceans/articles/2018/02/01/european-parliament-calls-for-a-moratorium-on-deep-sea-mining>; *Conservation International Calls for Minimum Ten-Year Moratorium on Deep-Sea Mining*, CONSERVATION INTERNATIONAL (Jan. 20, 2020), <https://www.conservation.org/press-releases/2020/01/20/conservation-international-calls-for-a-minimum-ten-year-moratorium-on-deep-sea-mining>.

⁸⁰ See Woody, *supra* note 76.

⁸¹ See Ben Doherty, *Collapse of PNG Deep-Sea Mining Venture Sparks for Moratorium*, THE GUARDIAN (Sep. 15, 2020), <https://www.theguardian.com/world/2019/sep/16/collapse-of-png-deep-sea-mining-venture-sparks-calls-for-moratorium>.

⁸² See *id.*

⁸³ See *Deadlines and Delays: What to Expect from the Next ISA Meeting*, DSM OBSERVER (Sept. 11, 2020) <http://dsmobserver.com/2020/09/deadlines-and-delays-what-to-expect-from-the-next-isa-meeting/>.

⁸⁴ See *International Seabed Authority Under Pressure Over Deep-Sea Mining Impacts*, WORLD OCEAN INITIATIVE (Aug. 16, 2019), <https://www.woi.economist.com/international-seabed-authority-under-pressure-over-deep-sea-mining-impacts/>.

⁸⁵ *Id.* at 3.

⁸⁶ See *Advice and Assistance to States*, *supra* note 61.

⁸⁷ See *What is Seafloor Mining?*, WHOI (last visited Feb. 1, 2021), <https://www.whoi.edu/know-your-ocean/ocean-topics/ocean-resources/seafloor-mining/>; Heffernan, *Seabed Mining is Coming*, NATURE, (July 24, 2019), <https://www.nature.com/articles/d41586-019-02242-y>.

⁸⁸ See *Wealth in the Oceans Deep Sea Mining on the Horizon?*, *supra* note 68, at 3; Miller, *supra* note 78, at 5; *What is Seafloor Mining*, *supra* note 88, at 2; Heffernan, *supra* note 87, at 5.

⁸⁹ See *Wealth in the Oceans Deep Sea Mining on the Horizon?*, *supra* note 68, at 31; Miller, *supra* note 78, at 5; Heffernan, *supra* note 87, at 2.

Polymetallic manganese nodules are formed from iron and manganese hydroxides at depths between 4,000 and 6,500 meters.⁹⁰ Within these deposits are nickel, copper, lithium, *inter alia*.⁹¹ These deposits have a high commercial value in terms of technological application.⁹²

Cobalt-rich ferromanganese crusts are solid layers that form when “manganese and iron precipitate out of cold seawater.”⁹³ They commonly contain cobalt, nickel, and rare earth metals.⁹⁴ It is believed that over 20% of the global cobalt demand could be provided through the extraction of these mineral deposits.⁹⁵ As far as the process of extraction goes, the first step is the separation of the mineral crusts from the sea-floor.⁹⁶ Once separated, the crusts are crushed and ground to separate the attached deposits.⁹⁷ The byproduct, or “slurry”, is then pumped up through a mechanism up the water column into a processing vessel, which is most likely a ship.⁹⁸ Any excess water is removed from the slurry and then returned into the ocean.⁹⁹

The environmental impact of this process occurs at different levels throughout extraction.¹⁰⁰ Concerning the marine vessels that process the slurry, the potential impacts may include: the introduction of invasive species; noise and air pollution from the vessel itself; fluid leaks and discharges from the vessel and equipment used; and vibrations from the equipment.¹⁰¹

At the mining level, the introduction of light into the sea floor may affect the biodiversity of the sea floor.¹⁰² The light may affect marine life by altering their feeding and reproductive behavior.¹⁰³ It may also deter or attract species of fish and other marine life that are not accustomed to the light at the seafloor, thus creating a change into biological makeup of the seafloor.¹⁰⁴ Since little is known about deep sea organisms and their effect on the ocean as a whole, the impact could drastically affect the marine ecosystem.¹⁰⁵

⁹⁰ See Heffernan, *supra* note 87, at 2; *Wealth in the Ocean's Deep Sea Mining on the Horizon?*, *supra* note 68, at 2.

⁹¹ See *Wealth in the Oceans Deep Sea Mining on the Horizon?*, *supra* note 68, at 2; Miller, *supra* note 78, at 4; Heffernan, *supra* note 87, at 2.

⁹² See *Wealth in the Oceans Deep Sea Mining on the Horizon?*, *supra* note 68, at 2; Miller, *supra* note 78, at 3; Heffernan, *supra* note 87, at 5.

⁹³ *Wealth in the Oceans Deep Sea Mining on the Horizon?*, *supra* note 68, at 4; see Miller, *supra* note 78, at 4.

⁹⁴ *Wealth in the Oceans Deep Sea Mining on the Horizon?* *supra* note 68, at 4; see Miller, *supra* note 78, at 6; *What is Seafloor Mining*, *supra* note 88, at 2.

⁹⁵ *Wealth in the Oceans Deep Sea Mining on the Horizon?*, *supra* note 68, at 4.

⁹⁶ *Id.* at 5.

⁹⁷ *Id.*

⁹⁸ See *Wealth in the Oceans Deep Sea Mining on the Horizon?*, *supra* note 68, at 4; Miller, *supra* note 78, at 17-18.

⁹⁹ See UNEP, *supra* note 67.

