

The implications of seabed mining in the Area for the human right to health

Graham J. Hamley 

University of Strathclyde, Glasgow, UK

Correspondence

Graham J. Hamley, University of Strathclyde,
16 Richmond Street, Glasgow G1 1XQ, UK.
Email: graham.hamley@strath.ac.uk

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Abstract

As the prospect of seabed mining in the Area looms closer, much of the debate to date has focused on the prospects of economic gain versus environmental harm. This article contends that potential human health implications must also be considered, including threats to food safety and security and acceleration of global climate change. Through analysis of both scientific and legal literature, this article highlights several ways in which seabed mining may impact human health due to harm to marine biodiversity, threatening enjoyment of the right to health under international human rights law. Against this backdrop, this article reviews the draft regime for the exploitation phase of seabed mining, currently under development by the International Seabed Authority, and highlights two areas in which the regime is incompatible with the human right to health. These findings highlight potential for stronger alignment between the seabed mining and international human rights law regimes.

1 | INTRODUCTION

Once again, humanity finds itself in a position to exercise dominion over the natural world, as we hold the capacity to decide how and when to begin seabed mining in the Area.¹ This decision must be made with full awareness and consideration of the consequences. To date, much of the seabed mining narrative has focused on the trade-off between the promise of economic development and the risks of yet-unquantifiable environmental harm. However, there is one potential impact that has, so far, largely been ignored: the impact on human health. Specifically, this article argues that the harm that seabed mining can cause to marine biodiversity could yield knock-on implications for human health via risks to food safety and security and acceleration of global climate change.

There is an expanding body of literature that demonstrates the extent to which human health is dependent upon marine biodiversity and the ecosystem services that it provides (such as production of atmospheric oxygen or provision of food sources).² There is ample evidence to suggest that the impacts that seabed mining will have on marine biodiversity could also have knock-on implications for human health. Framed in human rights terms, seabed mining, through harm to marine biodiversity, has the potential to undermine enjoyment of the human right to health and lead to violations of international human rights law (IHRL).

The objectives of this article are therefore to highlight how the seabed mining regime has the potential to harm human health and, by extension, the enjoyment of the human right to health; and thus to analyse whether the draft regime for seabed mining in its current form is compatible with the right to health. Section 2 of this article demonstrates the connections between marine biodiversity and human health and highlights how seabed mining could disrupt this

¹Any references to seabed mining throughout this article refer to mining in the Area, and not within national jurisdiction. The 'Area' is defined in United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397 (UNCLOS) art 1(1) as 'the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction'.

²For an overview of marine ecosystem services, see EB Barbier, 'Marine Ecosystem Services' (2017) 27 *Current Biology* R507.

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relationship. Section 3 explains why protection of marine biodiversity is essential to fully realize the right to health and, on this basis, argues that States are subject to a series of obligations under the right to health concerning the governance of marine biodiversity. Finally, Section 4 showcases two areas in which the draft legal regime for seabed mining is currently misaligned with IHRL, thus presenting risks to both marine biodiversity and human health and, by extension, the enjoyment of the human right to health.

2 | UNDERSTANDING THE NEXUS BETWEEN HUMAN HEALTH, MARINE BIODIVERSITY AND SEABED MINING

In recent years, a body of literature has emerged regarding the interconnection between human health and biodiversity, including marine biodiversity.³ It is clear that marine biodiversity supports human health through the provision of essential ecosystem services, including provision of food,⁴ inputs for medical innovation,⁵ production of atmospheric oxygen⁶ and sequestration of atmospheric carbon.⁷ However, marine biodiversity is also capable of yielding negative health outcomes as a source of waterborne pathogens and food safety risks.⁸ Conversely, humans harm marine biodiversity through destructive fishing practices, extractive industries, marine plastic pollution and agricultural runoff, among other things. Moreover, the negative impacts that humans have on marine biodiversity can generate a negative feedback loop, whereby the more harm we cause to marine biodiversity, the more harm we suffer as a result. For example, pollution of the marine environment means that we are exposed to greater health risks from consumption of contaminated seafood. Thus, human health is intrinsically linked to the health of marine biodiversity. To add further cause for concern, recent scientific research reveals a high degree of connectivity between marine ecosystems, both horizontally and vertically within the water column, meaning that disturbances to marine biodiversity in areas beyond national jurisdiction can have significant implications for coastal marine ecosystems and human communities dependent on them.⁹ This, in turn, means that the magnitude of risk to human health is not contingent on physical proximity to the drivers of harm to marine biodiversity. These findings are aligned with broader trends in recent decades towards the adoption of integrated

environmental management models such as the ecosystem approach and the One Health approach. Based on advancing scientific understanding of ecosystem connectivity and the specific drivers of harm discussed in the remainder of this section, it is logical to conclude that seabed mining in the Area has the potential to yield negative health outcomes on a global scale, as a result of its impact on marine biodiversity. It is for this reason, among others, that this article focuses on the potential health impacts of seabed mining in the Area, rather than in areas under national jurisdiction—to prevent geographic proximity from being seen or used as grounds to discount thorough consideration of public health risks in decision making concerning seabed mining in the Area.

