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Unilateral and Multilateral Deep-Sea Mineral Mining Regulations: Why an Effective Enforcement Mechanism is Needed in Order to Promote Responsible Mining Practices in the Future

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UNILATERAL AND MULTILATERAL DEEP-SEA MINERAL MINING REGULATIONS: WHY AN EFFECTIVE ENFORCEMENT MECHANISM IS NEEDED IN ORDER TO PROMOTE RESPONSIBLE MINING PRACTICES IN THE FUTURE

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ABSTRACT

This paper focuses on enforcement issues with regard to deep-sea mineral mining in terms of unilateral and multilateral structures. It begins by exploring early forays into mineral mining, namely in the Democratic Republic of the Congo, and the necessity of the extractives industries generally. Next, this comment analyzes unilateral policy regimes, specifically through the lens of United States courts and through differing mining regulatory regimes between countries, and how unilateral regulatory change is likely an ineffective mechanism for enforcing standards for the industry. Finally, this comment looks at international structures that currently govern deep-sea mineral mining and how multilateral regulatory regimes may provide an effective enforcement mechanism in the future. This comment addresses, among other things, (1) the origins of deep-sea mineral mining regulation under the International Seabed Authority; (2) domestic regulation of deep-sea mineral mining; (3) the environmental concerns associated with deep-sea mining; (4) how unilateral changes to regulatory regimes may create externalities that undermine enforcement efforts; and (5) dynamics of international norms and its effects on deep-sea mineral mining.

It also explores potential solutions for industry regulations and how to systematize such regulations. It concludes that while the impacts of deep-sea mining are not thoroughly understood, there exist both domestic and international solutions to account for future unknown risk and possible incentive structures that can effectively direct countries toward compliance with international norms. Though this comment takes the position that unilateral policy efforts with regard to deep-sea mineral mining seem unlikely to be effective, it nonetheless recommends that the United States pass new legislation raising liability limits for deep-sea mining organizations similar in manner to the Oil Pollution Act of 1990. This comment further recommends that any international law-based changes include creating new international agreements, or amendments to existing agreements, to emplace incentive structures necessary for compelling compliance with international norms, which would grant the International Tribunal for the Law of the Sea (ITLOS) adjudicative authority and the World Trade Organization (WTO) the authority to provide specific, enforceable trade-based remedies for deep-sea mineral mining infractions.

INTRODUCTION

"If you can't grow it, you gotta mine it."[1] This statement succinctly and effectively describes the ultimate reality of what humanity requires for sustainment and advancement. This quote does not, however, raise more fundamental questions. If we must mine it, should we? And if we should, under what conditions? Some of the most important commodities necessary for modern life come in the form of minerals located both on land and in the deep ocean.[2] Our experience with land-based mining regulations show that sole reliance on domestic regulations, absent strong, international incentive structures and regulatory mechanisms, are insufficient to effectively manage the industry.

The extractive industries provide the raw materials we use in every-day devices like computers and cell phones.[3] Cobalt, nickel, and copper are the necessary ingredients for lithium-ion batteries, which are the commercial-ready solution for large scale energy storage.[4] Most importantly, these minerals are the raw materials that will provide the final link in the chain for actioning the sustainable energy movement and enabling a mass transition away from fossil fuels.[5] This transition comes, however, with all the implications that large-scale extraction bring.[6]

The largest source of minerals necessary for lithium-ion batteries is currently the Democratic Republic of the Congo.[7] Yet, as our demand for energy storage grows, the economic viability of new sources of minerals,

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1. Mary Beth Gallagher, *Understanding the Impact of Deep-Sea Mining*, MIT DEP'T OF MECH. ENG'G (Dec. 4, 2019), http://meche.mit.edu/news-media/understanding-impact-deep-sea-mining [https://perma.cc/36NW-YQ3Z].

2. *A World of Minerals in Your Mobile Device*, U.S. GEOLOGICAL SURV. (Sept. 2016), https://pubs.usgs.gov/gip/0167/gip167.pdf [https://perma.cc/X8YJ-AZTD].

3. *Id.*

4. Gallagher, *supra* note 1.

5. Gallagher, *supra* note 1. *See generally* KRISTEN HUND ET AL., MINERALS FOR CLIMATE ACTION: THE MINERAL INTENSITY OF THE CLEAN ENERGY TRANSITION (World Bank Group 2020), http://pubdocs.worldbank.org/en/961711588875536384/Minerals-for-Climate-Action-The-Mineral-Intensity-of-the-Clean-Energy-Transition.pdf [https://perma.cc/S7Y7-SV47].

6. KRISTEN HUND ET AL., *supra* note 5. Extractive industries represent approximately 2-11 percent of total global energy consumption. Increasing demand for minerals does not necessarily mean an increase in fossil fuel consumption for mining activities, however. Those industries have the opportunity to utilize sustainable energy solutions for expanded operations in the future. A holistic approach to the total carbon cost of sustainable energy solutions, which includes the impact of mineral mining necessary to build such technologies, provides a better estimate for the total impact these efforts will have. *Id.* at 17.

7. Gallagher, *supra* note 1.

namely the deep ocean, will become increasingly attractive.[8] With an estimated $16 trillion worth of minerals in the Clarion-Clipperton Zone (CCZ) alone, an area located between Hawaii and the west coast of Mexico, it is no wonder why the deep ocean is considered a solution for satisfying future mineral demands.[9]

On December 10th, 1982, 157 signatory nations created the United Nations Convention on the Law of the Sea (UNCLOS) in addition to the International Seabed Authority (ISA) and the International Tribunal for the Law of the Sea (ITLOS) to manage the new agreement.[10] The ISA in turn created the Mining Code, drove research efforts to understand what the impacts of deep-sea mining will be, and how best to manage extraction efforts in the commons.[11]

To date, the ISA has issued thirty-one exploratory permits for deep-sea mineral mining to twenty-two different countries or corporations.[12] The countries represented are primarily wealthier nations like Russia, China, Japan, France, and Germany, but there is also substantial representation from island nations like Nauru, Tonga, the Cook Islands, and Kiribati.[13] The majority of these permits are for exploration in the CCZ.[14] Smaller nations, like Papua New Guinea, have sought to pursue deep-sea mining projects through joint ventures,[15] while corporations from

8. Gallagher, *supra* note 1.

9. *Why the U.S. is Missing Out on the Race to Mine Trillions of Dollars Worth of Metals from the Ocean Floor*, 60 MINUTES (Nov. 17 2019), https://www.cbsnews.com/news/rare-earth-elements-u-s-on-sidelines-in-race-for-metals-sitting-on-ocean-floor-60-minutes-60-minutes-2019-11-17/ [https://perma.cc/U8C7-XAQR].

10. United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS].

11. *The Mining Code*, INT'L SEABED AUTH., https://www.isa.org.jm/mining-code [https://perma.cc/FY9T-7YQV] (last visited Oct. 4, 2021). The ISA has adopted a mining code for exploration, but with regard to exploitation the code is still under development. *Id.*

12. Michael Lodge, *The International Seabed Authority and Deep Seabed Mining*, U.N. CHRONICLE, https://www.un.org/en/chronicle/article/international-seabed-authority-and-deep-seabed-mining [https://perma.cc/B8EA-X6WL] (last visited Oct. 4, 2021); *Exploration Contracts*, INT'L SEABED AUTH., https://www.isa.org.jm/exploration-contracts [https://perma.cc/2ECH-6GDH] (last visited Oct. 4, 2021).

13. *Exploration Contracts*, INT'L SEABED AUTH., *supra* note 12.

14. *Id.*

15. Colin Filer et al., *How PNG Lost $120 Million and the Future of Deep-Sea Mining*, DEV. POL'Y CENTRE BLOG (Apr. 28, 2020), https://devpolicy.org/how-png-lost-us120-million-and-the-future-of-deep-sea-mining-20200428/ [https://perma.cc/W38M-N7QQ].

larger countries either operate independently or under the auspices of government-related structures in their home countries.[16]

As the mining industry races to develop extractive technology to commercialize deep-sea mineral mining, the scientific community also works to understand what the totality of the impact might look like.[17] Despite attempts at deep-sea extraction in places like Papua New Guinea, larger scale projects in the CCZ do not appear actionable in the near future.[18] The general concern in the scientific community is that deep-sea mineral mining will begin at scale before researchers are able to fully understand what the impact of these efforts will be.[19] Indeed, as we have observed with land-based mining, environmental effects are only one of the externalities created by extractive industries, while other second order effects may become apparent later on.[20]

In terms of the human impact on the deep ocean, it may very well be impossible to reduce the level of uncertainty to zero. Current domestic and international regulations, however, do not effectively account for our current understanding, or lack of understanding.[21] Further, previous and ongoing experiences with externalities created by land-based mineral extraction should provide even more warning against swift, underinformed commercialization.[22] The implications of delaying deep-sea mineral mining efforts may, at worst, require prolonged reliance on fossil fuels and a greater focus on carbon recapture efforts, but it will come

16. Wang Yan, *China's Deep-Sea Mining, a View from the Top*, CHINA DIALOGUE OCEAN (Oct. 18, 2019), https://chinadialogueocean.net/10891-china-deep-sea-exploration-comra/ [https://perma.cc/8E8F-3QKN]. Chinese corporations seek exploratory permits from the ISA, but these corporations operate under the auspices of the China Ocean Mineral Resources Research and Development Association (COMRA), which provides government oversight and support for mining activities. *Id.*

17. Laura Kaikkonen et al., *Assessing the Impacts of Seabed Mineral Extraction in the Deep Sea and Coastal Marine Environments: Current Methods and Recommendations for Environmental Risk Assessment*, 135 MARINE POLLUTION BULL. 1183, 1184 (2018).

18. John Childs, *Greening the Blue? Corporate Strategies for Legitimizing Deep Sea Mining*, 74 POL. GEOGRAPHY 1, 1 (2019); Gallagher, *supra* note 1.

19. Gallagher, *supra* note 1.

20. Kaikkonen, *supra* note 17, at 1193.

21. *See, e.g.*, 30 U.S.C. §§ 1401-1472 (2021) (the United States Code includes environmental impact assessments as part of the domestic licensing process); *The Mining Code*, INT'L SEABED AUTH., *supra* note 11 (procedures for approving environmental impact assessments include publication on the ISA website and the ability of signatory nations to recommend changes).

22. *See, e.g.*, AMNESTY INT'L, "THIS IS WHAT WE DIE FOR" HUMAN RIGHTS ABUSES IN THE DEMOCRATIC REPUBLIC OF THE CONGO POWER THE GLOBAL TRADE IN COBALT 16 (2016), https://www.amnesty.org/en/wp-content/uploads/2021/05/AFR6231832016ENGLISH.pdf [https://perma.cc/6F5A-Z9QV].

with an increased certainty that mineral mining in the future will produce predictable, manageable externalities.[23] This paper assumes a certain level of inevitability with regard to deep-sea mineral mining commercialization and, without recommending a prohibition on such practices in exchange for environmental protections, proposes both (1) amendments to domestic regulatory regimes; and (2) new or amended international agreements to manage the industry in the future.

Though a piece of the solution includes changes to domestic regulatory regimes, international solutions are necessary to ensure an actionable enforcement mechanism exists. Using the United States as an example, domestic regulatory regimes are problematic because (1) there currently does not exist a robust structure for a future hypothetical plaintiff to recover from an injury received as a result of deep-sea mineral mining; [24] (2) differences in domestic regulatory regimes may only serve to encourage mining companies to operate out of countries with more lax regimes, thus spurring a regulatory race to the bottom; and (3) domestic solutions aimed at regulating other countries has historically been ineffective in the mineral mining industry. To ensure actionable, uniform enforcement of deep-sea mineral mining regulations under the ISA, countries should either amend UNCLOS to make adverse ITLOS

23. *See* HUND ET AL., *supra* note 5.