¹⁰⁰ See *id.*

¹⁰¹ See *id.*

¹⁰² See *id.*

¹⁰³ See *id.*

¹⁰⁴ See *id.*

¹⁰⁵ See *id.*

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At the mineral lifting stage, from the seabed to the vessel, the potential environmental harm comes from what is known as the “clouding effect.”¹⁰⁶ Essentially, the concern is that the discharge from the vessels may impact the oxygen levels of the water.¹⁰⁷ Furthermore, the released seawater will likely have a different salinity, temperature, and contain traces of toxic chemicals.¹⁰⁸ It is feared that ingestion of the contaminated water may cause bioaccumulation of toxic chemicals through the food chain.¹⁰⁹ Specific to hydrothermal vents, these potential mining sites are home to a wide range of organisms such as barnacles, snails and crabs.¹¹⁰ Since these organisms are localized around these vents, even small-scale mining may destroy their habitat.¹¹¹

Taking the current practices into consideration, it is no shock that DSM is a hot topic for debate. As of now, it is hard to see how DSM can be conducted without disturbing the marine biota.¹¹² The idea of DSM is not novel, it has been discussed and debated since the mid-twentieth century.¹¹³ It has only been within the last twenty years that DSM has been technologically feasible.¹¹⁴ There are serious concerns that need to be addressed in order for DSM to be a viable, sustainable and eco-friendly process that balances economic and environmental interests.¹¹⁵

As technology develops, and more funding goes into the research and development of the DSM industry, there is potential that the industry may actually be beneficial for the environment.¹¹⁶ The pro-DSM community argues that increased access to rare minerals such as cobalt will lead to cheaper ‘green’ technology. Lithium-ion batteries, which power most electric vehicles, are reliant on cobalt.¹¹⁷ An increase in the supply of cobalt would help make green technology more affordable and decrease carbon emission levels.¹¹⁸ In the case of rare earth elements, which are almost completely controlled by China, easier access could lead to technological advances that will further help the development of green technology.¹¹⁹ Nonetheless, under the current situation, commercial DSM and environment protection are at odds.¹²⁰ The current regime may be to blame for the lack of eco-friendly mining plans.

¹⁰⁶ *Id.*

¹⁰⁷ *See id.*

¹⁰⁸ *See id.*

¹⁰⁹ *See id.*

¹¹⁰ *See* UNEP, *supra* note 67; *Heffernan, supra* note 87.

¹¹¹ *See* UNEP, *supra* note 67; *Heffernan, supra* note 87.

¹¹² *See* Shaine Scarminach, *Diving into the History of Seabed Mining*, EDGE EFFECTS, <https://edgeeffects.net/seabed-mining/> (last updated Oct. 12, 2020).

¹¹³ *See id.*

¹¹⁴ *See id.*

¹¹⁵ *See* Ribiero, *supra* note 29.

¹¹⁶ *See* Alberts, *supra* note 11.

¹¹⁷ *See* Nicole Kobie, *A Cobalt Crisis Could put the Brakes on Electric Car Sales*, WIRED (Feb. 2, 2020), <https://www.wired.com/story/a-cobalt-crisis-could-put-the-brakes-on-electric-car-sales/>.

¹¹⁸ *See* Nathaniel Gronewold, *Deep-sea Miners See Tesla Growth as Signal to Pluck Cobalt*, E&E NEWS (Jan. 6, 2020), <https://www.eenews.net/stories/1062004431>.

¹¹⁹ *See* Daniel Ackerman, *Deep-Sea Mining: How to Balance Need for Metals with Ecological Impacts*, SCIENTIFIC AMERICAN (Aug. 31, 2020), <https://www.scientificamerican.com/article/deep-sea-mining-how-to-balance-need-for-metals-with-ecological-impacts1/>.

¹²⁰ *See* Rahul Sharma, *Deep-Sea Mining: Economic, Technical, Technological and Environmental Considerations for Sustainable Development*, 45(5) MAR. TECHNOL. SOC. J. 28 (2011).

III. NAVIGATING THE UNCHARTERED WATERS OF DEEPSEA CONTINENTAL SHELF MINING

As noted earlier, Portugal is currently awaiting a recommendation by CLCS based on their claim submitted in 2009.¹²¹ Portugal already has one of the largest EEZ in Europe due to its unique positioning and its territories such as the Azores archipelagos.¹²² In light of the pending recommendation, Portugal has initiated a national movement to transition into a maritime based economy.¹²³ The MPP is an action plan that outlines the goals and necessary steps Portugal must take in order to make this transition into a maritime economy.¹²⁴ Portugal plans to use national funding and to restructure their legislature in order to promote the research and development of maritime technology.¹²⁵ Among the many goals of this plan, DSM remains a top priority for Portugal, as it may give Portugal access to valuable mineral resources.¹²⁶ Even though seabed mining is seen by many in Portugal as a key component to the success of the MPP, it still meets opposition by many groups.¹²⁷ The critics argue that the economic gains from the extraction of minerals from the deep seabed will not outweigh the resulting environmental harm.¹²⁸ Although the idea of seabed mining is not new, its environmental effects have not been studied extensively.¹²⁹

It is estimated that the global demand for metals and minerals will double over the next twenty years.¹³⁰ It is also suggested that almost three fourths of the mineral resources of the world are located within the seabed.¹³¹ Even though the valuation of the mineral resources within Portugal's extended continental shelf claim are unknown, evidence has indicated that there is large economic potential in its exploitation.¹³² Since the ISA would not have the authority to regulate the practice of seabed mining within Portugal's continental shelf, a question remains— What, if any, are the standards Portugal must adhere to? There is no definitive answer as the language of UNCLOS is unclear and imposes obligations that restrict the development of the industry that is ever dependent on the ISA.¹³³ Even though Portugal may have sovereign rights to mine the continental shelf, the multiple layers of regulation

¹²¹ See GOVERNO DE PORTUGAL, *supra* note 1; Chairman of the Comm'n on the Limits of the Continental Shelf, *Progress of work in the Comm'n on the Limits of the Continental Shelf*, U.N. Doc. CLCS/98 (Apr. 2017); Continental Shelf Submission of Portugal, U.N. Doc. PT-Amended ES (Aug. 2017).

¹²² See GOVERNO DE PORTUGAL, *supra* note 1; Ribiero, *supra* note 29; DEEPSEA CONSERVATION COALITION, *supra* note 12.

¹²³ See GOVERNO DE PORTUGAL, *supra* note 1.

¹²⁴ See *id.*

¹²⁵ See *id.*; See Ribiero, *supra* note 29.

¹²⁶ See Ribiero, *supra* note 29.

¹²⁷ DEEPSEA CONSERVATION COALITION, *supra* note 12.

¹²⁸ See *id.*

¹²⁹ See UNEP, *supra* note 67.

¹³⁰ See George Cherkashov, *Mining for Marine Minerals*, in 17 THE REGULATION ON CONTINENTAL SHELF DEVELOPMENT: RETHINKING INTERNATIONAL STANDARDS 71 (Myron H. Nordquist et al eds., 2013) (eBook).