At present, the precise environmental and health impacts of seabed mining are shrouded in uncertainty, due to limited understanding of both the deep-sea environment generally and the specific infrastructure that will be used for extraction of seabed resources. Nonetheless, from the available literature on the projected environmental impacts of seabed mining, one can discern at least three potential pathways for environmental harm to negatively impact human health. One of the primary anticipated environmental impacts of seabed mining is its impact on marine life (particularly migratory fish stocks) and fisheries.¹⁰ Seabed mining is anticipated to impact fish stocks across the full extent of the water column. At the ocean surface, the presence of semi-permanent ships and support platforms may interrupt fish migration patterns by deterring fish through light and noise pollution, in addition to harmful discharges.¹¹ Mid-water, fish stocks may be interrupted by the presence of riser pipes transporting mined minerals to surface vessels, the vertical movement of mining vehicles and potentially also the disposal of waste sediment from surface vessels (known as 'dewatering plumes').¹² The depth at which dewatering plumes are discharged is anticipated to have a significant impact upon the harm that they may inflict, with shallower discharges presenting a greater risk.¹³ Finally, at the seabed level, marine ecosystems face significant risks through destruction of habitats and biota, generation and spread of sediment plumes from mining equipment (known as 'collector plumes') and noise and light pollution.¹⁴ Given the slow growth rates, fragility and high species diversity of deep-sea ecosystems, it is anticipated that ecosystem destruction from mining, including the removal of nodules that serve as a foundation for ecosystem health and abyssal plain food webs, could have significant adverse impacts on ecosystem function and marine food web stability.¹⁵ Collectively, these disturbances to marine ecosystems through the full spectrum of the water column could have significant negative knock-

³C Romanelli et al, 'Connecting Global Priorities: Biodiversity and Human Health: A State of Knowledge Review' (World Health Organization 2015); MN Moore et al, 'Linking Oceans and Human Health: A Strategic Research Priority for Europe' (European Marine Board 2013).

⁴D Destoumieux-Garzón et al, 'The One Health Concept: 10 Years Old and a Long Road Ahead' (2018) 5 *Frontiers in Veterinary Science* 14, 29–31.

⁵J Lloret, 'Human Health Benefits Supplied by Mediterranean Marine Biodiversity' (2010) 60 *Marine Pollution Bulletin* 1640, 1642.

⁶Y Sekerci and S Petrovskii, 'Mathematical Modelling of Plankton-Oxygen Dynamics under the Climate Change' (2015) 77 *Bulletin of Mathematical Biology* 2325, 2326.

⁷D Jin, P Hoagland and KO Buesseler, 'The Value of Scientific Research on the Ocean's Biological Carbon Pump' (2020) 749 *Science of the Total Environment* 141357, 141358–141359.

⁸LE Fleming et al, 'Oceans and Human Health: Emerging Public Health Risks in the Marine Environment' (2006) 53 *Marine Pollution Bulletin* 545, 551.

⁹E Popova et al, 'Ecological Connectivity between the Areas beyond National Jurisdiction and Coastal Waters: Safeguarding Interests of Coastal Communities in Developing Countries' (2019) 104 *Marine Policy* 90.

¹⁰A Chin and K Hari, 'Predicting the Impacts of Mining Deep Sea Polymetallic Nodules in the Pacific Ocean: A Review of Scientific Literature' (Deep Sea Mining Campaign and MiningWatch Canada 2020) 3.

¹¹*ibid* 32.

¹²*ibid* 26.

¹³JC Drazen et al, 'Midwater Ecosystems Must Be Considered When Evaluating Environmental Risks of Deep-sea Mining' (2020) 117 *Proceedings of the National Academy of Sciences of the United States of America* 17455, 17456.

¹⁴Chin and Hari (n 10) 32.

¹⁵See T Stratmann et al, 'Polymetallic Nodules Are Essential for Food-web Integrity of a Prospective Deep-seabed Mining Area in Pacific Abyssal Plains' (2021) 11 *Scientific Reports* 12238, 12244; LA Levin, DJ Amon and H Lily, 'Challenges to the Sustainability of Deep-seabed Mining' (2020) 3 *Nature Sustainability* 784, 787.

on implications for global fisheries, with repercussions for food security—particularly among coastal and indigenous communities that are highly dependent on marine ecosystems as an essential source of nutrition.¹⁶ While the precise scale of this impact has yet to be fully quantified, it is reasonable to conclude that seabed mining likely presents some degree of risk to global fisheries and, by extension, global food security and human health.¹⁷ Already, multiple indigenous Pacific Island communities have reported negative impacts to their fisheries practices from exploratory seabed mining activities.¹⁸

Another environmental concern from seabed mining is the potential impact of increased ambient metal concentrations on marine ecosystems.¹⁹ Scientists anticipate that seabed mining will release metal deposits—including copper, lead, zinc, cadmium and rare earth metals—into the surrounding environment through destruction of mineral deposits during the mining process.²⁰ While the precise impacts of elevated metal concentrations will depend upon the specific metals that are released, they may generally be divided into three groups: sub-lethal toxicity; lethal toxicity; and behavioural avoidance whereby species avoid areas with higher ambient metal concentrations.²¹ Individually or collectively, these impacts can result in reduced ecosystem structures (i.e. reduced species abundance, distribution or diversity), with knock-on implications for ecosystem service delivery.²² Potentially, the largest threat that this presents to human health is through bioaccumulation of metals in marine food webs, which could ultimately enter the human food chain.²³ The magnitude of this risk remains unclear due to, among other things, limited knowledge on the impacts of elevated ambient metal concentrations on deep-sea ecosystems and the extent to which deep-sea food webs, in which metals from seabed mining activities may accumulate, overlap with food webs from which humans harvest species for consumption.²⁴ However, despite prevailing uncertainties and in light of developing understanding of the high degree of connectivity between marine ecosystems, there is sufficient evidence to suggest that bioaccumulation of metals from seabed mining could present a threat to human health and well-being. Furthermore, the risk of metals entering the human food chain increases if dewatering plumes—which could also contain metal particles—are released into the surface or mid-water, thus directly overlapping with food webs from which species are harvested for human consumption.²⁵ There remains uncertainty around the precise health impacts of ingesting higher than usual metal concentrations. However, while the risks will depend on the metals in

question, existing research suggests that specific societal groups, including children and pregnant women, may be particularly susceptible to adverse health outcomes.²⁶