24. *See* 30 U.S.C. § 1419(2)(e) (2021) ("For the purposes of this chapter, any vessel or other floating craft engaged in commercial recovery or exploration shall not be deemed to be 'a vessel or other floating craft' under section 502(12)(B) of the Clean Water Act and any discharge of a pollutant from such vessel or other floating craft shall be subject to the Clean Water Act."). The Clean Water Act allows for private rights of action against those in violation of the Act. 33 U.S.C. § 1365 (2021). The Sixth Circuit has held that the Clean Water Act does not give plaintiffs an implied right of action to enforce contractual obligations of actors with the Environmental Protection Agency. *See* Board of Trustees of Painesville Twp. v. City of Painesville, 200 F.3d 396, 400-401 (6th Cir. 1999). However, the Deep Seabed Hard Mineral Resources Act provides for a private right of action, giving jurisdiction to the United States District Court for the District of Columbia. 30 U.S.C. § 1427 (2021). It is possible that a court may construe a deep-sea mineral mining license as a contract with the Environmental Protection Agency, which may reduce a private actor's ability to recover under the Clean Water Act. It is also possible that though the Deep Seabed Hard Mineral Resources Act declares vessels and floating craft to not be considered "vessels" for the purposes of the Clean Water Act, it is not clear that the Act would extinguish a defendant's ability to remove such a case to admiralty court. The lack of clarity with regard to a private actor's ability to recover from an injury received from deep-sea mineral mining activities, thus, calls for a clearer regulatory scheme that makes such rights. For example, the Oil Pollution Act provides a blueprint for how liability limits may be raised for private rights of action in the deep-sea mineral mining context by specifically identifying raised liability limits based off of specific offenses of a defendant. Oil Pollution Act of 1990, 33 U.S.C. §§ 2701-2720 (1990).

decisions redeemable by complainants at the WTO for determination of an effective trade-related remedy, or create a new international agreement under the WTO similar in structure to the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS).

This comment first looks at the importance that certain minerals play and their current global usage, concluding that the vast deposits in the deep ocean will be a future source of minerals. Second, this comment analyzes redressability in United States courts given the environmental concerns associated with deep-sea mineral mining in addition to domestic regulatory regimes that may be insufficient for regulating the industry. Lastly, this comment analyzes the international structures governing deep-sea mineral mining and how they can be changed to create reliable enforcement mechanisms to ensure the future of the industry.

I. HISTORICAL CONTEXT FOR MINERAL MINING AND THE FUTURE OF DEEP-SEA MINERAL MINING

A. Why Deep-Sea Mineral Mining is Both Critical to Progress and Reasonably Inevitable

According to the United States Geological Survey's (USGS) Mineral Commodity Report in 2020, "China was the world's leading consumer of cobalt, with more than 80% of its consumption being used by the rechargeable battery industry."[25] That report concluded that known land-based cobalt deposits totaled around seven million tons, while deep-sea nodules on the Atlantic, Indian, and Pacific Ocean floors totaled more than 120 million tons.[26] Lithium-ion batteries traditionally contain lithium cobalt oxide and graphite.[27] These energy storage systems are widely used from cell phones and computers, to electric vehicles.[28] In short, mining and refining cobalt makes possible much of the advanced technology we currently use and seek to use in the future.

A recent World Bank report estimates that global production of "graphite, lithium, and cobalt could increase by nearly 500% by 2050 to

25. U.S. GEOLOGICAL SURV., MINERAL COMMODITY SUMMARIES 51 (2020), https://pubs.usgs.gov/periodicals/mcs2020/mcs2020.pdf [https://perma.cc/E7CC-VSD5].

26. *Id.*

27. *What is a Lithium-Ion Battery and How Does it Work?*, UNIV. OF WASH. CLEAN ENERGY INST., https://www.cei.washington.edu/education/science-of-solar/battery-technology/ [https://perma.cc/XV3M-PFAE] (last visited Sept. 30, 2021).

28. *Id.*

meet the growing demand for clean energy technologies."[29] Specifically, the report predicts that by 2050 (1) annual demand for cobalt will increase by about 450% or about 750,000 tons annually; (2) demand for nickel will increase about 100% or about 2.2 million tons annually; and (3) annual demand for copper will remain approximately the same at about 1.3 million tons per year.[30] Coincidentally, deep-sea nodules contain cobalt (.2-.25%), nickel (1.25-1.5%), and copper (1-1.4%).[31]

Though the report discusses various alternatives to lithium-ion batteries for energy storage that may become commercially viable at some point, it is more likely that lithium-ion batteries will remain the primary source of energy storage for the foreseeable future.[32] Present indicators suggest that lithium-ion battery storage has become a technology on which policy makers rely in seeking a transition to clean energy, which may necessarily increase lithium-ion usage in the future.[33]

B. Previous Experiences with Extractive Industries and What They Can Teach Us About the Future of Deep-Sea Mineral Mining Regulation

One of the more prescient examples of negative first and second order effects resulting from mineral mining comes from the Democratic Republic of the Congo (DRC). This section shows that in the presence of vast mineral wealth, ineffective regulations for the mining industry in the DRC spawned a host of negative byproducts that endure to this day. Next, this section uses the DRC example to show what unintended consequences may result from such ineffective regulation. Lastly, this section compares the incentive structure in the DRC to the current incentive structure in deep-sea mineral mining.

As early as 1958, the DRC was the world's largest producer of industrial diamonds and cobalt.[34] After winning independence on June 30,

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29. HUND ET AL., *supra* note 5, at 12; *Mineral Production to Soar as Demand for Clean Energy Increases*, THE WORLD BANK (May 11, 2020), https://www.worldbank.org/en/news (choose press releases under view by news type; then search "mineral production to soar as demand for clean energy increases"; choose article with identical title). [https://perma.cc/XH8W-S5BN].

30. HUND ET AL., *supra* note 5, at 73.

31. Gallagher, *supra* note 1.

32. HUND ET AL., *supra* note 5, at 59-69; Gallagher, *supra* note 1.

33. *California Gov. Newsom Calls Transition to Electric Cars an "Economic Imperative*," NATIONAL PUBLIC RADIO (Sept. 24, 2020), https://www.npr.org/2020/09/24/916625380/california-governor-on-his-order-to-ban-sale-of-new-gasoline-vehicles-by-2035 [https://perma.cc/NUN4-57T3].

34. Hubert André-Dumont, *Mining in the Democratic Republic of the Congo: A Case Study*, 57 ROCKY MT. MIN. L. INST. 9-1, 9-4 (2011).

1960, the DRC plunged into a period of unrest that lasted until President Mobutu effectively seized power in 1965.[35] Mobutu ruled from 1965 until 1991, a period marked by social and economic decline and the ultimately unsuccessful nationalization of a large Belgian mining company, Union Miniére.[36]

In 1994, the Congolese government sought to open the country to mining investors through an initial series of partnerships with its state-owned mining company, La Générale des Carriéres et des Mines (Gécamines).[37] These partnerships did not endure, however. The eastern portion of the DRC once again plunged into war from 1998 to 2001, resulting in a division of control of the country's mineral rich portions between the DRC government, Rwanda, Uganda, and Jean-Pierre Bemba, the leader of the Mouvement de Libération du Congo.[38] Unrest in mineral-rich areas of the DRC persists to this day, driven in part by the wealth associated with control of mining activities and commercial agreements made with neighboring countries.[39]

As foreign investment in Congolese mining activities began, and increased, after 1994, the national debt became untenable for the DRC government.[40] In 2010, the DRC received debt relief through the International Monetary Fund (IMF) and the World Bank's International Development Association, which reduced the external debt to approximately $2.9 billion.[41] As of 2010, the DRC's gross domestic product (GDP) stood around $12.5 billion, according to the Minister of Planning.[42] It was estimated in 2009 that the DRC's mining industry accounted for 70% of total export earnings and that as of 2010, the industry had grown by 20%.[43] Although the relative size of the mining industry is quite large as compared to other economic activities, the Congo's government collected less than $200 million from that sector in 2010.[44]

35. *Id.* at 9-8 to 9-10.
36. *Id.* at 9-10.
37. *Id.* at 9-11.
38. *Id.* at 9-11 to 9-13.
39. *Id.* at 9-15.
40. *Id*. at 9-18 to 9-19.
41. *Id.* at 9-24.
42. *Id.* at 9-16.
43. *Id.* at 9-17.
44. *Id*. This lack of officially reported state revenue can also be explained by the presence of corruption. *See DR Congo Loses $750m in Mining Revenues to Corruption*, AL JAZEERA (July 21, 2017), https://www.aljazeera.com/news/2017/7/21/dr-congo-loses-750m-in-mining-revenues-to-corruption [https://perma.cc/8CTS-B4QF].

Prior to 2002, the DRC primarily used mining conventions as the vehicle for enabling foreign mining operations.[45] Mining conventions were development agreements between foreign organizations and the government.[46] In 2002, the DRC adopted the Mining Code, a law that encompasses licensing and environmental protections; however, many issues still persist to this day.[47] In 2007, for example, the DRC government signed a mining agreement with China, which involved exchanging mineral rights for building infrastructure.[48] This agreement is comparable in substance and appearance to the mining conventions that the DRC's Mining Code sought to eliminate.

Today, the DRC has an estimated untapped reserve of $24 trillion in mineral deposits.[49] Further, the DRC is the world's largest producer of cobalt, supplying about 70% of global demand.[50] In the presence of strong global demand and access to vast deposits, it is no wonder why unrest and corruption have been the hallmarks of the mining industry in the DRC.

Both rent-seeking behavior from domestic government officials and access to great wealth for international actors has come into conflict with, and at times has counterintuitively promoted, unwanted domestic mining activities. Artisanal mining, or the act of extracting minerals by hand on an individual basis, is one such activity that is common in the DRC.[51] Although this practice is referred to as illegal, in 2002 the DRC

45. André-Dumont, *supra* note 34, at 9-18.

46. *Id.* at 9-18 to 9-19.

47. *Id.* at 9-27 to 9-28. United Nations' attempts to improve the mineral mining industry in the Congo from 2003 to 2008 were largely ineffective due to the lack of enforcement from the international community. *See* Thiery Vircoulon, *Behind the Problem of Conflict Minerals in DR Congo: Governance*, INT'L CRISIS GRP (Apr. 19, 2011) https://www.crisisgroup.org/africa/central-africa/democratic-republic-congo/behind-problem-conflict-minerals-dr-congo-governance [https://perma.cc/M8BS-4HHK]. Although the exact amount is unknown, it is estimated that hundreds of millions of dollars of state mining revenue went missing from the state owned Gécamines between 2011 and 2014. Annie Callaway, *Powering Down Corruption: Tackling Transparency and Human Rights Risks from Congo's Cobalt Mines to Global Supply Chains*, ENOUGH PROJECT (Oct. 2018), https://enoughproject.org/wp-content/uploads/PoweringDownCorruption_Enough_Oct2018-web.pdf [https://perma.cc/35AU-XKA9].

48. André-Dumont, *supra* note 34, at 9-28.

49. *DR Congo: UN Advises Prudent Use of Abundant Resources to Spur Development*, UN NEWS (Oct. 10, 2011), https://news.un.org/en/story/2011/10/390912-dr-congo-un-advises-prudent-use-abundant-resources-spur-development#.WYyOHrIrLrc [https://perma.cc/6QC3-WVAD].

50. U.S. GEOLOGICAL SURV., *supra* note 25, at 51.

51. AMNESTY INT'L, *supra* note 22, at 4.

government identified zones approved for artisanal mining.[52] In the areas where China holds concessions, the DRC government has deployed troops to prevent artisanal mining, but the practice still occurs.[53] It is estimated that 20% of cobalt currently exported from the DRC is a result of the artisanal mining efforts of around 110,000 regular miners, a number that rises to around 150,000 on a seasonal basis.[54]

Artisanal miners suffer from both health and safety issues. Some of these miners short and long-term health issues include the potentially fatal "'hard metal lung disease,' . . . respiratory sensitization, asthma, shortness of breath, and decreased pulmonary function."[55] Though there is no accurate data on the total number of artisanal mine collapse accidents, at least 82 miners died between 2014 and 2015.[56] In 2014, UNICEF estimated that "approximately 40,000 children worked in mines across southern DRC, many of them cobalt mines" working up to 12 hours per day.[57] Human rights abuses as an externality were certainly not expected consequences of the global increase in demand for technological advancement and are likely not a desired byproduct of the clean energy movement, yet these conditions persist.

Although the 2002 Mining Code purports to regulate the artisanal mining industry, the lack of effective government regulation in practice is evidence that not all aspects of the code are enforceable by the government.[58] And as previously noted, the DRC Mining Code's prohibition on mining conventions did not inhibit the DRC government from entering into agreements that were similar in substance to previous mining conventions.

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52. *Amnesty Int'l Public Statement*, *DRC: Crisis in Mines Requires Sustainable Solution*, AMNESTY INT'L (July 25, 2019) https://www.amnesty.org/en/wp-content/uploads/2021/05/AFR6207722019ENGLISH.pdf [https://perma.cc/J2MK-49CF].