¹³¹ See *id.*

¹³² See GOVERNO DE PORTUGAL, *supra* note 1.

¹³³ See Isabel Feichtner, *Mining for Humanity in the Deep Sea and Outer Space: The Role of Small States and International Law in the Extraterritorial Expansion of Extraction*, 32(2) LEIDEN J. OF INT'L LAW 255 (2019).

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imposed by international treaties makes it difficult to see DSM for Portugal in the foreseeable future.¹³⁴

To begin with, Portugal has yet to draft any sort of national legislation to regulate DSM.¹³⁵ Although an attempt was made by the autonomous region of Azores to create legislation, it was ultimately found to be unconstitutional.¹³⁶ Azores did not have the authority to create legislation regarding minerals because the Portuguese constitution deems mineral rights to be “of public domain” and therefore are under the domain of Portugal’s central government.¹³⁷ Even if Portugal succeeds in nationalizing interest in the MPP and also generates enough domestic support to draft thorough regulations for DSM, it is unlikely they will draft anything before the ISA finalizes the Mining Code.¹³⁸

Portugal as a member of the EU is unlikely to create any sort of national legislation before the EU creates legislation for DSM.¹³⁹ Despite the fact that under UNCLOS the continental shelf is the exclusive right of the coastal state, the EU would still have the final say over Portugal’s ability to mine on the continental shelf.¹⁴⁰ This lack of autonomy prevents Portugal from engaging in small scale DSM tests independently.¹⁴¹ While the risks are high when implemented on a large scale, the current legal regime has not been conducive for independent action on a small scale that would promote technological advancements.¹⁴² This in turns slows down the research and development of the DSM industry which relies too much on the ISA.¹⁴³ UNCLOS imposes further obligations on Portugal, as states must adhere to whatever the minimum international standard is for the regulation of DSM.¹⁴⁴

A. The Lack of Clarity of UNCLOS

UNCLOS provides that states have an obligation to protect and preserve the marine environment.¹⁴⁵ In regard to seabed activity, the states are obligated, *inter alia*, to set preventative measures against pollution from the installation of infrastructure and the devices used in the exploration or exploitation of marine resources.¹⁴⁶ The problem with UNCLOS.

¹³⁴ See ARNESEN, *supra* note 21, at 320-321, 332.

¹³⁵ See Margarida Mendes and João Martins, *Muddying the Waters*, E-FLUX: ARCHITECTURE (last visited Oct. 25, 2020), <https://www.e-flux.com/architecture/oceans/331867/muddying-the-waters/>.

¹³⁶ *Id.*

¹³⁷ *Id.*

¹³⁸ *Id.*

¹³⁹ *Id.*

¹⁴⁰ *Id.*; see ARNESEN, *supra* note 21.

¹⁴¹ See ARNESEN, *supra* note 21; see also *Plan 2020-2030: Costa Silva’s “Strategic Vision” for Portugal to be Approved by Council of Ministers*, PORT. RESIDENT (Sep. 15, 2020), <https://www.portugalresident.com/plan-2020-2030-costa-silvas-strategic-vision-for-portugal-to-be-approved-by-council-of-ministers/> (stating that ‘guarantees of safety’ must be made before deep-sea mining can commence).

¹⁴² See Bolong, *supra* note 19, at 253, 263.

¹⁴³ See Groves, *supra* note 43 (explaining why the ISA is counterintuitive for the U.S. sponsored seabed exploration within the Area).

¹⁴⁴ See Cherkashov, *supra* note 130, at 74, 75.

¹⁴⁵ U.N. Convention on the Law of the Sea, *opened for signature* Dec. 10, 1982, 1833 U.N.T.S. 397, 477 (entered into force Nov. 16 1994).

¹⁴⁶ See *id.* at 478.

language is that it is relatively vague and does not offer any real standard for DSM.¹⁴⁷ The ISA, although useful as a guideline for mitigating environmental harm, does not have the authority to regulate Portugal's exploitation of mineral resources within their exclusive jurisdiction.¹⁴⁸ Furthermore, UNCLOS preventative measures against pollution through the exploitation of marine resources is too broad to reasonably apply to a large project like the MPP.¹⁴⁹ ISA has developed regulations for environmental protection, but has not developed regulations for the exploitation of mineral resources.¹⁵⁰

Commercial seabed mining is likely to become more prominent as time goes on.¹⁵¹ Therefore, it is imperative that an effective policy and legal framework be established to protect sensitive marine environments from irreparable harm.¹⁵² Marine scientists are concerned that seabed mining will deplete resources and damage key elements of ecosystems, which may harm biodiversity and the marine ecosystem as a whole.¹⁵³ One reason for this concern is that there is little data available on deep-sea marine biota.¹⁵⁴ What is known about deep sea organisms are their slow growth rates, late reproduction and low fecundity.¹⁵⁵

B. The ISA is Not Achieving its Goal and is Impeding the Progress of Sustainable DSM

The ISA's Legal and Technical Commission released a proposal called the Mining Code, which is still in development.¹⁵⁶ This Code will govern the exploitation of minerals in international waters known as the Area.¹⁵⁷ Under this Code, states and mining companies that plan to mine in the Area must create environmental impact assessments under strict environmental standards and will be required to comply under the oversight of an independent entity.¹⁵⁸ Most commercial DSM operations will be conducted in the Area, however, there are many issues associated with the ISA and its approach to DSM.

¹⁴⁷ Cherkashov, *supra* note 130; Ribiero, *supra* note 29; Lodge, *supra* note 20; see U.N. Convention on the Law of the Sea, *supra*, note 147; see Miller, *supra* note 78; see Joanna Mossop, *The Legal Framework for the Regulation of Safety and Environmental Issues on the Outer Continental Shelf*, in 17 THE REGULATION ON CONTINENTAL SHELF DEVELOPMENT: RETHINKING INTERNATIONAL STANDARDS 195 (Myron H. Nordquist et al eds., 2013) (ebook); see UNEP, *supra* note 67.

¹⁴⁸ Lodge, *supra* note 20; see UNEP, *supra* note 68.

¹⁴⁹ Lodge, *supra* note 65; see UNEP, *supra* note 68.

¹⁵⁰ See UNEP, *supra* note 67; Lodge, *supra* note 20; Cherkashov, *supra* note 130; Mossop, *supra* note 147.