Finally, seabed mining could accelerate global climate change, which presents an array of risks to human health including exposure to increased occurrence of extreme weather events, altered distribution of infectious diseases (e.g. malaria) and secondary effects including famine, civil war and forced migration.²⁷ The ocean plays an essential role in regulating Earth's climate.²⁸ Scientists estimate that the ocean stores up to 60 times more carbon than the atmosphere²⁹ and that the ocean has absorbed approximately 30% of global anthropogenic carbon dioxide since the beginning of the industrial revolution.³⁰ A portion of absorbed carbon is transported to the seafloor by a process called the carbon pump, where it can be sequestered in sediment for millennia.³¹ While the precise proportion of global carbon sequestered in marine sediment is currently unknown,³² Atwood and colleagues posit that 'marine sediments are one of the most expansive and critical carbon reservoirs on the planet'.³³ The role that seabed sediment plays in sequestering carbon has triggered concern that seabed mining will disturb and resuspend these sediments in the water column, potentially releasing sequestered carbon.³⁴ Resuspended sediments are exposed to oxygen, enabling embedded carbon to be remineralized to carbon dioxide, which could potentially be re-released into the atmosphere.³⁵ At present, the extent to which disruption of marine sediment could impact atmospheric carbon dioxide concentrations remains unknown.³⁶ In addition to climate risks from the release of sequestered carbon, there remains uncertainty around whether mining activities could interrupt other essential regulating ecosystem services such as the absorption of atmospheric oxygen.³⁷

In summary, an incontrovertible nexus exists between human health and marine biodiversity, which means that how we govern the marine environment has knock-on implications for human health. Due to the degree of marine ecosystem connectivity and the global reach of marine ecosystem services (including facilitating global food security and supporting climate regulation), this remains equally true for seabed mining, even though the mining activities themselves will take place far from any human populations. Although significant

¹⁶Chin and Hari (n 10) 32–36.

¹⁷ibid 5.

¹⁸J Aguon and J Hunter, 'Second Wave Due Diligence: The Case for Incorporating Free, Prior, and Informed Consent into the Deep Sea Mining Regulatory Regime' (2019) 38 *Stanford Environmental Law Journal* 3, 13–15.

¹⁹C Hauton et al, 'Identifying Toxic Impacts of Metals Potentially Released During Deep-sea Mining: A Synthesis of the Challenges to Quantifying Risk' (2017) 4 *Frontiers in Marine Science*.

²⁰ibid 2.

²¹ibid 4.

²²ibid.

²³See, e.g., T Chouvelon et al, 'Patterns of Trace Metal Bioaccumulation and Trophic Transfer in a Phytoplankton-Zooplankton-Small Pelagic Fish Marine Food Web' (2019) 146 *Marine Pollution Bulletin* 1013, 1014.

²⁴Hauton et al (n 19) 26.

²⁵Chin and Hari (n 10) 26.

²⁶Z Rivera-Núñez et al, 'Association of Biomarkers of Exposure to Metals and Metalloids with Maternal Hormones in Pregnant Women from Puerto Rico' (2021) 147 *Environment International* 106310, 106311; M Al Osman, F Yang and IY Massey, 'Exposure Routes and Health Effects of Heavy Metals on Children' (2019) 32 *Biomaterials* 563, 563.

²⁷CD Butler et al, 'Climate Change and Human Health' in SJ Williams and R Taylor (eds), *Sustainability and the New Economics: Synthesising Ecological Economics and Modern Monetary Theory* (Springer 2022) 51, 55–60.

²⁸BC O'Leary and CM Roberts, 'Ecological Connectivity across Ocean Depths: Implications for Protected Area Design' (2018) 15 *Global Ecology and Conservation* e00431, e00433.

²⁹A Oka, 'Ocean Carbon Pump Decomposition and Its Application to CMIP5 Earth System Model Simulations' (2020) 7 *Progress in Earth and Planetary Science* 1, 1.

³⁰Jin et al (n 7) 141358–141359.

³¹ibid 141358.

³²TB Atwood et al, 'Global Patterns in Marine Sediment Carbon Stocks' (2020) 7 *Frontiers in Marine Science* 165, 166.

³³ibid 165.

³⁴Chin and Hari (n 10) 38.

³⁵Atwood et al (n 32) 165.

³⁶Chin and Hari (n 10) 38; P Howard et al, 'An Assessment of the Risks and Impacts of Seabed Mining on Marine Ecosystems' (Flora and Fauna International 2020) 117.

³⁷Hauton et al (n 19) 5.

uncertainties remain, there is sufficient evidence of potential negative health impacts to trigger application of the precautionary approach by States, thus necessitating consideration of the potential health impacts in the development of the international seabed mining regime. The precautionary approach demands that 'where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation' or harm to human health.³⁸ In 2011, the International Tribunal for the Law of the Sea (ITLOS) declared the precautionary approach to be trending towards becoming part of customary international law.³⁹ While there is no universal consensus on the precise threshold for triggering the precautionary approach, in general it requires the potential harm to be of sufficient gravity (e.g. significant, serious or irreversible) and to have a sufficient probability of materializing (Trouwborst proposes there must be 'reasonable grounds for concern' that harm may occur).⁴⁰ In the context of seabed mining in the Area, States are already under a clear obligation to apply the precautionary approach with regard to environmental harm.⁴¹ Concerning risks to human health, there is a strong argument that the risks highlighted in this section (including health impacts of impaired food security and safety) are of sufficient gravity to trigger precautionary measures. Additionally, one may also contend that there are 'reasonable grounds for concern' that these risks may materialize, on the basis that there is a logical chain of cause and effect whereby mining activities result in harm to human health *vis-à-vis* marine biodiversity. The remaining uncertainty lies in quantifying both the gravity and probability of such risks with a higher degree of precision. However, as noted by ITLOS, the obligation to apply the precautionary approach 'applies in situations where scientific evidence concerning the scope and potential negative impacts of the activity in question is insufficient but where there are plausible indications of potential risks'.⁴² Therefore, this article contends that seabed mining presents sufficient risk to human health to trigger application of the precautionary approach by States.