53. *Id.*

54. AMNESTY INT'L, *supra* note 22, at 16. Recent government efforts suggest a formalization of artisanal mining efforts where the DRC government will purchase cobalt from artisanal miners. Pratima Desai and Helen Reid, *Congo Likely to Start Artisanal Cobalt Mining Within 8 Weeks*, REUTERS (July 12, 2021), https://www.reuters.com/article/congo-cobalt-artisanal/congo-likely-to-start-artisanal-cobalt-buying-within-8-weeks-idUSL5N2OJ4MM [https://perma.cc/T5ER-9RP2].

55. AMNESTY INT'L, *supra* note 22, at 22.

56. *Id.* at 24.

57. *Exposed: Child Labor Behind Smart Phone and Electric Car Batteries*, AMNESTY INT'L (Jan. 19, 2016) https://www.amnesty.org/en/latest/news/2016/01/child-labour-behind-smart-phone-and-electric-car-batteries/ [https://perma.cc/27P9-8AD9].

58. *See* Vircoulon, *supra* note 47 (noting that United Nations actions to affect change, followed by domestic DRC action, were all ineffective at stemming the tide of illegal, or unwanted, mining practices).

These domestic policy enforcement failures have inspired international action. Starting in 2003, the United Nations passed a series of resolutions to halt the illegal exploitation of minerals in the DRC.[59] After these efforts proved ineffective, the United Nations called on the international community to assist.[60] Sanctions on both individuals and companies have largely proved ineffective, and this is partially due to the lack of States' political willpower to create such compliance in the DRC.[61] DRC domestic efforts to regulate the industry, from reducing military involvement in the mining industry to attempts at removing rebel groups from mineral-rich provinces, have also been ineffective.[62]

One such example of a country attempting to answer the UN's call was when the United States passed the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) in 2010.[63] The Dodd-Frank Act requires, in part, that American companies (1) determine whether certain minerals exist in their supply chain, (2) conduct investigations to determine the origin of the minerals, and (3) publish the findings of their investigations.[64] A company's determination that the minerals in their supply chain did not originate in rebel-controlled mines is confirmed by an external auditor before receiving a "DRC conflict free" label.[65]

This legislation did not achieve its intended purpose. In a hearing before the Subcommittee on International Monetary Policy and Trade in May 2012, Chairman Miller of California noted that compliance with this regulatory measure cost U.S. companies between $9 and $16 billion while also erecting a de facto trade embargo against the DRC.[66] The committee also noted that the de facto embargo actually incentivized further growth of the mineral black market in the DRC.[67] The Dodd-Frank Act's noble intent did not produce the ultimately desired result: to halt the use of conflict minerals and to disincentivize improper mining practices.

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59. *Id.*
60. *Id.*
61. *Id.*
62. *Id.*
63. Dodd-Frank Wall Street Reform and Consumer Protection Act, H.R. 3224, 111th Cong. (2010).
64. Vircoulon, *supra* note 47.
65. *Id.*
66. *The Costs and Consequences of Dodd-Frank Section 1502: Impacts on America and the Congo: Hearing Before the Subcomm. on Int'l Monetary Pol'y and Trade of the H. Comm. on Fin. Servs.*, 112th Cong. (2012).
67. *Id.*

Another gap in the Dodd-Frank Act is that it only applies to companies who are required to file disclosures with the Securities and Exchange Commission (SEC) under the Securities Exchange Act of 1934.[68] In other words, the Act only applies to a small portion of publicly traded companies in the U.S., not private companies. Though some sort of domestic regulation might be necessary to ensure U.S. companies do not support unwanted mining practices, corporate disclosure is an incomplete mechanism for effectuating policy goals aimed at adjusting mineral mining practices abroad.

In all, mineral mining in the DRC is a remarkably valuable industry, responsible for satisfying much of the world's demand for minerals used in modern technology. The DRC has attempted domestic regulation and enforcement to address the problem, and countries like the United States have enacted their own domestic laws to assist in regulating the industry. An effective international enforcement mechanism is the missing piece. To avoid similar pitfalls with future deep-sea mineral mining regulation, the United Nations, through the ISA and ITLOS, needs a proper enforcement mechanism to ensure uniform compliance with rules and norms.

II. UNILATERAL PROBLEMS: NATIONAL MANAGEMENT OF EXTRACTIVE INDUSTRIES AND WHY DOMESTIC REGULATORY REGIMES ARE INSUFFICIENT TO MANAGE DEEP-SEA MINERAL MINING

Unilateral regulatory efforts appear to be ineffective mechanisms for regulating deep-sea mineral mining. Whether it be a State's currently structured judicial remedies that may not supply redress for plaintiffs, or unilateral policy changes by an individual State with regard to the licensing process or the conduct of mining, it is not clear that unilateral regulatory changes will be sufficient. This section discusses (1) how the United States' federal court system may be insufficient to provide remedies for controversies arising out of deep-sea mineral mining activities; and (2) how differences in deep-sea mining regulations between individual countries may lead to both regulatory arbitrage and a race to the bottom. This section also briefly explains that any changes to domestic structures will not solve jurisdictional problems, thus making recovery more difficult in a setting where likely defendants might be international actors. In short, the purpose of this section is to show that unilateral

68. *Disclosing the Use of Conflict Minerals*, U.S. SEC. AND EXCH. COMM'N https://www.sec.gov/opa/Article/2012-2012-163htm---related-materials.html [https://perma.cc/93BW-KLF5] (last visited Mar. 21, 2021).

updates to domestic regulatory regimes are necessary, but if they occur in isolation, or without coordination and agreement from other participating States, these efforts will likely not achieve the change they seek.

A. U.S. Courts Will Likely be Ineffective Forums for Adjudication of Complaints Arising from Mineral Mining Environmental Disasters on the Ocean

Remedies issued by the judiciary serve an important function in redressing wrongs in an ex-post fashion where ex-ante regulation may have failed or where an actor failed to abide by regulations. There are two significant barriers a future plaintiff may face if injured in some fashion by deep-sea mineral mining activities: (1) if the harm is felt on a global scale, both federal common law and the special injury requirement erect significant barriers to recovery; (2) deep-sea mineral mining litigation will likely occur under admiralty jurisdiction, and with admiralty jurisdiction comes limitation of liability, which would limit recovery to the value of the vessel.

As discussed in the environmental impact portion of this paper, one potential injury may involve plume creation on a massive scale that destroys, or irreparably damages, the ocean ecosystem. Plaintiffs seeking redress for injuries sustained from large-scale environmental impacts face an uncertain future with regard to proper venue and controlling law, however.[69] If a defendant is able to successfully remove a case to admiralty court, it is likely that under current rules, the defendant would only be liable up to the value of the vessel involved in the incident. Though

69. Given the potential variation with such a hypothetical deep-sea mineral mining claim, it seems likely that such a case would likely be brought in, or removed to, admiralty court, thus obviating much discussion by way of comparison to cases concerning recovery from global warming-related injuries. If deep-sea mineral mining claims are not heard in admiralty court, it is more difficult to say whether state or federal court would provide the proper venue. Plaintiffs seeking redress for injuries sustained by the effects of global warning from fossil fuel producers have received varied signals in this regard. In City of Oakland v. BP, the Ninth Circuit held that a federal court does not have jurisdiction over a state law nuisance claim. 960 F.3d 570, 575 (9th Cir. 2020) ("[w]e hold that the state-law claim for public nuisance does not arise under federal law for purposes of 28 U.S.C. § 1331 . . . "). In City of New York v. Chevron Corp., however, the Second Circuit held that state law nuisance claims regarding global warming are displaced by federal common law because of the federal interests implicated in the action. 993 F.3d 81, 91-92 (2d Cir. 2021) ("[t]his is because such quarrels often implicate two federal interests that are incompatible with the application of state law: (i) the overriding . . . need for a uniform rule of decision on matters influencing national energy and environmental policy, and (ii) basic interests of federalism.") (internal quotations and citations omitted).

domestic judiciaries are not the sole source solution for deterring bad behavior and redressing wrongs, this paper argues that determining proper liability limits in a similar manner to the Oil Pollution Act of 1990 will be helpful in erecting an effective regime that future plaintiffs can rely on. Federal legislation can be a powerful tool in this department to properly adjust incentives.

1. Environmental Concerns with Deep-Sea Mineral Mining

One of the greatest unknowns associated with deep-sea mineral mining is the environmental impacts of those efforts.[70] These impacts include immediate effects of deep-sea mining on known flora and fauna in addition to potential second order effects on the ocean ecosystem as a whole. Absent the occurrence of large-scale commercial mining projects, these effects remain conjecture, however.

Researchers are concerned with both the effects of mining on the ocean floor and of sediment plumes that mining activities create.[71] Current deep-sea mining methods involve using a collector vehicle to gather mineral nodules that are then brought to a surface ship for processing.[72] This vacuum process gathers all material, including nodules and any flora and fauna that may be collocated with these minerals, from the top ten to fifteen centimeters of the ocean floor.[73] After the nodules are pumped to the surface processing ship, the minerals are separated from unwanted materials, creating a slurry, which is then released back into the water, releasing a second sediment plume.[74] Though the effects of these plumes are not well understood, one study suggests that plumes might be more localized.[75] The general concern with plume creation is a plume's potential impact on the ocean ecosystem, whether through the disbursement of toxic materials released throughout the water column or sediment clogging filter feeding organisms, among other things.[76]

In addition to the concern about sediment plume creation at the ocean floor, the deep ocean regenerates at a glacial rate: new sediment

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70. Kaikkonen et al., *supra* note 17, at 1183; *see also* Gallagher, *supra* note 1.

71. Kaikkonen et al., *supra* note 17, at 1186.

72. Gallagher, *supra* note 1.

73. *Id.*

74. *Id.*

75. Jeremy Spearman et al., *Measurement and Modeling of Deep-Sea Sediment Plumes and Implications for Deep Sea Mining*, 10 SCIENTIFIC REPORTS 1 (2020), https://www.nature.com/articles/s41598-020-61837-y.pdf [https://perma.cc/SEW2-NBV2] (Sediment plumes in this study traveled only 9km before settling on the ocean floor).

76. Gallagher, *supra* note 1.

accumulates at a rate of about one millimeter every thousand years.[77] Thus, this method, which is the only method predicted to become commercially viable in the near future, functionally means that areas disturbed by such activity would be unlikely to recover.[78]

Aside from sediment plumes, environmental researchers are also concerned with noise pollution that mining vessels create, the overall lack of understanding of the ocean food web, and the role the deep ocean plays in the overall system.[79] In 2018 for example, scientists studied the carbon sequestration role that bacteria play in the deep ocean.[80] The study explained that these bacteria play an important role in the carbon cycle and that in the North Atlantic, they were responsible for sequestering between 15-45% of carbon.[81] Another study found that benthic bacteria consume inorganic carbon, but that there was not enough information to understand the effects deep-sea mineral mining might have on these bacteria and their ability to digest carbon if the ecosystem is disrupted.[82]

In sum, the degree of potential environmental harm associated with deep-sea mining may be limited to the distance a plume travels, or might extend far greater depending on how the food web is affected. Land-based mining efforts have environmental impacts of their own, and those impacts have spilled over beyond the borders of mining sites.[83] The broad comparison between land-based and sea-based impacts goes only to show that mining operations have created numerous, unintended environmental consequences. Such prior experiences on land, paired with indicators that reasonably could lead one to believe that sea-based operations may have significant impacts, counsel a robust system of international enforcement of mining regulations.

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77. *Id.*

78. *Id.*

79. Kaikkonen et al., *supra* note 17, at 1187.

80. Maria G. Pachiadaki et al., *Major Role of Nitrite-Oxidizing Bacteria in the Dark Ocean Carbon Fixation*, 358 SCIENCE 1046, 1046 (2017).

81. *Id.*

82. Andrew K. Sweetman et al., *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*, 64 LIMNOLOGY AND OCEANOGRAPHY 694, 709 (2018).

83. Adator Stephanie Worlanyo & Li Jiangfeng, *Evaluating the Environmental and Economic Impact of Mining for Post-Mined Land Restoration and Land-Use: A Review*, 279 J. ENV'T MGMT. 1, 1 (2021). Land-based mining has affected soil and water quality in addition to disruption and destruction of plant and animal life. *Id.* at 2. Although effects on soil are more localized to mining and dump sites, effects on surface and sub-surface water can extend far beyond a mining site. Some mining activities have removed large swaths of vegetation, affecting migratory bird patterns. In other cases, discharge of mining waste containing toxic heavy metals made the surrounding area uninhabitable. *Id.* at 3-8.