¹⁵¹ See Miller, *supra* note 78; Heffernan, *supra* note 87 (showing that as valuable raw materials become increasingly rare, more organizations are looking to seabed mining to harvest those resources).

¹⁵² See Cherkashov, *supra* note 130; Mossop, *supra* note 147.

¹⁵³ See *Wealth in the Oceans*, *supra* note 68; DEEPSEA CONSERVATION COALITION, *supra* note 12; Ribiero, *supra* note 29; Miller, *supra* note 78.

¹⁵⁴ See Miller, *supra* note 78.

¹⁵⁵ See *Wealth in the Oceans*, *supra* note 68.

¹⁵⁶ See Miller, *supra* note 78; *Draft Exploitation Regulations*, ISA (last visited Oct. 4, 2020), <https://www.isa.org.jm/mining-code/ongoing-development-regulations-exploitation-mineral-resources-area>.

¹⁵⁷ See Miller, *supra* note 78; ISA, *supra* note 157.

¹⁵⁸ See Miller, *supra* note 78; ISA, *supra* note 157.

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C. The Shortcomings of UNCLOS, ISA, and the Role of Developing Countries in the Legal Regime

The ISA was intended to be a mechanism “for the benefit of mankind as a whole. . . taking in particular the interests and needs of developing states.”¹⁵⁹ One way in which the ISA was designed to do so, was by requiring the “equitable sharing of the financial benefits” of DSM in the Area, amongst the 167 member countries of the ISA.¹⁶⁰ The ISA also serves to protect the interests of member states that rely on exporting minerals.¹⁶¹

Countries that would be negatively affected by DSM in the Area and the added competition to the mineral market are developing countries like the Democratic Republic of the Congo.¹⁶² Many question whether the ISA can protect the interest of the countries that would be negatively affected by DSM. The ISA is burdened by high administrative expenses that may undermine these interests until the Enterprise becomes operational.¹⁶³ The Enterprise is the organ of the Authority empowered to undertake all technical, industrial, or commercial activities relating to the exploration of the Area and exploitation of its resources.¹⁶⁴

The administrative expenses of the Authority are met through the contributions of its members “until the Authority has sufficient funds from other sources to meet those expenses.”¹⁶⁵ To help ensure funds are being contributed by member states, any member state shall have no vote “if the amount of its arrears equal or exceeds the amount of financial contributions from it for the preceding two years.”¹⁶⁶ As of May 5, 2020, there are 57 members of the Authority which have been in arrears for two or more years.¹⁶⁷ Unsurprisingly, most member states in arrears are developing nations from Africa.¹⁶⁸ Based on the May 13, 2020 Report of the Secretary-General, from the period of 1998-2019, the outstanding contributions from member states amount to \$1, 108, 373.¹⁶⁹

Under Section 7 of the Annex of the 1994 Resolution Adopted by the General Assembly of the ISA, “the Authority shall establish an economic assistance fund from a portion of the funds of the authority which exceeds those necessary to cover the

¹⁵⁹ See *Deep-Sea Mining: Who Stands to Benefit?* SAVE THE HIGH SEAS (last visited, Nov. 8, 2020), http://www.savethehighseas.org/wp-content/uploads/2020/07/DSCC_FactSheet6_DSM_WhoBenefits_4pp_web.pdf.

¹⁶⁰ See *Study to Investigate State of Knowledge of Deep Sea Mining: Final Report Legal Analysis*, FWC MARE/2012/06-SC E1/2013/04 [hereinafter *Study Report*] (explaining equitable sharing in the ISA); G.A. Res. 48/263 Agreement relating to the implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982 [Hereinafter *Part XI*] (Aug. 17, 1994).

¹⁶¹ See SAVE THE HIGH SEAS, *supra* note 159.

¹⁶² *Indicative List Of States Members Of The International Seabed Authority Which Would Fulfil The Criteria For Membership In The Various Groups Of States In The Council In Accordance With Paragraph 15 Of Section 3 Of The Annex To The Agreement For The Implementation Of Part Xi Of The United Nations Convention On The Law Of The Sea Of 10 December 1982*, ISBA, ISBA/26/CRP.2 (May 15, 2020).

¹⁶³ See SAVE THE HIGH SEAS, *supra* note 159; *Study Report*, *supra* note 160; *Part XI*, *supra* note 160.

¹⁶⁴ See ISBA, *History of the Enterprise*, <https://isa.org.jm/files/files/documents/enterprise-ae.pdf> (last visited Jan. 21, 2021).

¹⁶⁵ See SAVE THE HIGH SEAS, *supra* note 159; *Study Report*, *supra* note 160.

¹⁶⁶ See SAVE THE HIGH SEAS, *supra* note 161; *Study Report*, *supra* note 160; *Part XI*, *supra* note 160.

¹⁶⁷ Fin. Comm., Status of contributions and related matters, ISBA/26/FC/4.

¹⁶⁸ See *id.*

¹⁶⁹ See *id.*

administrative expenses.”¹⁷⁰ The funds received by the ISA from contractors and voluntary contributions shall be used for the establishment of the economic assistance fund.¹⁷¹ The economic assistance fund, once established, is meant to assist developing land-based producer states whose economies would be most affected by DSM.¹⁷² The ISA will determine on a case-by-case basis the extent of the assistance, and in doing so shall give consideration to the nature and magnitude of the problems encountered by the developing States.¹⁷³

There is uncertainty as to whether the developing States will receive any real financial benefit from the ISA, considering its high administrative costs and the unclear royalty system of the Enterprise.¹⁷⁴ As of 2019, there was a total of 29 contracts issued by the ISA.¹⁷⁵ The assessed administrative and overhead cost of management per contract was \$80,308 with a total cost of \$2,328,932.¹⁷⁶

Administrative expenditures of the Secretariat alone in the proposed budget is \$13,632,262.¹⁷⁷ For conference services, the budget is \$4,042,500.¹⁷⁸ If you include the budget for other programs, the costs are upwards of \$20,939,362 without including the \$637,320 set aside for the development of the Enterprise.¹⁷⁹

Under the 1994 Resolution Adopted by the General Assembly, Section 1 of the Annex provides that “in order to minimize costs to State Parties, all organs and subsidiary bodies to be established under the Convention and [the] Agreement shall be cost-effective.”¹⁸⁰ If Section 1 of the Annex serves any purpose, it is to make sure that the developing states most protected by the ISA can actively participate and contribute to the Authority.¹⁸¹ However, as budgets increase so do the financial burdens on Sponsoring states, private DSM corporations, and member states who must contribute to the funds in order to have a vote in ISA matters.¹⁸²

The Enterprise, when effective, is supposed to allocate profits from DSM activity in the Area to the developing countries most affected by DSM.¹⁸³ However, the African nations that would be most affected by DSM may have the least desire to see this industry emerge.¹⁸⁴

¹⁷⁰ *Part XI, supra* note 160.