It is outside the scope of this article to offer a perspective on the complete package of response actions that the precautionary approach requires in the context of seabed mining in the Area (e.g. a moratorium on seabed mining until knowledge gaps are filled, vs. authorization to proceed with caution). For current purposes however, it is logical to conclude that it at least requires States to factor considerations concerning health and the right to health into decision-making processes and to incorporate tools within the seabed mining regime that promote stronger understanding and awareness of the

health–biodiversity nexus and that mitigate such impacts in a cost-effective manner.

3 | MARINE BIODIVERSITY AND THE HUMAN RIGHT TO HEALTH

The previous section introduced the nexus between human health and marine biodiversity and the potential impacts of seabed mining on this relationship. This section summarizes the right to health, its suitability for the protection of this human health–marine biodiversity nexus and the package of State obligations that this gives rise to concerning ocean governance. Before doing so, however, it is important to note that, while this article focuses exclusively on the implications of seabed mining for realization of the right to health, it is clear from the analysis in the previous section and related literature that seabed mining has the potential to threaten full realization of a broad spectrum of human rights, beyond the right to health. Potentially impacted rights include the rights to life, to work, to an adequate standard of living and to freedom from discrimination, in addition to the human rights of indigenous peoples.⁴³ As such, detailed consideration must be given to the full spectrum of human rights in the development of the legal regime for seabed mining in the Area.

The right to health first emerged as a binding human right in 1966 in Article 12(1) of the International Covenant on Economic, Social and Cultural Rights (ICESCR) and is fully entitled 'the right of everyone to the enjoyment of the highest attainable standard of physical and mental health'. Today, every State has ratified at least one international agreement that commits it to protect the right to health.⁴⁴ The right to health is not to be understood as a right to be healthy, since an individual's health status depends on a range of factors beyond the control of the State, including genetics, lifestyle, etc.⁴⁵ Rather, it must be understood as a right of access to conditions that enable a person to enjoy the highest attainable standard of health.⁴⁶ The Committee on Economic, Social and Cultural Rights (CESCR) asserts that, in addition to access to healthcare, it also includes a right of access to a range of 'underlying determinants of health', including food and nutrition, and a healthy environment.⁴⁷ Additionally, Article 12(2) of ICESCR explicitly requires States to promote '[t]he improvement of all aspects of environmental ... hygiene' in furtherance of full realization of the right to health.⁴⁸ Like all

⁴³Aguon and Hunter (n 18) 28–29.

⁴⁴Office of the UN High Commissioner for Human Rights (OHCHR), 'The Right to Health' (June 2008) 1. Other IHRL treaties that protect the right to health include: International Convention on the Elimination of all Forms of Racial Discrimination (adopted 21 December 1965, entered into force 4 January 1969) 660 UNTS 195 art 5(e)(iv); Convention on the Elimination of All Forms of Discrimination against Women (adopted 18 December 1979, entered into force 3 September 1981) 1249 UNTS 13 arts 11(1)(f) and 12; Convention on the Rights of the Child (adopted 20 November 1989, entered into force 2 September 1990) 1577 UNTS 3 art 24; Convention on the Rights of Persons with Disabilities (adopted 13 December 2006, entered into force 3 May 2008) 2515 UNTS 3 art 25.

⁴⁵CESCR, 'General Comment No. 14: The Right to the Highest Attainable Standard of Health (Art. 12)' UN Doc E/C.12/2000/4 (11 August 2000) para 8.

⁴⁶*ibid* para 4.

⁴⁷*ibid*.

⁴⁸International Covenant on Economic, Social and Cultural Rights (adopted 16 December 1966, entered into force 3 January 1976) 993 UNTS 3 (ICESCR) art 12(2)(b).

³⁸Rio Declaration on Environment and Development in 'Report of the United Nations Conference on Environment and Development' UN Doc A/CONF.151/26 (vol I) (12 August 1992) Principle 15; M Martuzzi, 'The Precautionary Principle: In Action for Public Health' (2007) 64 *Occupational and Environmental Medicine* 569, 569. Many authors contend that the 'precautionary approach' and 'precautionary principle' are functionally synonymous (e.g. AL Jaeckel, *The International Seabed Authority and the Precautionary Principle: Balancing Deep Seabed Mineral Mining and Marine Environmental Protection* (Brill/Nijhoff 2017) 27).

³⁹*Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area* (Advisory Opinion) [2011] ITLOS Rep 10, para 135.

⁴⁰Jaeckel (n 38) 38–39.

⁴¹ITLOS (n 39) paras 125–135.

⁴²*ibid* para 131.

economic, social and cultural (ESC) rights, the right to health is subject to the doctrine of progressive realization, which allows States a margin of discretion concerning the manner and timeframe with which they pursue its full realization.⁴⁹ This doctrine derives from a pragmatic recognition that States require both time and resources to facilitate full realization of ESC rights.⁵⁰ However, the discretion that this affords is far from absolute. Despite the temporal discretion afforded to States, they are nonetheless subject to a series of obligations requiring immediate fulfilment, including obligations to start taking tangible steps towards full realization of ESC rights and to ensure both non-discrimination and non-retrogression in enjoyment of such rights.⁵¹ Moreover, States are required to deploy maximum available resources to this end and to cooperate internationally as necessary in addition to taking unilateral action.⁵² In addition to these obligations that apply generally to all ESC rights, States are also subject to a series of minimum core obligations that are specific to the right to health and are of immediate effect and non-derogable.⁵³ These include an obligation to ensure access to health facilities, goods and services (including underlying determinants of health) on a non-discriminatory and equitable basis.⁵⁴ Thus, while the right to health is subject to progressive realization, many components transcend the temporal discretion that the doctrine affords and thus require immediate fulfilment.