2. Federal Common Law and Historical Adjudication of Environmental Cases

The judiciary is not fully equipped to effectively adjudicate claims or properly enforce deep-sea mining regulations. First, case law shows that when injuries result from large-scale environmental accidents or the effects of rising sea levels brought on by global warming, courts in the U.S. are without the ability to effectively redress a wrong in its entirety.[84] Given the unknown scope of potential environmental impacts, it may be possible that future deep-sea mineral mining controversies would be subject to similar limitations.

In *Native Village of Kivalina v. ExxonMobil Corp.,* members of a federally recognized tribe of Inupiat Native Alaskans brought a suit against ExxonMobil and other defendants alleging "that massive greenhouse gas emissions emitted by the Energy Producers have resulted in global warming, which, in turn, has severely eroded the land where the City of Kivalina sits and threatens it with imminent destruction."[85] One of the issues in the case was the existence of federal common law and whether it was competent to provide a remedy in this situation.[86] The Ninth Circuit held that federal common law governed environmental public nuisance claims.[87] The court also noted that such a claim would require proof that the defendant unreasonably interfered with the "enjoyment of a public right" and, thus, caused the harm.[88] The court conceded that the federal common law "is subject to the paramount authority of Congress" because federal common law is used to fill gaps in legislation.[89]

Ultimately, the court found that Kivalina and its residents were without remedy because the Clean Air Act and previous case law displaced their federal common law public nuisance claim for damages.[90] As a final word, the court explained that their "conclusion obviously does not aid Kivalina, which itself is being displaced by the rising sea . . . [b]ut the

84. *See, e.g.,* Native Village of Kivalina v. ExxonMobil Corp., 696 F.3d 849 (9th Cir. 2012); Alaska Native Class v. Exxon Corp. (In re Exxon Valdez), 104 F.3d 1196 (9th Cir. 1997).

85. *Native Village of Kivalina*, 696 F.3d at 853.

86. *Id.* at 855-56.

87. *Id.* at 855.

88. *Id.*

89. *Id.* at 856.

90. *Id.* at 857; *See also* Am. Elec. Power Co., Inc. v. Connecticut, 564 U.S. 410, 424 (2011) (holding that the "Clean Air Act and the EPA actions it authorizes displace any federal common-law right to seek abatement of carbon dioxide emissions from fossil-fuel fired powerplants.").

solution to Kivalina's dire circumstances must rest in the hands of the legislative and executive branches of our government, not the federal common law."[91] If future deep-sea mineral mining complaints are brought by communities who sustain injuries caused by the industry generally, it may be possible that courts applying the federal common law would similarly defer to congressionally supplied remedies instead of creating a federal common law remedy.[92]

The Court's deference to Congressional action does not leave plaintiffs entirely without hope for redressability, however.[93] In a way, the court implicitly states that it would be willing to issue judgments when Congress or the President is the source of that authority.

Another case highlights how the injury requirement may raise barriers to recovery. In *Alaska Native Class v. Exxon Corp.*, one of the many cases arising out of the Exxon Valdez disaster, the plaintiffs brought a suit under general maritime law for non-economic damages.[94] The complaint alleged that the spill "harmed an integrated system of communal subsistence . . . inextricably bound up not only with the harvesting of natural resources damaged by the spill but also with the exchange, sharing and processing of those resources as the foundation of an established economic, social, and religious structure."[95] The court held that a party could not recover damages for a public nuisance claim unless they are able to show a special injury "different in kind from that suffered by the general public."[96] The court further held that even though the class may have suffered such an injury "more severely than other members of the public," there would be no recovery because the injuries alleged in the complaint were "shared by all Alaskans."[97]

In a worst-case scenario, the proliferation of commercial mining projects may have a significant, negative effect on ocean ecosystems similar in scope, or potentially larger, than oil-related environmental disasters. If this were to be the case, a community adversely affected by such industry collective action may face difficulties recovering under federal common law in the absence of specific federal legislation creating a cause of action. The special injury requirement under federal common

91. *Native Village of Kivalina*, 696 F.3d at 858.

92. *See* 33 U.S.C. §§ 1401-1420 (1972).

93. *Native Village of Kivalina*, 696 F.3d at 858.

94. Alaska Native Class v. Exxon Corp. (In re Exxon Valdez), 104 F.3d 1196, 1197 (9th Cir. 1997).

95. *Id.* at 1198 (internal quotations omitted).

96. *Id.* (internal quotations omitted).

97. *Id.*

law, thus, does not bode well for future hypothetical plaintiffs injured by mining practices.

The threat of litigation can serve as an effective deterrent against unwanted behavior, but the lack of domestic redressability leaves a gap. This gap may be filled by domestic legislation, but such action would only affect proceedings in U.S. courts and, most importantly, it would be retrospective. Changes to the U.S. regulatory regime will be necessary to ensure ex-post remedies are effectively available where they ought to be, but enforcement mechanisms at the international level will ensure litigation at the national level is not the only deterrent.

3. Admiralty Law and Its Applicability to Deep-Sea Mineral Mining

Admiralty cases are exclusively the providence of federal courts in the United States.[98] It is generally the case that an admiralty tort claim must (1) involve a "vessel;" (2) satisfy the location test, where the injury occurs on navigable waters; and (3) satisfy the connection test, where the activity either has the potential to disrupt maritime commerce or that it shows a "substantial relationship to traditional maritime activity."[99] First, the term "vessel" in Admiralty tort cases is broadly construed and has included both off-shore oil drilling rigs[100] and dredging barges.[101] Second, the location test does not require that both the tort and the injury be relegated to navigable waters. The Admiralty Extension Act prescribes admiralty jurisdiction in cases where damage is caused by a vessel on navigable waters even though the damage is consummated on land.[102] Third, the connection test involves an intermediate level of generality where the court assesses the general features of the type of incident to determine if that sort of incident has a potentially disruptive impact on maritime commerce.[103]

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98. U.S. CONST. art. III, § 2.

99. Jerome B. Grubart, Inc. v. Great Lakes Dredge & Dock Co., 513 U.S. 527, 534 (1995) (quoting Sisson v. Ruby, 497 U.S. 358, 365-67) (internal quotations omitted).

100. Offshore Co. v. Robison, 266 F.2d 769, 779 (5th Cir. 1959); In re Oil Spill by the Oil Rig Deepwater Horizon in the Gulf of Mexico, on April 20, 2010, 808 F.Supp.2d 943, 950 (E.D. La. 2011), *aff'd sub nom.* In re DEEPWATER HORIZON, 745 F.3d 157 (5th Cir. 2014).

101. Stewart v. Dutra Const. Co., 543 U.S. 481, 497 (2005) (holding "a 'vessel' is any watercraft practically capable of maritime transportation.").

102. 46 U.S.C. § 30101(a) (2021).

103. *Grubart, Inc.*, 513 U.S. at 538. In that case, a dredging barge that collapsed a tunnel under the Chicago River satisfied the connection test because of its potential disruptive impact on maritime commerce. It seems likely that deep-sea mineral mining vessels would even more readily satisfy this test.

The court's reasoning in the *Deepwater Horizon* case is particularly instructive when considering whether deep-sea mineral mining ships are likely to be classified as vessels. There, the court found that the drilling platform was a vessel, because it was practically capable of transportation, it was only connected to the ocean floor by a well head, and there were no other legs or attachments.[104] There is no requirement that the platform be in motion to be considered a vessel.[105] Because deep-sea mining is conducted by a ship that is not permanently moored to the ocean floor, but rather controls a piece of equipment that operates on the ocean floor, it will likely be considered a vessel for the purposes of admiralty jurisdiction. The location and connection tests would likely also be satisfied for the purposes of admiralty jurisdiction.[106]

Thus, it is likely that two of the most foreseeable future controversies would fall under admiralty jurisdiction. If a future case involves an injury resulting from plume creation or nearly any other activity attributable to a mining vessel on the high seas, the case would fall within admiralty jurisdiction. If mining activities create more attenuated injury, like destruction of ocean ecosystems and the ocean's ability to perform carbon capture, plaintiffs bringing such a claim may find their cases removed to admiralty court.

One example of litigation surrounding environmental disasters at sea was the Deepwater Horizon oil spill.[107] After the disaster, numerous claimants brought a suit seeking damages for injuries sustained as a result of the incident.[108] These claimants sought recovery "under general maritime law, the Oil Pollution Act of 1990 (OPA), . . . and various state laws."[109] The court found that the case fell under admiralty jurisdiction because the drilling platform was considered a vessel.[110]

Relying on federal maritime law, the court dismissed the state law claims holding that state law "must yield to the needs of a uniform maritime law."[111] The court explained that "to subject a discharger to the varying laws of each state into which its oil has flowed would contravene a fundamental purpose of maritime law: '[t]o preserve adequate harmony

104. *In re Oil Rig Deepwater Horizon*, 808 F.Supp.2d at 950-51.
105. *Id.* at 950.
106. *See id.* at 950-51.
107. *Id.* at 947-48.
108. *Id.* at 947.
109. *Id.* at 948.
110. *Id.* at 949.
111. *Id.* at 954 (citing Romero v. International Terminal Operating Co., 358 U.S. 354, 373 (1959)).

and appropriate uniform rules relating to maritime matters.'"[112] Although states do have the ability to create remedies for oil spills that occur within their territorial waters, they do not have the ability to create remedies for incidents that occur on the high seas.[113] A future deep-sea mineral mining claim would likely be subject to similar reasoning, which would result in uniform application of admiralty law and dismissal of any state law claim.

Thus, in some cases, the normal tort analysis, and the injury requirement, do not properly account for the magnitude of modern-day environmental harms that may affect large groups of plaintiffs. As in *Deepwater Horizon*, courts seek to promote commerce, and as a byproduct, will limit liability unless a federal law is in place to expand liability beyond the value of the vessel. The history of American case law, accordingly, supports the contention that future environmental harms sustained by a large class of plaintiffs may not result in full redress of the injury received.

Federal courts have explained, however, that the application of maritime law in admiralty cases would be subordinate to Congressional action.[114] The cases mentioned above also show that state law will likely not be able to provide remedies for injuries committed by deep-sea mining vessels and their owners. In short, the American judiciary has signaled that (1) Congress is the appropriate institution for drafting regulations to govern liability in admiralty, and (2) it would honor and enforce those regulations as the sole source of authority where admiralty jurisdiction lies.

4. Limitation of Liability in Admiralty Law

Once a case is determined to be in admiralty jurisdiction, liability is typically limited to the value of a vessel.[115] The current version of the law reads: "The liability of the owner of a vessel for any claim, debt, or liability . . . shall not . . . exceed the value of the vessel and pending freight."[116] The Supreme Court noted that the purpose of the Act was "to encourage investments in ships and their employment in commerce[,]" so

112. *Id.* at 954 (quoting Kickerbocker Ice Co. v. Stewart, 253 U.S. 149, 160 (1920)).

113. *Id.* at 957; *see also* Askew v. Am. Waterways Operators, Inc., 411 U.S. 325, 339 (1973).

114. E. River S.S. Corp. v. Transamerica Delaval, Inc., 476 U.S. 858, 864 (1986) (holding that general maritime law applies to the extent it is not displaced by federal statute); *see also* S. Pac. Co. v. Jensen, 244 U.S. 205, 215 (1917) ("Congress has paramount power to fix and determine the maritime law which shall prevail throughout the country.").

115. 46 U.S.C. § 30505 (2021).

116. *Id*.

that "the shipping interests of this country might not suffer in competition with foreign vessels."[117]

In the case of large-scale environmental disasters where such impacts create thousands of plaintiffs, as in the Exxon Valdez spill of 1989 or Deepwater Horizon spill in 2010, this framework of liability would have limited the defendant's liability to the value of the drilling equipment or transportation equipment involved in the incident. Congress made an exception to this liability ceiling by passing the OPA,[118] which set higher liability limits for defendants responsible for damages caused by oil spills:

> [T]he total of the liability of a responsible party under section 2702 of this title and any such removal costs incurred by, or on behalf of, the responsible party . . . shall not exceed . . . $3,000 per gross ton, . . . for an offshore facility except a deepwater port, the total of all removal costs plus $75,000,000, . . . [and] for any onshore facility and deepwater port, $350,000,000.[119]

The most important feature of the OPA was that it set forth a higher level of liability for oil spills as opposed to other maritime injuries. Today, no such higher level of liability exists for deep-sea mineral mining.[120] In fact, the only deep-sea mining related liability statute creates civil penalties or criminal fines for conducting mining operations in violation of U.S. law.[121] In other words, Congress would have to pass new legislation creating increased liability for deep sea mineral mining companies who have the potential to create environmental effects similar in scope to oil spills.