¹⁷¹ *See* Fin. Comm., Report of the Secretary-General, ISBA/26/FC/2.

¹⁷² *See id.*

¹⁷³ *See id.*

¹⁷⁴ *See* SAVE THE HIGH SEAS, *supra* note 159; *Study Report, supra* note 160; *see also* Carver et al., *A Critical Social Perspective on Deep Sea Mining: Lessons from the Emergent Industry in Japan*, OCEAN AND COASTAL MANAGEMENT 193 (2020) (highlighting some key issues with the ISA royalty system).

¹⁷⁵ *See* Report of the Secretary-General, *supra* note 159.

¹⁷⁶ *See* Assembly Council, Proposed budget for the International Seabed Authority for the financial period 2021-2022 ISBA/26/A/5-ISBA/26/C/18 [Hereinafter *Proposed Budget*].

¹⁷⁷ *See id.*

¹⁷⁸ *See id.*

¹⁷⁹ *See id.* (chart showing total expenditures).

¹⁸⁰ *See Part XI, supra* note 160.

¹⁸¹ *Id.*; *Proposed Budget, supra* note 176; *see* SAVE THE HIGH SEAS, *supra* note 159; *Study Report, supra* note 160; Carver, *supra* note 174 (explaining the history of the ISA).

¹⁸² *See* Carver, *supra* note 174 (highlighting some key issues with the ISA royalty system).

¹⁸³ *See* SAVE THE HIGH SEAS, *supra* note 159; *Study Report, supra* note 148.

¹⁸⁴ Jeff Lewis and Helen Reid, *African Nations Criticise Push to Fast-Track Deep-Sea Mining Talks*, NASDAQ (July 27, 2021, 11:46 AM), <https://www.nasdaq.com/articles/african-nations-criticise-push-to-fast-track-deep-sea-mining-talks-2021-07-27-0>.

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Take the DRC for example, which dominates the cobalt market at 97.9% of global exports.¹⁸⁵ If DSM were to take off, their market dominance would diminish and their economy would be severely affected.¹⁸⁶

Part of the ISA's role is to protect these developing nation's economies, regulate minerals extracted from the Area, and establish the Enterprise, its corporate arm, which shall conduct commercial DSM for the "purpose of mankind" by distributing profits to the countries most affected.¹⁸⁷ However, the benefit from the Enterprise to countries most affected will not likely outweigh contribution payments, economic loss and market share loss.¹⁸⁸ Furthermore, once DSM activities produce cobalt, there may be a private market shift or boycott against cobalt produced in the DRC from certain nations and organizations opposed to the human rights violations occurring in the DRC.¹⁸⁹ Taking everything into consideration, within UNCLOS and the ISA, the DSM industry is reliant on a bureaucratic regime that struggles to balance economic, "humankind," and scientific interests it is intended to protect.¹⁹⁰

Imagine a perfect world where a Mining Code is established and commercial operations begin, the risks that the ISA seek to mitigate and prevent can still happen.¹⁹¹ The Mining Code may be considered the best practice or international standard when it is finalized, but the effects of DSM are so unpredictable that many scholars question its regulation.¹⁹² States that may have national jurisdiction of mineral resources below 200 meters, such as Portugal, may adopt the Code within its own legislation, and the same would likely occur at the EU level.¹⁹³ Also take into consideration developing nation states that also adopt the Code within their own national legislation.

Once the Code is established, countries can begin mining within their jurisdiction once they adopt it.¹⁹⁴ Compounded on the fact that there are over 50 pending CLCS claims that are to be decided within the next ten years.¹⁹⁵ The ISA can only control and limit mining operations within the Area.¹⁹⁶ Within national jurisdictions, countries are free to act as they

¹⁸⁵ See Report of the Secretary-General, *supra* note 159.

¹⁸⁶ See Lewis, *supra* note 184 at 3.

¹⁸⁷ See *Proposed Budget*, *supra* note 164; Carver, *supra* note 174.

¹⁸⁸ See Levin et al., *Challenges to the Sustainability of Deep-seabed mining*, 3 NATURE SUSTAINABILITY 10 (Oct. 10, 2020).

¹⁸⁹ See *id.*; see also Vivienne Walt, *Blood, Sweat, and Batteries*, FORTUNE (Aug. 23, 2018), <https://fortune.com/longform/blood-sweat-and-batteries/>.

¹⁹⁰ See Lima Charlie, *Deep sea mining raises critical issues for the International Seabed Authority*, LIMA CHARLIE NEWS (Mar. 22, 2018), <https://limacharlieneews.com/environment/deep-sea-mining/>.

¹⁹¹ See Komaki and Fluharty, *Options to Improve Transparency of Environmental Monitoring Governance for Polymetallic Nodule Mining in the Area*, FRONTIERS IN MARINE SCIENCE (Apr. 30, 2020), <https://www.frontiersin.org/articles/10.3389/fmars.2020.00247/full>.

¹⁹² See *id.* (pointing out some of the issues of monitoring DSM in the Area).

¹⁹³ *Maritime Claims*, CIA, <https://www.cia.gov/the-world-factbook/field/maritime-claims> (last visited Sept. 10, 2021).

¹⁹⁴ See Komaki, *supra* note 191.

¹⁹⁵ See *Submissions, through the Secretary-General of the United Nations, to the Commission on the Continental Shelf, pursuant to article 76, paragraph 8, of the United Nations Convention on the Law of the Sea of 10 December 1982*, UN (last updated Jan. 6, 2021) https://www.un.org/Depts/los/clcs_new/commission_submissions.htm.