Although there is no explicit acknowledgement within the ICESCR or by the CESCR of the intrinsic connection between human health and marine biodiversity, there are at least two tenable grounds on which to argue that States are already obligated to protect marine biodiversity as part of their pre-existing responsibilities under the right to health in IHRL.⁵⁵ The first argument stems from the widespread acknowledgement that a healthy environment is a prerequisite to realizing the highest attainable standard of health.⁵⁶ Biodiversity in turn plays a central role in enabling a healthy environment.⁵⁷ This relationship led the former United Nations (UN) Special Rapporteur on human rights and the environment, John Knox, to conclude that States' 'obligations to protect against environmental harm that interferes with the enjoyment of human rights ... apply to biodiversity as an integral part of the environment'.⁵⁸ Therefore, existing State

obligations to protect against environmental harm that interferes with the enjoyment of the right to health also extend to the protection of marine biodiversity. The second argument for a State duty to protect marine biodiversity under the right to health rests upon the growing body of evidence concerning human health–marine biodiversity linkages, twinned with the fact that the portfolio of recognized underlying determinants of health is not static and continues to grow as global understanding of human health develops.⁵⁹ Thus, one may contend that marine biodiversity should be considered an underlying determinant of the right to health in its own right on the basis that it contributes to positive health outcomes through the provision of essential ecosystem services. This means that States, as duty bearers under IHRL, have a responsibility to protect marine biodiversity under the human right to health.⁶⁰ This is important for current purposes because it means that States must duly consider this duty when taking steps that could harm marine biodiversity, such as while taking steps to operationalize seabed mining.

The existence of a duty to protect marine biodiversity under the right to health is important because it unlocks a package of interlinked State obligations concerning the governance of the marine environment. Two of these obligations are considered in detail in Section 4.2, namely, an obligation to advance and disseminate scientific research into the human health and marine biodiversity nexus and an obligation to facilitate public participation in the management of marine biodiversity.⁶¹ Consideration of these obligations in the below analysis highlights weaknesses in the current legal regime for seabed mining and areas of inconsistency with the right to health under IRHL.

The identification of a duty to protect marine biodiversity under the right to health, and the package of obligations that this gives rise to, is a valuable addition to the corpus of international law. In accordance with the principle of mutual supportiveness,⁶² it helps to reinforce and add form to existing marine protection obligations under the Convention on Biological Diversity and the United Nations Convention on the Law of the Sea (UNCLOS). Furthermore, it unlocks access to recourse mechanisms under IHRL, enabling individuals to challenge actions and decisions that infringe their rights as a result of harm to marine biodiversity.

⁴⁹ibid art 2(1).

⁵⁰CESCR, 'General Comment No. 3: The Nature of States Parties' Obligations (Art.2, Para. 1, of the Covenant)' UN Doc E/1991/23 (14 December 1990) para 1; J Tobin, *The Right to Health in International Law* (Oxford University Press 2012) 177–178.

⁵¹ICESCR (n 48) art 2(1)–(2); CESCR, 'General Comment No. 3' (n 50) para 9.

⁵²ICESCR (n 48) art 2(1).

⁵³CESCR, 'General Comment No. 14' (n 45) para 43; CESCR, 'General Comment No. 3' (n 50) para 10.

⁵⁴CESCR, 'General Comment No. 14' (n 45) paras 12(a), 43(a) and 43(e).

⁵⁵I acknowledge that there is extensive debate concerning the precise legal weight to be attributed to outputs of human rights treaty bodies (including the CESCR). I do not engage in that debate here but posit that such outputs may carry significant weight in informing interpretation of State obligations under IHRL. See further K Mechlem, 'Treaty Bodies and the Interpretation of Human Rights' (2009) 42 *Vanderbilt Journal of Transnational Law* 905; D McGrogan, 'On the Interpretation of Human Rights Treaties and Subsequent Practice' (2014) 32 *Netherlands Quarterly of Human Rights* 347.

⁵⁶ICESCR (n 48) art 12(2)(b); CESCR, 'General Comment No. 14' (n 45) paras 4 and 15.

⁵⁷This assertion is supported by, for example, the use of 'biodiversity' as a metric for good environmental status under the European Union Marine Strategy Framework Directive (European Commission, 'Our Oceans, Seas and Coasts', <https://ec.europa.eu/environment/marine/good-environmental-status/descriptor-1/index_en.htm>).

⁵⁸Human Rights Council (HRC), 'Report of the Special Rapporteur on the Issue of Human Rights Obligations Relating to the Enjoyment of a Safe, Clean, Healthy and Sustainable Environment' UN Doc A/HRC/34/49 (19 January 2017) para 26.

⁵⁹CESCR, 'General Comment No. 14' (n 45) para 10.

⁶⁰The logic on which this contention is based could likely be extrapolated out to demonstrate a basis for States to protect biodiversity generally. However, in this article and underlying PhD research, my research has focused solely on the marine context, and therefore, I do not wish to draw any conclusions regarding terrestrial biodiversity without first conducting detailed research with which to validate such claims.

⁶¹These obligations, and others not considered in this article, stem from my PhD research. To identify such obligations, I reviewed each of the pre-existing State obligations under the right to health (as expressed within the ICESCR, outputs of the CESCR and academic legal discourse) in light of the ways in which marine biodiversity supports human health.

⁶²For further reading on the principle of mutual supportiveness, see R Pavoni, 'Mutual Supportiveness as a Principle of Interpretation and Law-Making: A Watershed for the 'WTO-and-Competing-Regimes' Debate?' (2010) 21 *European Journal of International Law* 649.