Without such a measure, deep-sea mineral mining companies may be able to seek protection under the Limitation of Liability Act, which would

117. Am. Car & Foundry Co. v. Brassert, 289 U.S. 261, 263 (1933).

118. Oil Pollution Act of 1990, 33 U.S.C. § 2701 et seq. (1990).

119. 33 U.S.C. § 2704 (2018).

120. KEITH MACMASTER, ENVIRONMENTAL LIABILITY FOR DEEP SEABED MINING IN THE AREA: AN URGENT CASE FOR A ROBUST STRICT LIABILITY REGIME 19 (Schulich Sch. Of Law, Working Paper No. 14 (2019)). It is possible that deep-sea mining liability may be included under a separate domestic liability regime in the U.S., but the implications are currently unknown.

121. 30 U.S.C. § 1465 (2018) ("Any vessel documented or numbered under the laws of the United States . . . which is used in any violation of this chapter, any regulation issued under this chapter, or any term condition, or restriction of any license or permit . . . shall be liable in rem for any civil penalty assessed or criminal fine imposed and may be proceeded against in any district court of the United States having jurisdiction thereof.").

limit their liability to the value of their mining vessel and equipment.[122] This raises concerns about redressability as we have seen in the cases mentioned above. The lack of such legislation would also leave absent an incentive for deep-sea mineral mining companies to make their best effort to mitigate environmental harms. Congress's normal fact-finding activities would likely be frustrated by the current underdeveloped understanding of deep-sea mining impacts. In short, without a more accurate understanding of mining impacts, Congress may be unable to appropriately express liability in terms of a number figure as it did with the OPA. Such liability increases may be necessary in the future, even if they are difficult to determine at the moment.

5. Conclusions with Regard to the American Judiciary

In all, Congress and the President, through administrative agencies like the National Oceanic and Atmospheric Administration (NOAA), have the ability to adjust the course of future deep-sea mineral mining litigation in a manner that would positively affect a plaintiff's ability to recover damages commensurable to the injury received. Such a structure may include increases to liability limits in admiralty cases similarly to the OPA. It may also include enacting new legislation to create a cause of action for more attenuated injuries so that courts would not have to defer to federal common law.

These changes do not wholly address all of the challenges associated with deep-sea mineral mining regulation, but they would fill an important domestic gap in how the judiciary would meet the challenge. A positive byproduct could be that sufficient liability limits may deter mining companies from committing bad acts and that plaintiffs could more readily rely on a court's ability to grant a sufficient remedy.

Despite the potential for positive unilateral reform, it is not possible for all cases and controversies occurring around the world to be effectively brought into a United States court. The federal courts' jurisdiction is not unlimited. Even if liability limits under admiralty jurisdiction are increased, it may not be possible for a plaintiff to draw an international defendant into a U.S. court. If that defendant is an individual or citizen of a different country with no place of business or meaningful tie to the U.S.,

122. Jerome B. Grubart, Inc. v. Great Lakes Dredge & Dock Co., 513 U.S. 527, 535 (1995) (maritime law "ordinarily treats an 'appurtenance' attached to a vessel in navigable waters as part of the vessel itself.").

the defendant may choose not to defend the case, leaving the plaintiff with a judgment and no mechanism to collect damages.[123]

B. Domestic Regulatory Regimes and How Differences Between Countries May Create Externalities that Undercut Efficacy

1. Mineral Mining Regulatory Regimes by Country

In order to comply with UNCLOS requirements, contractors seeking exploratory mining licenses must satisfy two requirements: (1) they must be nationals of a signatory State or effectively controlled by the signatory State, and (2) the signatory State must sponsor the license seeker.[124] Sponsorship requires States to establish domestic regulatory regimes.[125] These domestic regimes ensure that contractors comply with obligations and the existence of these regimes exempt States from liability for contractor actions.[126] Though States have some degree of flexibility in the regulatory regimes they adopt, such regimes must adhere to, at a minimum, the environmental standards set forth by the ISA.[127]

As of 2018, thirty-one States, including non-signatories like the United States, have adopted such domestic regulatory regimes.[128] Even prior to this formalization under the ISA, the United States passed the Deep Seabed Hard Mineral Resource Act of 1980, which provided an interim procedure for deep-sea mineral mining operations.[129] The Act

123. Universal jurisdiction for certain types of crimes has been successful, but only when countries subject themselves to such jurisdiction. Jon B. Jordan, *Universal Jurisdiction in a Dangerous World: A Weapon for all Nations Against International Crime*, 9 MSU-DCU J. INT'L L. 1, 2-5, 23 (2000) (explaining universal jurisdiction generally and its limits). Deep-sea mineral mining infractions are likely not good candidates for universal jurisdiction as countries would be economically incentivized to protect their corporations from liability in foreign courts.

124. INT'L SEABED AUTH., COMPARATIVE STUDY OF THE EXISTING NATIONAL LEGISLATION ON DEEP SEABED MINING 3 (2019) https://www.isa.org.jm/files/files/documents/compstudy-nld.pdf [https://perma.cc/G8RM-ZXP5].

125. *Id*. This requirement was suggested in an ITLOS advisory opinion and later referenced at the twenty-third session of the ISA in 2017.

126. *Id*.

127. *Id*. at 4.

128. *Id*. at 5.

129. *Id*.

forbade extraction of minerals unless a contractor received a license from the United States or a "reciprocating" state.[130]

Signatory States' legislation is largely similar.[131] All States stress the need for environmental protection, however, standards vary.[132] Some States, like the United Kingdom, Nauru, and Tonga, set environmental protection as a condition upon which a license is granted.[133] On the other end of the spectrum, States like Russia only mention universally recognized principles of international law, representing the minimum legislative requirements under the ISA.[134] China's environmental protection scheme spells out a robust set of procedures including obligations for contractors to take necessary measures to prevent and reduce impacts of pollution, to assess the impact of exploration and exploitation activities, and establish monitoring programs.[135]

Most States provide conditions on which a license may be revoked, including an option for sponsoring States to revoke such a license in order to protect the marine environment.[136] Domestic regimes differ on the specified responsibilities of contractors with regard to environmental impact.[137] Eleven signatory States' legislation provides for robust monitoring and supervision of activities, but this list does not included Russia.[138]

Though the United States is not currently a signatory to UNCLOS, its domestic law reflects many of the principles espoused by the Convention.[139] The United States' laws concerning deep-sea mineral mining are contained in 30 U.S.C. §§ 1401-1472, also known as the Deep Seabed Hard Mineral Resources Act, and 15 C.F.R. Part 970, which

130. *Id*. Germany, the United Kingdom, France, Japan, and Italy adopted similar legislation from 1982-1985. *Id*. Russia, Germany, New Zealand, and the Czech Republic adopted similar legislation after the ITLOS advisory opinion from 1994 to 2000. *Id*. at 6.

131. *Id.* at 10-14.

132. *Id.* at 18.

133. *Id.*

134. *Id.*

135. *Id.*

136. *Id.* at 14.

137. *Id.* at 15-16. Fiji and Nauru, for example, require that contractors not dump minerals material or waste, while China and Germany explain that contractors must "[p]rotect the marine environment in the Area."

138. *Id.* at 17.

139. The United States adopted domestic regulations prior to UNCLOS creation and in subsequent law highlighted "the principle that the hard mineral resources of the deep seabed are the common heritage of mankind . . . [ensuring] nondiscriminatory access to such resources for all nations." 15 C.F.R. § 970.100(b)(1) (2021).

explains licensing procedures.[140] License approval in the United States is controlled by the National Oceanic and Atmospheric Administration (NOAA).[141] The regulatory approach is a flexible one, allowing NOAA to issue separate regulations in recognition of the evolving nature of the deep-sea mining industry.[142]

In a puzzling break with the spirit of flexibility, however, current regulations explain that the effects of destruction of benthos, blanketing off benthic fauna and dilution of the food supply, and surface plume effects on fish larvae are not expected to be significant.[143] The final part of that regulation explains that administrators will rely on the environmental conclusions outlined in the code when assessing site specific environmental impact statements.[144]

As will be discussed later in this paper, these domestic regulatory regimes have not yet been tested under changing incentives that might be associated with large-scale mining commercialization. The differences in domestic regulatory regimes signal that States may be taking incongruous approaches to deep-sea mineral mining and that such differences may result in varied practices. Though the ISA has encouraged States to adopt national legislation to assist in enforcing both the rules and the principles of UNCLOS, we already see potential issues with future enforcement.[145] Absent a robust enforcement mechanism at the international level, effective management of deep-sea mineral mining may be tenuous.

2. Differences in Regulatory Regimes May Lead to Regulatory Arbitrage and a Race to the Bottom

As outlined above, differing environmental standards alone may make deep-sea mineral mining licenses easier to obtain in countries with less stringent regulations as opposed to ones where environmental regulations could serve to limit license sponsorship and issuance. This creates an

140. 30 U.S.C. §§ 1401-72 (2021); 15 C.F.R. pt. 970 (2021).
141. 30 U.S.C. §§ 1403(12), 1412(a) (2021).
142. 15 C.F.R. § 970.100(c) (2021).
143. *Id.* at § 970.701(b)(2).
144. *Id.* at § 970.701(c).
145. *See, e.g.,* INT'L SEABED AUTH., *supra* note 124, at 15, 18. Russia, for example, explicitly mentions in its domestic regime that contractors will receive the full protection of the Russian government when conducting their activities and only generally mentions environmental protections, while states like the United Kingdom make environmental protection a prerequisite for licensing. *Id.* Thus, if required to revoke a license for a contractor's breach, of either the sponsoring state's law or the ISA, such enforcement may vary by state.

incentive for large mining corporations to shop for an optimal sponsoring State when seeking to begin the licensing process. Because environmental impacts of large-scale efforts are not yet known as there have yet to exist any large-scale mining efforts, there is not yet an incentive for corporations to engage in this type of regulatory arbitrage. If regulatory arbitrage does occur once deep-sea mineral mining becomes economical and begins in earnest on a large-scale, it is possible that countries will be incentivized to lower environmental standards in the licensing process in order to retain or attract corporations.

Additionally, early State sponsorship of mining activities in countries like China suggests that the government, in anticipation of lowering standards of other countries, would seek to anticipatorily lower their standards. In short, the pressure to maintain supremacy and access in the industry may incentivize countries to engage in a race to the bottom, where participating States apply bare minimum regulations at the expense of environmental or other standards.[146]

The joint venture structure suggests that smaller countries will have the same incentives as wealthier countries to engage in such deregulation. This structure is also a mechanism by which to transform such deregulation into increased mineral access. Joint ventures in the deep-sea mining space may take a number of different forms. One method may be for corporations to engage in profit-sharing agreements with local governments when the target minerals are in that country's territorial waters. Another form, however, may be incorporation in a certain country, or agreement with a sponsoring State, as the starting point for seeking an exploratory license from the ISA.

In 2011, Papua New Guinea (PNG) awarded a deep-sea mineral mining contract to Nautilus Minerals for the extraction of copper and gold

146. Though studies in certain cases claim that regulations have not affected economic growth and thus did not negatively affect competitive advantage, a portion of these studies focused on Clean Air Act regulations and not on circumstances comparable to deep-sea mineral mining licensure programs. *See, e.g.*, CARL A. PASURKA & DEBORAH VAUGHN NESTOR, THE U.S. ENVIRONMENTAL PROTECTION INDUSTRY: A PROPOSED FRAMEWORK FOR ASSESSMENT (U.S. Env't Prot. Agency 1992), https://www.epa.gov/sites/default/files /2017-09/documents/ee-0217a-1.pdf [https://perma.cc/P7R3-HKRT]. It is more likely in this case that since regulations directly affect a state's ability to remain competitive in the international space by gaining access to minerals, the likelihood of a regulatory race to the bottom will also be increased. *See* Richard B. Stewart, *Environmental Regulation and International Competitiveness*, 102 YALE L.J. 2039, 2059 (1993) (describing an environment where countries lower regulations in an attempt to gain competitive advantage over others).

at Solwara 1, a site off the coast of New Ireland.[147] The project was ultimately a failure as the company went into bankruptcy in 2019 after facing local and international opposition paired with a series of operational setbacks.[148] The PNG government retained a 15% stake in the venture, which resulted in $24 million of debt after Nautilus failed.[149] After the collapse of the Solwara 1 project, other island nations, including Fiji and Vanuatu, called for a 10-year moratorium on deep-sea mining efforts.[150]

Granted, this venture took place in PNG's territorial waters, but this does not necessarily mean that ventures with similar characteristics will not take place in the deep ocean. Generally speaking, there exist strong tax- and regulation-based incentives for corporations to incorporate or operate out of certain localities or countries.[151] The deep-sea mining industry may become subject to a similar set of incentives.