¹⁹⁶ See *Part XI*, *supra* note 160.

wish in regard to DSM as long as they meet whatever international obligations they may have in this regard.¹⁹⁷ If the Code is to be relied upon as the standard, then adopting the code should satisfy most obligations under international law.

What is the proper use of the Enterprise for the developing nations it is intended to protect? Their economies would still feel the effects of DSM even if it did not occur in the Area.¹⁹⁸ The majority of deep-sea minerals are found within the Area.¹⁹⁹ However, within the national jurisdiction of countries like Japan and Papua New Guinea, there are still tons of valuable mineral resources.²⁰⁰ Once commercial DSM within national jurisdiction occurs, the goals of the ISA will lack fruition.²⁰¹ The only way the ISA could effectively mitigate the damage to the developing countries is either by limiting mining contracts to developing nations, regulating commercial DSM in territorial waters, or help developing nations enter into the commercial DSM industry.²⁰² All of these options would make the ISA a gatekeeper for the commercial DSM industry while potentially making it a regulator for the market of certain metals.

Imagine this hypothetical situation where commercial DSM is only conducted in the Area under the supervision of the ISA. Once land based mineral extraction fails to meet the market demand, as is predicted with cobalt, the ISA shall be the authority that controls the market for such resources.²⁰³ The ISA and its corporate branch, the Enterprise, having that much control in the regulation of such an important mineral resource is troubling and is not the purpose UNCLOS had in creating the ISA.²⁰⁴

In either situation, the ISA will not achieve its central purpose.²⁰⁵ Instead, what could occur is a race to the bottom of the sea, collapse of certain African economies, and continuing advantages to the most developed nations which have consistently held leadership positions within the ISA.²⁰⁶ In the worst-case scenario, there will also be environmental harm due to false confidence in the Mining Code as a standard not fully tested.²⁰⁷ Neither the

¹⁹⁷ See *id.*

¹⁹⁸ See Garside, *African cobalt production volume by country 2019*, STATISTA (Oct. 15, 2020), <https://www.statista.com/statistics/1049801/cobalt-production-africa-by-country/>.

¹⁹⁹ See *Global Marine Mineral Resources*, USGS (last visited Jan. 23, 2020), https://www.usgs.gov/centers/pcmsc/science/global-marine-mineral-resources?qt-science_center_objects=0#qt-science_center_objects.

²⁰⁰ See Sharon Burke & Rachel Zimmerman, *The Global Race for Critical Minerals in the Deep Ocean*, NEW AMERICA (last updated Aug. 22, 2019), <https://www.newamerica.org/resource-security/reports/global-race-critical-minerals/>.

²⁰¹ See Louisa Casson, *Four Reasons why the International Seabed Authority Probably Won't Protect Our Oceans*, GREENPEACE (July 24, 2019), <https://www.greenpeace.org/international/story/23397/four-reasons-why-the-international-seabed-authority-probably-wont-protect-our-oceans/>.

²⁰² See *Deep-Sea Mining: Africa's New Frontier*, GGA (Feb. 16, 2018), <https://gga.org/deep-sea-mining-africas-new-frontier-2/>.

²⁰³ See generally, Sverdrup, H.U., *Integrated Modelling of the Global Cobalt Extraction, Supply, Price and Depletion of Extractable Resources Using the WORLD6 Model*, BIOPHYS ECON RESOUR QUAL 2, 4 (2017), <https://doi.org/10.1007/s41247-017-0017-0>; Burke, *supra* note 200.

²⁰⁴ See Casson, *supra* note 201.

²⁰⁵ See *id.*

²⁰⁶ *Law of Sea Structure Still Favors Discredited and Corrupt Redistributionist Model for Foreign Aid*, UNCLOS DEBATE (Mar. 15, 2004), <https://www.unclosdebate.org/evidence/436/law-sea-structure-still-favors-discredited-and-corrupt-redistributionist-model-foreign>.

²⁰⁷ See *Deep-Sea Mining: Africa's New Frontier*, *supra* note 202.

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economic prosperity for “mankind” nor the protection of the marine environment would be achieved.²⁰⁸ For these reasons, this Note suggests that the ISA should not be the “gatekeeper” of the DSM industry. Instead, states should be given more freedom to autonomously conduct DSM research and exploitation plans within their own territories without reliance on the ISA’s mining code or bureaucracy.

IV. A PROPER GOVERNMENTAL APPROACH TO DSM

While the ISA, under UNCLOS, was intended to be a flexible way to share the natural resources belonging to “the heritage of mankind,” in reality, it has failed to evolve at a rate that meets our rising demand for minerals like cobalt.²⁰⁹ DSM is coming along with the risks and benefits aforementioned.²¹⁰ While the ISA has not been assigned an easy task, the fate of DSM is being held back by expensive administrative costs that hinder its development and success.²¹¹ For this reason, this Note suggests to first amend UNCLOS and the ISA, and secondly call on Portugal and the EU to conduct small scale experimental mining operations.

A. Amending UNCLOS to Give the ISA a Different Role, Rather than Act as a Joint Venture, the ISA Should Act as a Legislative Branch for DSM Rules

While it is apparent that although the ISA was created with the sole intention of regulating DSM in the Area, its role has unintentionally changed to a sort of gatekeeper for DSM operations.²¹² Although the idea of the ISA is ambitious, there are numerous administrative expenses associated with its operation.²¹³ In order to alleviate this financial burden, the ISA should be restructured into a solely legislative body that sets standards for safe environmental practices in the exploration and exploitation of the Area. As righteous as the concept of the Enterprise may be, for the reasons stated previously, it is not likely to fulfill its purpose and goals.²¹⁴ Therefore, in order to cut administrative burdens, the ISA bylaws and UNCLOS should be amended to remove that arm of the ISA. Doing so would allow the ISA to focus its funds on research and would reduce costs to members.²¹⁵

When the cost to enter into contracts with the ISA is reduced, private and public entities funding excavations and research would have more capital to focus on developing

²⁰⁸ See Casson, *supra* note 201.