4 | SEABED MINING AND THE HUMAN RIGHT TO HEALTH

Thus far, this article has summarized the nexus between human health and marine biodiversity and the potential impacts of seabed mining on this relationship. It has also highlighted that this nexus gives rise to a package of State obligations concerning management of marine biodiversity under IHRL. This section pulls all these components together. It begins by briefly summarizing the legal regime for seabed mining in the Area and then proceeds to highlight two areas in which the current draft regime for the exploitation phase of seabed mining conflicts with the right to health.

Before doing so, however, it is necessary to clarify the legal connection between the two regimes. At first glance, it may appear as though State obligations under IHRL have no bearing on the seabed mining regime for two reasons. First, IHRL imposes obligations upon States, whereas seabed mining in the Area is regulated primarily by the International Seabed Authority (ISA), which is an international organization.⁶³ Second, in its traditional conceptualization, IHRL is generally understood to impose obligations on States with regard to harm that occurs within their national territory (although there is rapidly expanding legal discourse on the extraterritorial application of human rights treaties),⁶⁴ whereas sources of harm from seabed mining in the Area, by definition, originate outside the national territory of States. However, neither of these points precludes the applicability of IHRL to seabed mining in the Area; on the contrary, they demonstrate the versatility of IHRL. As an intergovernmental body, the ISA's membership is comprised of States that are themselves bound by IHRL and thus must exercise their decision-making powers in the ISA with due consideration to their other obligations under IHRL, as required by both the obligation to cooperate internationally to realize human rights⁶⁵ and the legal principle *pacta sunt servanda*, which prescribes that treaties are binding on States parties and thus must be observed and fulfilled in good faith.⁶⁶ Moreover, States that decide to sponsor mining contractors (discussed further in Section 4.1) must also implement national regulatory frameworks, which must be developed with due consideration of the State's obligations under IHRL. Under the right to health, States are obligated to refrain from 'interfering directly or indirectly with the enjoyment of the right to health'.⁶⁷ Logically, this obligation extends to State actions within the realm of international law-making. To be adopted, mining regulations must be approved by States as the final decision-makers in the ISA, as discussed further below.⁶⁸ Therefore, the content of the regime for seabed mining under the ISA is determined by States that are also obligated not to impede enjoyment of the right to health. Thus,

member States must ensure that the regime for the exploitation phase of seabed mining, which they are currently developing under the ISA, conforms with their obligations under the right to health. Of course, it remains to be seen to what extent failure by States to consider potential health implications in the development of a seabed mining regime would result in a tangible indirect interference with the enjoyment of the right to health. A conclusive determination on this point requires the knowledge gaps highlighted in Section 2 to be addressed. Finally, regarding the traditionally territorial nature of human rights obligations, while seabed mining may occur in areas beyond national jurisdiction, Section 2 demonstrates that it could nonetheless have significant implications for the health of individuals located within national jurisdiction (particularly coastal communities, indigenous peoples and other vulnerable groups regardless of proximity to the ocean) and thus within the jurisdiction of individual States.⁶⁹

4.1 | Overview of the legal regime governing seabed mining in the Area

The regulatory regime for governance of the Area is set out in UNCLOS and the Agreement Relating to the Implementation of Part XI of UNCLOS.⁷⁰ UNCLOS declares the Area and its mineral resources to be the 'common heritage of mankind',⁷¹ meaning that such resources may not be appropriated unilaterally by any State and any activities in the Area must be conducted 'for the benefit of humankind as a whole'.⁷²

The ISA, as the regulatory body for seabed mining in the Area,⁷³ has a multi-pronged mandate. Its primary function is to 'organize, control and carry out activities in the Area'.⁷⁴ However, it is also mandated to, inter alia, ensure protection of the marine environment and promote marine scientific research.⁷⁵ The primary tool through which the ISA satisfies these mandates is the Mining Code—a compendium of regulations, standards and guidelines that govern the three phases of seabed mining: prospecting (i.e. searching for deposits of valuable natural resources), exploration (i.e. assessing the suitability of any identified resources for commercial exploitation) and exploitation (i.e. full-scale commercial seabed mining).⁷⁶ To date, the ISA has developed regulations and procedures governing the prospecting and exploration phases of seabed mining⁷⁷ and is currently developing regulations, standards and guidelines to govern exploitation. A time limit has recently been imposed on their adoption process by the Republic of Nauru which, in June 2021, triggered the 'two year rule',

⁶³In addition to the ISA, sponsoring States—discussed below—play an essential role in regulating the actions of mining contractors. For a comprehensive overview of the role and responsibilities of sponsoring States, see ITLOS (n 39).

⁶⁴For further information, see M Milanovic, *Extraterritorial Application of Human Rights Treaties: Law, Principles, and Policy* (Oxford University Press 2011).

⁶⁵ICESCR (n 48) art 2(1).

⁶⁶Vienna Convention on the Law of Treaties (adopted 23 May 1969, entered into force 27 January 1980) 1155 UNTS 331 art 26.

⁶⁷ICESCR, 'General Comment No. 14' (n 45) para 33.

⁶⁸UNCLOS (n 1) art 162(2)(o)(ii).

⁶⁹Aguon and Hunter (n 18) 7.

⁷⁰Agreement relating to the implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982 (adopted 28 July 1994, entered into force 28 July 1996) 1836 UNTS 3 (1994 Part XI Agreement).

⁷¹UNCLOS (n 1) arts 133(a) and 136.

⁷²ibid arts 137 and 140.

⁷³ibid art 156(2).

⁷⁴Jaeckel (n 38) 88; UNCLOS (n 1) arts 153(1) and 157(1).

⁷⁵UNCLOS (n 1) arts 145 and 143, respectively.

⁷⁶ibid art 160(2)(f)(ii).