As will be explained later in detail, the ISA has promulgated rules governing exploratory license issuance. These rules dictate that signatory countries must develop their own domestic regulations and licensing procedures for deep-sea mining. Though many of these regulatory regimes are similar, it is unclear whether further, more comprehensive regulatory schemes sought by individual member States will incentivize all States to enact identical regulations.[152] In the absence of uniform domestic regulations, mining companies will be incentivized to seek licenses in countries with more relaxed regulations. Additionally, the joint venture structure incentivizes poorer countries to adopt more relaxed regulatory regimes to attract joint venture opportunities for mining companies.

For example, if the United States, Germany, or China were to impose stricter environmental regulation regimes, corporations interested in deep-sea mining activities could incorporate in countries that adopt a "bare minimum" approach to compliance with ISA requirements. A similar

147. John Childs, *Greening the Blue? Corporate Strategies for Legitimizing Deep Sea Mining*, 74 POL. GEOGRAPHY 1, 3 (2019).

148. Amanda Stutt, *Nautilus Minerals Officially Sinks, Shares Still Trading,* MINING DOTCOM, (Nov. 26, 2019, 3:38 PM), https://www.mining.com/nautilus-minerals-officially-sinks-shares-still-trading/ [https://perma.cc/XD95-3XH5].

149. *Id.* This was an amount the PNG government was unable to recover from Nautilus Minerals in bankruptcy.

150. *Collapse of PNG Deep-Sea Mining Venture Sparks Calls for Moratorium*, THE GUARDIAN, https://www.theguardian.com/world/2019/sep/16/collapse-of-png-deep-sea-mining-venture-sparks-calls-for-moratorium [https://perma.cc/QE37-U8UL] (last visited Mar. 21, 2021).

151. *See*, *e.g.*, Julia Simon, *Liberia's 'Flags of Convenience' Help it Stay Afloat,* NPR (Nov. 7, 2014, 4:19 PM), https://www.npr.org/2014/11/07/362351967/liberias-flags-of-convenience-help-it-stay-afloat [https://perma.cc/4QP2-55G4].

152. *See, e.g.*, INT'L SEABED AUTH., *supra* note 124, at 9-18.

incentive might also exist for domestic tax regimes. Thus, without a uniform update to domestic deep-sea mining regulation regimes, it is possible that the industry may adopt norms similar to the cruise ship industry's "flags of convenience."[153]

Because the licensing process under the ISA's Mining Code involves sponsorship from a signatory state, the joint venture model may, unintentionally, be an effective vehicle for promoting an opportunistic approach to deep-sea mining.[154] In order to secure profitable arrangements, smaller nations may be incentivized to underregulate in order to procure joint venture agreements with mining companies. This is not to say that stricter domestic licensing regimes are not necessary. Rather, it suggests that the international regulatory regime needs to be robust enough to enforce uniform adherence to UNCLOS standards. And such regulations need to be more effective than previous United Nations' attempts at affecting land-based mining efforts in the DRC. Relying solely on uniform updates to domestic regulatory regimes implicitly includes the expectation that countries will overlook self-interest. Such evidence supports the contention that a robust mechanism for international enforcement is necessary to override these incentives.

III. MULTILATERAL PROBLEMS AND SOLUTIONS: CHARACTERISTICS OF DEEP-SEA MINERAL MINING AND WHY IT REQUIRES AN INTERNATIONAL REGULATORY REGIME

As previously discussed, differences in domestic regulatory regimes create the risk of regulatory arbitrage and a race to the bottom. One mechanism for avoiding such risk is multilateral agreements. At times, these agreements suffer from enforceability issues, where collaboration between nations may occur at the outset, but the ultimate regulatory aims do not have the intended effects on the target industry.

This section analyzes various theories explaining the genesis stories surrounding international agreements and how certain types of agreements endure. Further, this section explores the manner in which international agreements interact with one another in order to obtain enforceability across seemingly unrelated regulatory efforts. Regardless of the manner in which, or the reasons for which, countries enter into agreements, enforceability of those agreements should be the measure of efficacy. Though some current structures might provide a blueprint from which deep-sea mineral mining regulations may be modeled, it is unknown

153. Simon, *supra* note 151.

154. *See* INT'L SEABED AUTH., *supra* note 124, at 13.

whether future individual national interest may override those enforcement mechanisms. More specifically, whereas international trade agreements provide enforcement mechanisms to deter unwanted behavior, it is unclear whether a similarly structured deep-sea mineral mining regime will serve as an effective deterrent.

A. Current International Structures Regulating Deep-Sea Mineral Mining

1. The United Nations and The International Seabed Authority

On December 10, 1982, the United Nations Convention on the Law of the Sea (UNCLOS) was opened for signature.[155] This agreement placed fifty percent of the world's seabed under international jurisdiction in order to protect interests of "geographically disadvantaged States, and small island developing States that are heavily reliant on the ocean and its resources for economic development."[156] The Convention declared in its preamble that the "ocean floor and the subsoil thereof . . . as well as its resources, are the common heritage of mankind, the exploration and exploitation of which shall be carried out for the benefit of mankind as a whole."[157] Starting with Article 136, Section 2, UNCLOS sets forth requirements for deep-sea mineral mining exploration and the responsibilities of signatories.[158] Among these imperatives is Article 145, which states that necessary "measures shall be taken . . . to ensure effective protection for the marine environment from harmful effects which may arise from" deep-sea mineral mining.[159]

In addition to establishing principles and preliminary limits on deep-sea mining, UNCLOS also established the International Seabed Authority (ISA), the Commission on the Limits of the Continental Shelf (CLCS), and the International Tribunal for the Law of the Sea (ITLOS).[160] The ISA

155. UNCLOS, *supra* note 10.

156. Michael Lodge, *The International Seabed Authority and Deep Seabed Mining*, UN CHRONICLE https://www.un.org/en/chronicle/article/international-seabed-authority-and-deep-seabed-mining [https://perma.cc/2BUN-CVM4] (last visited Mar. 21, 2021).

157. UNCLOS, *supra* note 10, at 25.

158. *Id.* at 70.

159. *Id.* at 73.

160. Lodge, *supra* note 156. Though these structures are the official organizations vested with the authority to enact regulations concerning the Area, dynamics in international law do not make these institutions immune from the actions of outside actors. *See*, *e.g.,* Julia Conley, 'Momentous' Moratorium on Deep-Sea Mining Adopted at Global Biodiversity Summit, ECOWATCH (Sept. 11, 2021) https://www.ecowatch.com/deep-sea-mining-moratorium-2654975897.html [https://perma.cc/N86L-9VUN]. Such collective action

is primarily responsible for regulating "exploration for and exploitation of deep seabed minerals."[161] As of 2017, the ISA had issued twenty-nine exploration contracts covering more than 1.3 million square kilometers of ocean floor.[162] Today, the number of contracts is thirty.[163] Although the ISA has established a regulatory framework for exploration, the complete mining code has yet to be codified.[164]

In its draft environmental regulation, the ISA requires applicants, among other things, to provide an environmental impact statement.[165] After an application is completed and submitted, the environmental plans are posted to the ISA's website for sixty days to allow signatories and other stakeholders to submit comments.[166] The ISA directs that the environmental impact statement a party submits as part of an application must include "an impact analysis to describe and predict the nature and extent of the Environmental Effects of the mining operation."[167]

UNCLOS's broad declarations, supported by signatories, may face an uncertain future without uniform adherence to those standards by all countries engaged in mining. For example, although 157 nations were signatories to UNCLOS, the United States is conspicuously absent.[168] Thus, the United States is not a party to many of the agreements or

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outside the walls of the United Nations may be sufficient in some cases to affect policy decision-making. W. Michael Reisman, *The View from the New Haven School of International Law*, 86 PROCEEDINGS OF THE AMERICAN SOCIETY OF INTERNATIONAL LAW 114TH ANNUAL MEETING 118, 122 (1992) ("In international decision, the observer must examine, in addition to formal international organization, state officials, nongovernmental organizations, pressure groups, interest groups, gangs, and individuals, who act on behalf of all other participants and on their own."). Thus, collective decisions with symbolic appearance, as seems to be the case with the Global Biodiversity Summit, may indeed influence policy decisions at the International Seabed Authority and the United Nations generally.

161. Lodge, *supra* note 156.

162. *Id.*

163. *Exploration Contracts*, INT'L SEABED AUTH., https://www.isa.org.jm/index.php/exploration-contracts [https://perma.cc/4SHD-KXB8] (last visited Sept. 29, 2021).

164. *The Mining Code*, INT'L SEABEAD AUTH., https://www.isa.org.jm/mining-code [https://perma.cc/2Z2K-LBJ6] (last visited Sept. 29, 2021).

165. INT'L SEABED AUTH., DRAFT REGULATIONS ON EXPLOITATION OF MINERAL RESOURCES IN THE AREA 14 (Mar. 22, 2019) https://isa.org.jm/files/files/documents/isba_25_c_wp1-e_0.pdf [https://perma.cc/Y6GY-EEN2].

166. *Id.* at 16.

167. *Id.* at 37.

168. Will Schrepferman, *Hypocri-sea: The United States' Failure to Join the UN Convention on the Law of the Sea,* HARV. INT'L REV., (Oct. 31, 2019), https://hir.harvard.edu/hypocri-sea-the-united-states-failure-to-join-the-un-convention-on-the-law-of-the-sea-2/ [https://perma.cc/U4NL-SQ6Z].

regulations concerning the deep ocean or deep-sea mineral mining under the ISA. The U.S. Constitution allows the President to enter into international agreements and treaties with the approval of two-thirds of the Senate.[169] The prospect of joining the Convention was first raised during President Clinton's administration, but the Senate has never ratified U.S. involvement in any such agreement.[170] Reasons for failure to ratify may vary, but the lack of U.S. involvement may signal an uncertain future for the enforceability of international standards for deep-sea mining in the future. Ultimately, U.S. domestic law concerning mineral mining reflects many of the values espoused by UNCLOS, but lack of commitment to the agreement raises questions of enforceability.

2. The International Tribunal for the Law of the Sea

The International Tribunal for the Law of the Sea (ITLOS) is an independent judicial body vested with the authority to adjudicate disputes that involve interpreting the Convention.[171] Within ITLOS, the Seabed Disputes Chamber, typically consisting of eleven judges, has the authority to adjudicate disputes relating to deep-sea mining activities.[172] ITLOS also has the authority to issue advisory opinions.[173]

One such advisory opinion in 2011 concerned the "responsibilities and obligations of states sponsoring persons and entities with respect to activities in the area."[174] Much of the Tribunal's explanation of the Convention's language puts responsibility on member states for environmental assessments and environmental monitoring of the effects of mining activities.[175] The Tribunal stated that the "sponsoring State is under a due diligence obligation to ensure compliance by the sponsored contractor with this obligation."[176] Outside of the responsibilities outlined in UNCLOS, the Tribunal also explained that it is now generally considered a requirement in customary international law that organizations

169. U.S. CONST. art. II, § 2.

170. 60 MINUTES, *supra* note 9.

171. *Competence*, *Jurisdiction of the Tribunal*, ITLOS, https://www.itlos.org/en/main/jurisdiction/competence/ [https://perma.cc/5ASE-N8YX] (last visited Sept. 30, 2021).

172. *Id.*

173. *Id.*

174. ITLOS, RESPONSIBILITIES AND OBLIGATIONS OF STATES SPONSORING PERSONS AND ENTITIES WITH RESPECT TO ACTIVITIES IN THE AREA (Advisory Opinion of Feb. 1, 2011), https://www.itlos.org/fileadmin/itlos/documents/cases/case_no_17/17_adv_op_010211_en.pdf [https://perma.cc/CBG2-9XWK] [hereinafter ITLOS Advisory Opinion of Feb 1, 2011].

175. *Id.* at 43-46.

176. *Id.* at 43.

"undertake an environmental impact assessment where there is a risk that the proposed industrial activity may have a significant adverse impact in a transboundary context, in particular, on a shared resource."[177] Ultimately, the Tribunal expanded State responsibilities explaining that "the obligations of the contractors and of the sponsoring State concerning environmental impact assessments extend beyond the scope of application of specific provisions of the Regulations."[178]

A fundamental feature of the Seabed Disputes Chamber is flexibility. Depending on the nature of the controversy, disputants can choose a third-party forum for adjudication.[179] If a case concerns the interpretation of a mining contract, parties can submit the dispute to an ad hoc three-member panel for commercial arbitration.[180] If a dispute relates to production subsidization, parties may submit to arbitration under the WTO dispute settlement process.[181]

Seabed Dispute Chamber orders face difficulty in enforcement, however. One of the primary vehicles to enforce a judgment involves attaching property. Because the Seabed disputes chamber is not a constitutional court and because the Convention allows for State immunity from liability, ITLOS orders may be unenforceable in national courts.[182] If ITLOS decisions do not have their own compelling enforcement mechanisms independent of actions by individual States, the United Nations, through the ISA, might necessarily be required to call on member States to assist. Yet individual States would be unable, through their own domestic regulatory regimes, to achieve desirable outcomes, as was observed in the United States' attempt to influence domestic mining conditions in the DRC.