²⁰⁹ See Winnie Yeh, *Deep-Sea Minerals Could Meet the Demands of Battery Supply Chains—but Should They?*, WORLD ECONOMIC FORUM (Aug. 03, 2020), <https://www.weforum.org/agenda/2020/08/deep-sea-minerals-could-meet-the-demands-of-battery-supply-chains-but-should-they/>; Maria Bolevich, *Ocean Stakeholders Discuss Calls for Moratorium on Deep-Sea Mining*, DSM OBSERVER (Dec. 29, 2020), <https://dsmobserver.com/2020/12/ocean-stakeholders-discuss-calls-for-moratorium-on-deep-sea-mining/>.

²¹⁰ See *id.*; *Law of Sea Structure Still Favors Discredited and Corrupt Redistributionist Model for Foreign Aid*, *supra* note 208; *Deep-Sea Mining: Africa’s New Frontier*, *supra* note 202.

²¹¹ See *The Rising Profile of ISA Financial Regulations*, DSM OBSERVER (last visited Feb. 1, 2021), <https://dsmobserver.com/2017/07/rising-profile-isa-financial-regulations/>.

²¹² See *id.*; Yeh, *supra* note 209.

²¹³ See *The Rising Profile of ISA Financial Regulations*, *supra* note 211.

²¹⁴ See Casson, *supra* note 201.

²¹⁵ See Joanna Dingwall, *Commercial Mining Activities in the Deep Seabed beyond National Jurisdiction: The International Legal Framework*, THE LAW OF THE SEABED 139, 139-62 (Catherine Banet, ed., Jan. 29, 2020).

technology.²¹⁶ Since no mining operations have begun, a major problem with DSM technology has been funding.²¹⁷ Reducing administrative expenses and focusing on technology would speed the development of DSM tools by giving states and private actors more capital to use on research and development.²¹⁸ Some leaders in the DSM industry have attributed the “financial and regulatory uncertainty” as the main setback for the industry.²¹⁹

Portugal and other member states should focus on developing their own national legislation for DSM within their continental shelves as opposed to depending on the Mining Code. Some scientists and conservationists believe that the Mining Code will encourage mining expeditions to begin with a false sense of confidence.²²⁰ It is no secret that the high upfront costs related to DSM have made both private and state actors eager to receive a return on their investment.²²¹ However, the possible harm to the environment is very real and the false sense of security that the Mining Code may create could be devastating.²²² However, if Portugal’s extended continental shelf claim were to be approved by the CLCS, then it would be in a position to serve as an industry leader.²²³

Given Portugal’s ocean-centric nature and longtime conservation of the marine ecology, it is likely mining operations in its own jurisdiction would be easier to regulate and control damage than it would be in the Area.²²⁴ Most mining operations will begin in the Area under the current regime for DSM.²²⁵ However, it is unclear how damage would be controlled or how miners would be held accountable for any large-scale damage.²²⁶ If mining operations were to be done within national waters via extended continental shelves, then the burden of regulating mining operations and controlling the damage would be shared amongst all states independently.²²⁷ Placing the burden of regulation on the ISA is expensive and the only way it could sustain itself would be by contracting many mining operations in the Area.²²⁸

If states were given personal responsibility over the waters in which DSM operations were to occur, then there would be a greater sense of urgency in protecting

²¹⁶ See *id.*

²¹⁷ See Doherty, *supra* at note 81.

²¹⁸ See *The Rising Profile of ISA Financial Regulations*, *supra* at note 211; Dingwall, *supra* at note 215.

²¹⁹ Olive Heffernan, *Seabed mining is coming*, NATURE, <https://www.nature.com/articles/d41586-019-02242-y> (Aug. 16, 2019).

²²⁰ See *id.*

²²¹ *Under Pressure Documentary*, SPC-EU DEEP SEA MINERALS PROJECT, <https://dsm.gsd.spc.int/index.php/under-pressure-documentary> (last visited Feb. 1, 2021).

²²² See *id.*

²²³ See Margarida Mendes & Joao Martins, *Muddying the Waters*, E-FLUX ARCHITECTURE, <https://www.e-flux.com/architecture/oceans/331867/muddying-the-waters/> (last visited Aug. 20, 2021).

²²⁴ See Office of General Counsel, *Seabed Activities*, NOAA, https://www.gc.noaa.gov/gcil_seabed_management.html (Feb. 8, 2018).

²²⁵ See Carver, *supra* note 174.

²²⁶ See *id.*

²²⁷ See generally Tearinaki Tanielu, *Establishment of a Nat'l Regul. Framework for the Expl. and Exploitation of Deep Sea Minerals: A Case Study for Kiribati*, UNITED NATIONS NIPPON FOUNDATION (Dec. 2013), https://www.un.org/depts/los/nippon/unff_programme_home/fellows_pages/fellows_papers/Tanielu_1314_Kir.pdf.

²²⁸ See *id.*

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territorial waters.²²⁹ As seen in Portugal, the people of the country have successfully objected to DSM expeditions in the past.²³⁰ However, when mining occurs in the Area, it is likely that the general population would be oblivious to mining operations until something bad happens.²³¹ Not only will states have a personal sense of urgency in protecting their waters, it would significantly reduce the upfront costs for DSM agents.²³² Less upfront costs mean more free capital, which in turn could be used to finance a regulatory body for each nation through some sort of taxing system.

In short, putting the DSM industry in the hand of individual nations as opposed to the ISA would overcome many of the shortcomings of the current DSM regime.²³³ The United States already has various statutes and regulations for DSM such as the Deep Seabed Hard Mineral Resources Act.²³⁴ Within this act there are various provisions which set forth its enforcement and penalties, *inter alia*.²³⁵ Through this act, the United States has also established a means for civil action.²³⁶ If the MPP is to become a reality, concrete laws on DSM need to be established.

Take note that the United States is not a member to UNCLOS but still observes it, because of this they do not need to rely on the Mining Code and the ISA for DSM exploration and exploitation.²³⁷ This shows that it is possible for nations to independently regulate the deep sea resources without dependence on the ISA.²³⁸ Portugal should follow the United States lead once their claim is approved as their proposed continental shelf would give them the opportunity to conduct DSM in what they believe is the best practice for their unique marine ecosystem. With the United States help and with the support of the EU, Portugal could

²²⁹ See generally Kirsten F. Thompson ET AL., *Seabed Mining and Approaches to Governance of the Deep Seabed*, FRONTIERS IN MARINE SCIENCE, Dec. 2018, at 1.

²³⁰ See Arnesen, *supra* note 21 (stating that DSM activity near the Azores territory was halted due in part to public backlash).