⁷⁷International Seabed Authority (ISA), 'The Mining Code' <<https://www.isa.org/jm/index.php/mining-code>>.

which requires the ISA to finalize the Mining Code by 9 July 2023 or, failing that, to consider applications for exploitation contracts under whatever rules are in place at that time.⁷⁸

The ISA is composed of three principal organs: the Assembly, the Council and the Secretariat.⁷⁹ The Assembly is the plenary body comprising all ISA member States.⁸⁰ The Council, composed of 36 ISA member States, operates as the executive organ and is mandated to, *inter alia*, provisionally authorize regulations, pending final approval by Assembly, and to approve or reject applications for exploration and exploitation contracts.⁸¹ The Secretariat is the administrative organ of the ISA.⁸² The Council is supported by the Legal and Technical Commission (LTC).⁸³ While the LTC theoretically operates as an advisory body to the Council on a range of issues including reviewing applications for exploration and exploitation contracts, and drafting the Mining Code,⁸⁴ legal commentators have observed that ISA operating procedures grant significant weight to decisions of the LTC, making it difficult in some instances for the Council to act contrary to the LTC's recommendations. For this reason, Jaeckel concludes that 'in practice the work of the LTC exceeds an advisory mandate'.⁸⁵

The ISA does not operate alone in managing seabed mining. All contractors that wish to undertake seabed mining must be sponsored by a State party to UNCLOS.⁸⁶ Sponsoring States play a fundamental role in the governance of seabed mining. The seabed mining regime exists to regulate the actions of mining contractors, which will commonly be non-State actors and thus not bound by public international law. Sponsoring States bridge this gap by developing a domestic regulatory framework under which to hold contractors accountable for their actions, while the sponsoring States themselves remain accountable under UNCLOS for discharging this responsibility adequately.⁸⁷ Sponsoring States are, *inter alia*, subject to an obligation to apply the precautionary approach and an obligation of due diligence to take necessary steps to ensure contractors' compliance with seabed mining requirements under UNCLOS.⁸⁸

4.2 | Areas of conflict between the seabed mining regime and the human right to health

As noted in Section 2, seabed mining has the potential to impact human health through, *inter alia*, disruption of fisheries, introduction of toxic metals into the human food chain and acceleration of climate

change. Framed in human rights terms, these impacts stand to undermine rightsholders' enjoyment of the right to health by depriving them of access to a range of underlying health determinants, including access to safe and potable water, adequate food and nutrition, healthy environmental conditions and marine biodiversity itself.⁸⁹ While there is still uncertainty surrounding the gravity of the potential harm and the probability that it will materialize, as discussed in Section 2, this obligates States to exercise the precautionary approach, requiring them to factor potential human rights impacts into their decision making concerning the development of a seabed mining regime. On this basis, this Section highlights two areas in which States have thus far failed to satisfy their obligations under the right to health regarding development of the regime for the exploitation phase of seabed mining.

4.2.1 | Insufficient mechanisms to drive research into the potential health impacts of seabed mining

The first area of inconsistency between the seabed mining regime and IHRL is the absence of sufficient mechanisms to promote research into the health impacts of seabed mining. There is a compelling argument that under the right to health, States are subject to an implicit obligation to develop and diffuse research into the linkages between human health and marine biodiversity—including research into drivers of harm to these linkages. This obligation is not explicitly mandated in the text of any human rights treaty: rather, it is a logical prerequisite to enable States to satisfy their explicit obligations to respect, protect and fulfil the human right to health—including their immediate obligations to ensure access to health facilities, goods and services (including underlying determinants of health) on a non-discriminatory and equitable basis.⁹⁰ Without detailed understanding of the risks that seabed mining poses to human health, States cannot hope to mitigate these risks and thus protect enjoyment of the right to health. Although Section 2 highlights several potential ways in which seabed mining may impact marine biodiversity with knock-on implications for human health, knowledge gaps pervade and persist regarding the potential environmental and health impacts of seabed mining, fuelled in part by a limited understanding of the deep-sea environment generally.⁹¹

In its current form, the draft regime for the exploitation phase of seabed mining promotes research in multiple ways. UNCLOS itself mandates the ISA to 'promote and encourage the conduct of marine scientific research in the Area and [to] coordinate and disseminate the results of such research and analysis when available'.⁹² UNCLOS also obligates States parties themselves to 'promote marine scientific research in the Area' by various means.⁹³ These mandates on the ISA

⁷⁸1994 Part XI Agreement (n 70) Annex, Section 1, paras 15(b) and (c); ISA 'Letter Dated 30 June 2021 from the President of the Council of the International Seabed Authority Addressed to the Members of the Council' UN Doc ISBA/26/C/38 (20 June 2021) Annex II.

⁷⁹UNCLOS (n 1) art 158(1).

⁸⁰*ibid* art 159(1) and (6).

⁸¹*ibid* art 162.

⁸²*ibid* art 166.

⁸³*ibid* art 165.

⁸⁴*ibid* art 165(2).

⁸⁵Jaeckel (n 38) 96.

⁸⁶UNCLOS (n 1) art 163(2)(b).

⁸⁷ITLOS (n 39) para 75; X Xu and G Xue, 'Potential Contribution of Sponsoring State and Its National Legislation to the Deep Seabed Mining Regime' (2021) 13 Sustainability 10784, 10784.

⁸⁸ITLOS (n 39) paras 110 and 127; UNCLOS (n 1) art 139(2).

⁸⁹CESCR, 'General Comment No. 14' (n 45) paras 4 and 11.

⁹⁰ICESCR (n 48) art 12(1); CESCR, 'General Comment No. 14' (n 45) paras 12(a), 34–37, 43(a) and 43(e).

⁹¹DJ Amon et al, 'Assessment of Scientific Gaps Related to the Effective Environmental Management of Deep-seabed Mining' (2022) 138 Marine Policy 105006.

⁹²UNCLOS (n 1) art 143.