In all, ITLOS is a new international adjudicatory body that operates across a number of different regimes with a seemingly broader charter than other international courts.[183] Specifically relating to the Seabed Disputes Chamber, enforceability of decisions remains an outstanding question. As this comment later argues, the flexible nature of ITLOS should be leveraged to fill the enforceability gap by utilizing already existing precedent within the ITLOS and WTO dispute settlement structures to create a trade-related remedy for deep-sea mineral mining cases.

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177. *Id.* at 45 (citing I.C.J. in its judgment in Pulp Mills on the River Uruguay. *Id*.).

178. *Id.* at 46.

179. John E. Noyes, *The International Tribunal for the Law of the Sea*, 32 CORNELL INT'L L J. 109, 138 (1999).

180. *Id.*

181. *Id.* at 138-39.

182. *Id.* at 171.

183. *Id.* at 140.

This mechanism is different from subsidy adjudication at the WTO because deep-sea mineral mining subject matter would be most appropriately adjudicated within the Seabed Disputes Chamber. As will be later discussed, the inclusion of non-trade related subject matter within the WTO process is not novel. The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) was brought under the auspices of the WTO in 1994, in part to take advantage of the great enforcement power inherent to international trade tribunals.[184] A similar approach may be possible for deep-sea mineral mining.

B. The Transnational Legal Process and Deep-Sea Mineral Mining

Generally, most countries observe principles of international law and agreements most of the time.[185] One theory for why international agreements can be binding is based on national interest and identity.[186] Harold Koh, one of the leading experts in public and private international law in the United States, argues that this binding force is more readily explained by (1) the interaction between nations; and (2) domestic internalization of international norms.[187] In part, violating international norms creates friction between countries, making future participation in international agreements more difficult.[188] Thus, country leaders may shift non-compliant behaviors to ones of compliance in order to avoid such friction.[189] These shifts are then codified in domestic law, this being an internalization of international law that permeates domestic legal and political structures through legislation, executive action, and judicial decisions.[190] Finally, international norms become enmeshed in domestic policy decision-making through this process.[191]

Koh's theory accounts for rogue states who invariably will have to participate in the international community. Through these same mechanisms, such states will be drawn into general compliance with

184. Allison Cychosz, *The Effectiveness of International Enforcement of Intellectual Property*, 37 J. MARSHALL L. REV. 985, 992-93 (2004).

185. Harold H. Koh, *Transnational Legal Process*, 75 NEB. L. REV. 181, 194 (1994).

186. *Id.* at 199.

187. *Id.*

188. *Id.* at 203.

189. *Id.* at 204.

190. *Id.*

191. *Id.* (citing Robert O. Keohane, *Compliance with International Commitments: Politics Within a Framework of Law*, 86 PROCEEDINGS OF THE AMERICAN SOCIETY OF INTERNATIONAL LAW 114TH ANNUAL MEETING 176, 176-180 (1992)).

international norms.[192] Ultimately, the theory of the transnational legal process predicts that nations will come into compliance with international norms as a result of interactions with other nations.[193]

Koh's theory puts a gloss on the mechanisms that push nations back into compliance with international norms, however. Though scholars disagree about the efficacy of the dispute resolution process at the WTO, some data suggests that countries largely comply with WTO decisions.[194] WTO member States largely remain in compliance with trade agreements whether it be the result of settlement negotiations or adherence to adverse WTO decisions.[195]

One example of specific mechanisms at play involved the extraterritorial kidnapping of Humberto Alvarez-Machain by the United States.[196] The Supreme Court held that the abduction was justified because it was not in violation of the extradition agreement between the United States and Mexico, but this was not the final word on the matter.[197] The abduction earned much criticism from the media and the international community, ultimately leading to congressional hearings, and a review of Department of Justice policy on transborder kidnappings.[198] Under the

192. *Id.* at 205.

193. *Id.* at 206. Environmental compliance procedures under the ISA Mining Code adhere, in part, to the transnational legal process principles mentioned in Koh's article. The opportunity for signatory nations to provide feedback on environmental impact assessments might provide an opportunity to bring potentially non-compliant nations back into compliance during the licensing issuing process. What this process does not address, however, is licensee actions after a license is issued, which are not necessarily governed by the same mechanism.

194. William J. Davy, *Compliance Problems in WTO Dispute Settlement*, 42 CORNELL INT'L L.J. 119, 119 (2009) ("[a] recent examination of the implementation record of WTO decisions for the first ten years of WTO dispute settlement found a compliance rate of 83%"). *But see* Edward Lee, *Measuring TRIPS Compliance and Defiance: The WTO Compliance Scorecard*, 18 J. INTELL. PROP L. 401, 403 (2011) ("[s]ome commentators extol the success of the WTO dispute system in securing an excellent compliance record in adjudicated decisions, particularly when compared to the prior GATT system [while others], however, believe the WTO system is deeply flawed or ineffective for any number of reasons.") (internal citations omitted).

195. Debra P. Steger & Susan M. Hainsworth, *The First Three Years*, 1 J. INT'L ECON. L. 199, 204 (1998) ("One of the most desirable developments since the establishment of the WTO has been the increased propensity of parties to reach mutually agreed solutions to disputes. The binding nature of decisions, the short timeframes, the automaticity of the steps in the process and the strengthened mechanisms for surveillance and enforcement of rulings all contribute to the mutually acceptable resolution of disputes.").

196. Koh, *supra* note 185, at 195-96. This case came to the United States Supreme Court in *United States v. Alvarez-Machain*, 504 U.S. 655 (1992).

197. United States v. Alvarez-Machain, 504 U.S. 655, 670 (1992).

198. Koh, *supra* note 185, at 195-96.

pressure of North American Free Trade negotiations, Secretary of State Warren Christopher announced an amendment to the U.S.-Mexico extradition agreement that would ban transborder kidnappings.[199] Ultimately, the positive incentives associated with a liberalized trade agreement between two countries incentivized a return to compliance with international norms.

Another example involved the extraterritorial return of refugees from Haiti and Cuba.[200] In 1992, the United States, in violation of Article 33 of the 1951 United Nations Refugee Convention Relating to the Status of Refugees, began returning refugees found on the high seas.[201] The Supreme Court upheld the executive action, but again this was not the final word.[202] In 1994, after receiving pressure from the United Nations, various human rights groups, and the Congressional Black Caucus, President Clinton reversed this policy.[203] This time, a return to compliance was not achieved through trade related mechanisms, but through domestic interests in complying with international human rights norms.

Another theory suggests that states will act in their own interest and that compliance with international norms is a result of either coincidence of interest, coercion, cooperation, or coordination.[204] Goldsmith and Posner's theory of cooperation and the multilateral prisoner's dilemma is particularly apropos to deep-sea mineral mining.[205] In a multilateral setting, efficacy of, and compliance with, a norm relies on each State's ability and willingness to punish those who violate the terms of a treaty in addition to punishing States who fail to punish those violating States.[206] Compliance can be systematized by establishing international institutions or multilateral treaties, which increase transparency of international relations, ultimately making it easier to identify and punish cheaters.[207]

Goldsmith and Posner's suggestion that States will act in their own interest and that such action, if it results in a multilateral agreement, is the result of a coincidence of interests may explain, in part, some of the

199. *Id.* at 196.
200. *Id.*
201. *Id.* at 196-97.
202. *Id.* at 197.
203. *Id.* at 197-98.
204. *See* JACK L. GOLDSMITH & ERIC A. POSNER, THE LIMITS OF INTERNATIONAL LAW 27-32 (2005).
205. *Id.* at 29, 87.
206. *Id.* at 87. Goldsmith and Posner explain that WTO efficacy is largely attributable to the fact that States are willing to retaliate against non-compliance if other States violate their obligations. *Id.* at 162.
207. *Id.* at 86.

dynamics at play during the signing of UNCLOS. The 1985 Helsinki Protocol serves as a comparable example of some of these forces.[208] This agreement was intended to reduce instances of acid rain by addressing sulfur dioxide emissions.[209] Though signatories met emission reduction goals in the specified time, it is possible that this agreement only codified what countries had already planned to do.[210] As evidence of this, the behavior of non-signatory States also matched that of signatory States.[211] Put simply, the Helsinki Protocol may not have compelled any changes in behavior, but rather the agreement may have only codified emissions reduction goals that were policy targets already included in domestic policy regimes. Similarly, it is possible that States agreed to UNCLOS's provisions out of a coincidence of interests, but that no State did so at either the sacrifice or benefit of their own interests as deep-sea mineral mining had still yet to occur.

As discussed in section IV(A) regarding domestic policy regimes, and in light of legislative action prior to the passage of UNCLOS, it is possible that the Convention may have simply codified an already existing sentiment in many States. The Helsinki Protocol is further applicable to UNCLOS, because domestic legislative action was initiated by the United States, a non-signatory to the Convention. Thus, a possible explanation for UNCLOS is that the agreement captured the assent of many nations who were already so inclined, thus making a public display of their virtue. It could be interpreted as an international agreement that levied no cost on signatories. Future commercialization may adjust that calculus.

With regard to international environmental treaties, another theory identifies five requirements, all of which must be met, in order for the treaty to succeed.[212] First, treaties need to create an aggregate gain that provides a reason for states to begin negotiations and ultimately become parties to the agreement.[213] Second, the gains of the agreement have to be distributed between states so that each state shares in the success of the agreement.[214] Third, the treaty must ensure countries would lose by not participating.[215] Fourth, the treaty must provide incentives for all parties to

208. *See id.* at 8-10.
209. *See id.*
210. *Id.* at 10.
211. *Id.*
212. SCOTT BARRETT, ENVIRONMENT AND STATECRAFT: THE STRATEGY OF ENVIRONMENTAL TREATY-MAKING 33 (2003).
213. *Id.*
214. *Id.*
215. *Id.*

comply with the treaty.[216] And fifth, the treaty must deter entry by third parties.[217] Though UNCLOS and the ISA arguably satisfy the first three conditions, a future multilateral agreement may be necessary to ensure States are properly incentivized to comply with the treaty and that third parties are deterred from entering into deep-sea mining activities.

As already discussed, the Convention's regulations as applied to deep-sea mineral mining have not yet been tested by changes in incentives associated with commercialization. Treaties concerning agreements on regulation of common goods and environmental protections can serve to reframe state interests, however.[218] This initial agreement, and shift in perception, provides a foundation to begin the iterative process of creating international norms.[219]

UNCLOS and the ISA's Mining Code may have been the first steps in codifying existing sentiment with regard to regulating deep-sea mineral mining, but they ought not be the final word. Rather, they represent a first step in the evolutionary process of deep-sea mineral mining regulation. The next step necessarily needs to include mechanisms by which to incentivize, or compel, membership to the agreement and adherence to international standards for mining.

C. Possible Mechanisms for Enforcing ITLOS Orders

UNCLOS signatory States are currently engaged in a multilateral prisoner's dilemma, except the unknown variables are the values associated with non-compliance. Though States will enter into agreements because on balance they will gain more than they will lose, changes in, or creation of, new international norms is the product of changes in payoffs that create a conflict of interests.[220] More specifically, States will violate treaties if their interests are strong enough to outweigh their sense of obligation.[221]

The future expected change in payoffs will likely be associated with commercialization of deep-sea mineral mining. Once economically viable, State, and corporate, payoffs associated with compliance may adjust. If such an adjustment occurs in the absence of an effective system to punish non-compliance, it is possible that UNCLOS and ISA principles will

216. *Id.*
217. *Id.*
218. *Id.* at 11.
219. *Id.* at 17-18.
220. GOLDSMITH & POSNER, *supra* note 204, at 41.
221. *Id*. at 83.

morph into a new set of international norms redrawn by signatory States to suit the changed conditions.[222] The absence of a robust regime for enforcing ITLOS orders only adds to these concerns.[223]

International norms can be enforced in the absence of multilateral treaties and official structures, but such an absence leaves open the possibility of piecemeal application of regulations. The most prevalent examples of this phenomenon evince a collision of national interests rather than actions by individual states seeking to compel others to adhere to norms for effective management of natural resources in the commons. For example, internationally unpopular military action taken by one country may result in trade barriers and other sanctions as an attempt to force course correction.[224] Applied to deep-sea mineral mining, this type of enforcement would require one State's actions to so diametrically oppose another's that the other State would be willing to retaliate. The attenuated nature of mineral access creating adverse consequences for another State does not appear to provide a solid footing upon which to construct an international regulatory regime. Thus, relying on unstructured international retaliation to unilateral state action will likely be insufficient for the purposes of enforcing deep-sea mineral mining interests. Put simply, non-compliant behavior by one state may not generate significant enough of an incentive for another state to raise trade barriers or impose sanctions unilaterally, and relying on such action may lead to a lack of uniformity in regulatory enforcement.