²³¹ See Andrew Thaler, *What Did People Talk About When They Talked About Deep-Sea Mining in 2020?*, DSM OBSERVER (Jan. 25, 2021), <https://dsmobserver.com/2021/01/what-did-people-talk-about-when-they-talked-about-deep-sea-mining-in-2020/>. The International Seabed Authority was mentioned a little less than 5,000 times over the last year, with slightly more than 2,500 individuals contributing to the online conversation.

²³² See Sharma, *supra* note 120, at 1.

²³³ See generally Sabine Christiansen ET AL., *Towards Transparent Governance of Deep Seabed Mining*, INST. FOR ADVANCED SUSTAINABILITY STUDIES 1 (July 2016), https://publications.iass-potsdam.de/rest/items/item_1592897_6/component/file_1592899/content.

²³⁴ See 30 U.S.C.S. § 1411 (LexisNexis) (prohibited activities by citizens); 30 U.S.C.S § 1412 (LexisNexis) (Licenses for explorations and permits of commercial recovery); 30 U.S.C.S § 1419 (addressing the protection of the environment).

²³⁵ See 30 U.S.C.S § 1462 (LexisNexis) (addressing civil penalties); 30 U.S.C.S § 1463 (LexisNexis) (addressing criminal offenses under the act).

²³⁶ See U.S.C.S § 1427 (LexisNexis) (stating that any person may commence a civil action for equitable relief in the United States District Court for the District of Columbia).

²³⁷ See Groves, *supra* note 43.

²³⁸ See Aditya Singh Verma, *A Case for the United States' Ratification of the UNCLOS*, THE DIPLOMATIST (May 2, 2020 12:00 PM), <https://diplomatist.com/2020/05/02/a-case-for-the-united-states-ratification-of-unclos/>.

be a hub for DSM and set a standard that meets the needs of both the industrialist and environmentalist.²³⁹

V. CONCLUSION

Portugal is a country with deep cultural roots to the ocean.²⁴⁰ When the CLCS gives Portugal its recommendations on the outer limits, Portugal may be one of the best countries to develop safe and proper commercial DSM operations.²⁴¹ The MPP is exciting and ambitious but also very feasible if done properly.²⁴² Some argue that DSM is inevitable while others say it is unnecessary, but essentially too much has been invested into this industry for it to disappear.²⁴³ Unfortunately, the process is very risky, but the risks can be mitigated if small scale mining experiments were to occur in countries like Portugal.²⁴⁴ The current regime on DSM is an interplay between the ISA, the CLCS and UNCLOS.²⁴⁵

Portugal, being a part of the EU, is unfortunately not granted the same amount of freedom as the United States when it comes to making decisions on DSM within their territory.²⁴⁶ Even if DSM were to occur within Portugal's sovereign territory, the EU has the ultimate say on what coastal states may or may not do.²⁴⁷ The EU is not likely to make any forward progress with commercial DSM until the ISA finishes drafting the Mining Code.²⁴⁸ Therefore, the MPP is really at the mercy of the ISA, and then the EU for the final say.²⁴⁹

While the advocates of commercial DSM expect operations around the world to begin by 2025, the reality is that it may take much longer given the complicated DSM regime.²⁵⁰ Perhaps the consistent delay in the establishment of the Mining Code is a reflection of just how risky and harmful mineral exploitation in the deep sea really is. The global cobalt demand is increasing as 'green' technology becomes more and more dependent on Lithium-Ion batteries.²⁵¹ Maybe it is time for alternative batteries not reliant on cobalt to be developed by the leaders in green technology, such as Tesla is for electric vehicles. Commercial DSM

²³⁹ See Koen Rademaekers ET AL., *Deep-seabed Exploitation. Tackling Economic, Environmental and Societal Challenges*. EUROPEAN PARLIAMENTARY RESEARCH SERVICE, IP/G/STOA/FWC/2013-001/Lot3/C4 (March 2015).

²⁴⁰ See GOVERNO DE PORTUGAL, *supra* note 1.

²⁴¹ See *New Numerical Models Available to Predict the Impacts of Deep-Sea Mining*, EUROCEAN (Nov. 16, 2018), <https://www.eurocean.org/np4/872.html>.

²⁴² See GOVERNO DE PORTUGAL, *supra* note 1.

²⁴³ See *Deep-sea Mining: Who Stands to Benefit*, *supra* note 160; Study Report, *supra* note 160.

²⁴⁴ See Walter Leal Filho ET AL., *Deep Seabed Mining: A Note on Some Potentials and Risks to the Sustainable Mineral Extraction from the Ocean*, 9 J. MARINE SCI. ENG'G. 521 (2021).

²⁴⁵ Keith Master, *Environment Liability for Deep Seabed Mining in the Area: An Urgent Case for a Robust Strict Liability Regime*, 33 OCEAN YEARBOOK (2019).

²⁴⁶ See Groves, *supra* note 43.

²⁴⁷ See Amesén, *supra* note 21.

²⁴⁸ See *id.*

²⁴⁹ See *id.*

²⁵⁰ See IUCN, *supra* note 9.

²⁵¹ See Pratima Desai, *Cobalt Demand for 5G Technology to Challenge Electric Vehicles*, REUTERS (Sep. 21, 2020), <https://www.reuters.com/article/us-cobalt-5g-electric/cobalt-demand-for-5g-technology-to-challenge-electric-vehicles-idUSKCN26C1EQ>.

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may be inevitable, but it should be done the right way if it is to be a sustainable alternative to terrestrial mining.

The ISA has a lot of pressure from both the international and corporate community to finish drafting the Mining Code.²⁵² If the international DSM regime were restructured in way that gave coastal states, like Portugal, more autonomy in their exploration and exploitation of deep-sea minerals, then that burden on the ISA could be eased.²⁵³ It should also be considered just how successful the ISA could really be without the support of the United States. Generally, the United States respects UNCLOS as the customary law of the high seas, but they objected to how it handles deep sea mining for the very issues that prevent Portugal to really nationalize the MPP.²⁵⁴

²⁵² See Carver, *supra* note 174.

²⁵³ See *id.*; Arnesen, *supra* note 21; Groves, *supra* note 43.

²⁵⁴ See Groves, *supra* note 43.