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222. *See id*. On the other hand, Goldsmith and Posner do suggest that when States' legislatures adopt international treaties as law, they may be increasing the likelihood of compliance with the terms of the treaty. *Id.* at 92-93. As discussed in the section regarding national legislation relating to deep-sea mineral mining, many states, including the U.S., have adopted similar legislation, which signals some degree of resolve in complying with UNCLOS and ISA norms, but again, those norms have not yet been tested under what appear to be inevitable changes in circumstances.

223. JULIA BROWER, ET AL., UNCLOS DISPUTE SETTLEMENT IN CONTEXT: THE UNITED STATES' RECORD IN INTERNATIONAL ARBITRATION PROCEEDINGS 6-7 (Dec. 10, 2012) https://law.yale.edu/sites/default/files/documents/pdf/cglc/yale_law_school_-_unclos_and_arbitration.pdf [https://perma.cc/M8X6-RRKU] (signatory states must undertake "a good faith obligation . . . to comply with a decision.").

224. This was the case when Russian military action against Ukraine resulted in U.S. sanctions. *See* CONG. RSCH. SERV., IF10779, U.S. SANCTIONS ON RUSSIA: AN OVERVIEW (2020). This has also been the United States' general approach to compel countries like Cuba and North Korea to comply with international norms. *See* Eleanor Albert, What to Know About Sanctions on North Korea, COUNCIL ON FOREIGN RELATIONS (July 16, 2019) https://www.cfr.org/backgrounder/what-know-about-sanctions-north-korea [https://perma.cc/Q7M5-YYDF].
Such action by the U.S. is more an attempt to balance power regionally as opposed to protect the integrity of international agreements on the management of natural resources.

Enforceability of ITLOS judgments may become tenuous if there is not substantially a greater incentive for compliance over non-compliance. The ISA and ITLOS may have to venture outside the four walls of UNCLOS in order to create incentives that make compliance the most attractive solutions for individual countries. Different from the general manner in which countries interact with each other and seek to compel compliance on an ad hoc basis, regulation of the deep ocean would best be served if systematized and directly related to international trade.[225]

To date, ITLOS has rendered decisions in contentious cases relating primarily to territorial waters and vessel disputes.[226] Cases regarding deep-sea mineral mining have been the providence of advisory opinions where signatory States have asked the Tribunal to interpret the Convention.[227] Thus, the enforceability of ITLOS orders in contentious cases regarding deep-sea mineral mining rights or proper use of exploratory licenses in general has not yet been tested. Without such an example, it is difficult to know whether signatories would be inclined to comply with adverse ITLOS judgments should they be issued. An argument based on the transnational legal process may show that non-complying countries will be brought back into compliance through their interaction with other countries, but this still leaves open the question: through what specific mechanism will this be achieved?[228]

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225. Deep-sea mineral mining as an activity supports extraction of materials used in products that enter the international market. This activity does not exist in a silo. The ultimate benefit a corporation, and the sponsoring state, realize is the value addition and sale of goods produced as a result of mineral extraction. Thus, an effective mechanism for compelling compliance could relate directly to either reducing or expanding the end-use benefit associated with the activity.

226. *Contentious Cases*, ITLOS, https://www.itlos.org/en/main/cases/contentious-cases/ [https://perma.cc/9HWD-VDGF] (last visited Feb. 6, 2021).

227. ITLOS Advisory Opinion of Feb. 1, 2011, *supra* note 174.

228. The PNG mining case shows that mobilization of similarly-minded groups against deep-sea mining efforts may be more robust than expected, although this may not necessarily be the case going forward. In that specific instance, opposition was certainly organized against Nautilus Minerals Ltd., but the company and the venture would likely not have been commercially viable even in the absence of opposition. *See* Colin Filer, et al., *How PNG lost US$120 million and the future of deep-sea mining*, DEVPOLICY BLOG (April 28, 2020), https://devpolicy.org/how-png-lost-us120-million-and-the-future-of-deep-sea-mining-20200428/ [https://perma.cc/3KWX-8A24]. The PNG government made a substantial investment in the company and, when Nautilus Minerals declared bankruptcy, lost nearly $120 million. Nautilus's early investment in pioneering the first major commercial operation faced difficulties aside from environmental and community opposition. If future projects are able to effectively address issues of commercial viability (i.e., effective equipment, lower operating costs, etc.), the reduction of barriers in general may make organized opposition less effective in general. In short, the organized opposition

As previously mentioned, sponsoring States have the obligation to assist the ISA in ensuring mining organizations comply with environmental best practices.[229] One concern could be that a country, through one of its corporations, engaging in mining operations may experience significant economic gains if they are able to skirt their original promises as they relate to environmental compliance or the geographical boundaries of a mining license.[230] A solution completely internal to the ISA may be an insufficient deterrence to avert non-compliance. Other mechanisms, like sanctions from other countries or trade retaliation, might more readily deter such action.

In a hypothetical example of such a systematized mechanism, a country extracting cobalt and nickel from the ocean floor, might experience greater economic gain if they disregard their environmental responsibilities by releasing sediment plumes in excess of their approved impact assessment or by conducting operations outside the boundaries of their license. Any state could be authorized to bring a complaint claiming injury for such action. If the claim is successful, ITLOS could issue an adverse judgement that would be redeemable at the WTO. The WTO could then authorize retaliation in the form of tariff increases on the violating country. Such increases would relate to products produced with the mined minerals, or any benefit accrued depending on what portion of the value the country is operating in, and would offset the gain the violating country would have realized by noncompliance. Such a mechanism would reduce the potential gain that country would experience by violating their original agreement and would draw them back into compliance. In short, non-compliance would result in no net gain for a country.

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to the Nautilus Minerals project in PNG may have been slightly overstated in its efficacy since many other issues existed with the project and it may have been doomed to fail even in the absence of any opposition from interest groups. Additionally, organization against the Solwara 1 project occurred on an ad hoc basis, which supports Harold Koh's theory of countries being brought back into compliance, but it does not provide an enduring mechanism for future issues that may occur with deep-sea mining projects. Put differently, effective opposition by advocacy groups in one setting does not mean that advocacy will be the solution in all settings. Relying solely on this structure and not a more systematized mechanism of known incentives actionable by national governments does not provide an enduring framework for assuring future compliance with environmental or geographical boundaries infractions of exploratory license holders.

229. ITLOS Advisory Opinion of Feb 1, 2011, *supra* note 174, at 44.

230. Domestic regulations that make such a concern prevalent primarily come from domestic regulations in countries like Russia where environmental constraints are vague and mining companies are promised the protection of the Russian government. INT'L SEABED AUTH., *supra* note 124, at 15.

This comment suggests three ways to approach such a solution: (1) creation of a new international agreement granting ITLOS the authority to adjudicate the mining claims, naming the WTO as the appropriate venue for redeeming the judgment; (2) an international agreement under the WTO structure granting partial or cooperative adjudicative authority to ITLOS; or (3) an international agreement placed entirely under the WTO structure that focuses exclusively on deep-sea mineral mining remedies.

As previously discussed, deep-sea mineral mining disputes involving subsidization claims can be brought to the WTO. This existing precedent is helpful in paving a partial path to ITLOS enforceability, but the cooperative solution suggested by the first two options above raises questions of comity between international tribunals, which may raise more questions than it answers. The more fitting and likely more actionable structure would look similar to TRIPS. The World Intellectual Property Organization (WIPO) is the primary structure under the United Nations dealing with intellectual property and it provides a venue for settlement negotiations and mediation.[231] However, because it lacks effective enforcement power, the WIPO recommends that IP holders seek remedies through remedies outside the WIPO structure.[232] TRIPS was a separate agreement brought under the WTO in 1994 to solve this problem. TRIPS is the only international agreement regarding intellectual property that includes a comprehensive section dedicated to enforcement.[233] Ultimately, TRIPS provides a venue for intellectual property owners to bring a complaint and receive a remedy through the WTO adjudicatory process.[234] A comparable approach may solve the enforceability issues with ITLOS.

Under such a structure, signatories, and non-signatories like the United States, would be empowered to enter into a treaty outside of the UNCLOS structure specifying norms for adjudication and retaliation, vesting adjudicatory power in the WTO. In any specific instance, this process may necessarily need to include a determination by the Seabed Disputes Chamber that a defendant violated the terms of UNCLOS, but final adjudication and the award of a remedy would be the providence of the WTO dispute settlement process. The WTO would engage in specific

231. *Settling Disputes and Enforcing IP Rights*, WORLD INTELL. PROP. ORG., https://www.wipo.int/sme/en/settle_ip_disputes/ [https://perma.cc/E2CX-DJPV] (last visited Nov. 14, 2021).

232. *Id.*

233. *Enforcement of Intellectual Property Rights,* WORLD TRADE ORG., https://www.wto.org/english/tratop_e/trips_e/ipenforcement_e.htm [https://perma.cc/4ZVS-BG3V] (last visited Mar. 21, 2021).

234. *Id.*

fact finding to determine the degree to which trade barriers could offset the gains a State realized by violating the terms of a mining license.

In short, the next evolutionary step for regulating deep-sea mineral mining must necessarily include an actionable mechanism to compel compliance with UNCLOS and ISA norms. Because the current structure does not grant ITLOS or the ISA the ability to punish non-compliance beyond license revocation, a new mechanism for enforcement must venture outside the traditional structure. Trade related remedies have experienced great success with compliance historically, and the precedent set by the existence of TRIPS provides a promising blueprint for what deep-sea mineral mining enforcement might look like in the future.

CONCLUSION

Domestic regulatory regimes and courts are ill-equipped to provide uniform enforcement of international norms, full redressability of injuries, or effective deterrence for violations of international norms. First, our experience with mineral mining, notably in the DRC, shows the limits of domestic regulation. Whether these regulations originated in the DRC or were regulatory responses by other countries answering the United Nations' call for assistance, the ultimate goals of these measures were not met. In fact, domestic regulatory regimes like the Dodd-Frank Act may have served to increase black market mining activity. The noticeable gap in the DRC example is effective enforcement of international norms by international organizations.

Though a potential solution would be absolute uniformity in domestic regulatory regimes, a much more actionable mechanism would be to create an enforceable international standard. Even in the presence of national regulatory uniformity, systematized international mechanisms for regulation enforcement will be necessary.

Second, with the United States as an example, redressability of harm created by future mineral mining activities may be severely limited to a level below that of the harm caused. This example shows that the traditional liability structure for maritime activities in Admiralty may be insufficient in order to offset harm created by mining operations. Increases in liability standards, done in a manner similarly to the Oil Pollution Act of 1990, might mitigate this concern.

Third, deep-sea mineral mining regimes require a robust, enforceable multilateral structure in order to account for foreseeable future dynamics. Both signatories and non-signatories seem to embrace UNCLOS's guiding principles, but adherence to this lofty ideal has yet to be tested under future changes associated with large-scale commercialization. Once deep-sea

mineral mining becomes economical, both corporate entities and sponsoring states will be highly incentivized to breach the ISA's Mining Code and UNCLOS's principles in order to maximize their own interests. In the absence of an effective mechanism to draw these actors back into compliance, such activities will continue, be it through disregard of environmental concerns or mining boundaries.

Currently, environmental concerns are largely hypothetical since studies do not conclusively prove the negative impacts mining activities will have. Nonetheless, implementing incentive programs and retaliatory measures is still possible in the absence of certainty. Put simply, we do not need to wait to discover the negative impacts of deep-sea mineral mining before establishing an effective system of enforcement.

Lastly, the absence of a strong system of enforcement does not mean that the originally negotiated terms of UNCLOS are a failure. Rather, the Convention and subsequent Mining Code ratified by the ISA are necessary steps in an evolutionary process inherent to international agreements. The next necessary step is to ensure a strong system of compliance so that all actors are incentivized to abide by international norms and to enforce such compliance in other States.