⁹³*ibid* art 143(3).

and States parties to promote marine scientific research are a valuable tool to advance our understanding of the deep seabed environment. However, such obligations are framed in broad language and do not obligate the ISA or UNCLOS States parties to advance research on the potential health impacts of seabed mining specifically.

Building on UNCLOS, the draft exploitation regulations (subsequently referred to as ‘the draft regulations’) establish similarly broad research agendas, prescribing that ‘Contractors, sponsoring States and members of the Authority shall cooperate with the [ISA] in the establishment and implementation of programmes to observe, measure, evaluate and analyse the impacts of Exploitation on the Marine Environment’.⁹⁴ The draft regulations also obligate contractors and ISA member States to ‘[identify] gaps in scientific knowledge and [develop] targeted and focused research programmes to address such gaps’ and to ‘[promote] the advancement of marine scientific research in the Area for the benefit of mankind as a whole’.⁹⁵ Like the obligations established under UNCLOS, these obligations are broadly worded and do little to help guide, harmonize and focus international research efforts.

The draft regulations also promote dissemination of research outcomes by obligating contractors, sponsoring States and ISA member States to ‘share the findings and results of such programmes with the [ISA] for wider dissemination’.⁹⁶ Moreover, they establish a mechanism to support funding of such research through the establishment of an Environmental Compensation Fund (ECF), the express purposes of which include ‘the promotion of research into methods of marine mining engineering and practice by which environmental damage or impairment resulting from Exploitation activities in the Area may be reduced’.⁹⁷ However, it is premature to celebrate the value of the ECF as we await detailed operating procedures from the ISA that will help us understand the amount of financial support that the ECF will be able to offer in practice.⁹⁸

In addition to the explicit research obligations considered above, the draft regulations also promote research through environmental impact assessments (EIAs), which every prospective contractor must include in their application for an exploitation contract in the form of an environmental impact statement (EIS).⁹⁹ The EIA and EIS present a valuable opportunity to obligate contractors to consider the potential health implications of mining activities *vis-à-vis* its environmental impacts. Unfortunately, the draft regulations fail to capitalize on this opportunity and EIA and EIS requirements are silent on the issue of human health impacts. The template EIS presented in the draft regulations does afford consideration to ‘impacts on the socioeconomic environment’ and explicitly references impacts on fisheries, marine traffic and tourism, among others, but does not explicitly reference

human health.¹⁰⁰ Inclusion of an explicit obligation to consider human health would guarantee that such impacts are afforded due consideration. Without it, there are no legal grounds to ensure that an EIA or EIS gives targeted consideration to the health impacts of their proposed actions. This therefore represents a missed opportunity for States to explicitly mandate contractors to help advance research into the impacts of seabed mining on important human health and marine biodiversity linkages.

In summary, while UNCLOS and the draft regulations impose various research obligations on States—in their capacity as both ISA members and as sponsoring States—to advance research (either directly or through obligations on contractors), such obligations are too broadly worded to support States in satisfying their obligation under the right to health to advance and disseminate research into health–biodiversity linkages. The draft regulations and associated standards present an opportunity for States to promote alignment between these two regimes. While the seabed mining regime obviously cannot expressly stipulate all research priorities or mandate research into every conceivable facet of seabed mining, one may contend that a mandate to research its potential health impacts is sufficiently important to warrant explicit inclusion in the exploitation regulations alongside existing environmental research obligations, since there is little logic in pursuing seabed mining in furtherance of the common heritage of humankind doctrine if the activities required to do so ultimately inflict harm on the beneficiaries that they are intended to serve. Incidentally, it must also be acknowledged that the economic gains that seabed mining promises could, in turn, facilitate medical developments that yield a net gain to global public health, despite any adverse health outcomes from harm to marine biodiversity. However, this remains to be seen and such a cost–benefit analysis cannot be performed without a comprehensive understanding of the precise health risks that seabed mining presents, for which research mandates—like those considered in this subsection—are essential.

4.2.2 | Inadequate provision for participatory rights in the seabed mining regime

The second area of inconsistency between the seabed mining regime and the right to health is the inadequacy of mechanisms within the seabed mining regime to facilitate public participation as a general principle of international law. Under the right to health, States are obligated to ensure rights holders’ access to the underlying determinants of health, including access to health-related information and participation in health-related decision making.¹⁰¹ States are also required to facilitate participation in accordance with their obligation to ensure non-discrimination (an obligation which, as noted in Section 3, requires immediate fulfilment) and their obligations to respect, protect and fulfil the right to health.¹⁰² The Aarhus Convention pioneered a now widely accepted three-pillar model for

⁹⁴ISA ‘Draft Regulations on exploitation of Mineral Resources in the Area’ UN Doc. ISBA/25/C/WP.1 (22 March 2019) (ISA Draft Regulations) reg 3(e).

⁹⁵*ibid* reg 3(f).

⁹⁶*ibid* reg 3(e).

⁹⁷*ibid* reg 55(b).

⁹⁸PA Singh, ‘The Two-year Deadline to Complete the International Seabed Authority’s Mining Code: Key Outstanding Matters that Still Need to Be Resolved’ (2021) 134 *Marine Policy* 104804, 104808.

⁹⁹1994 Part XI Implementing Agreement (n 70) Annex, section 1, para 7; ISA Draft Regulations (n 94) regs 7(3) and 47(1), and Annex IV, sections 4–6.

¹⁰⁰ISA Draft Regulations (n 94) Annex IV, sections 6 and 9.

¹⁰¹CESCR, ‘General Comment No. 14’ (n 45) para 11.

¹⁰²CESCR (n 48) arts 2(2) and 3; CESCR, ‘General Comment No. 14’ (n 45) paras 33, 35–37.

participation that mandates stakeholder access to environmental information, public participation in environmental decision making and access to justice.¹⁰³ This model has now been deemed a general State obligation under IHRL,¹⁰⁴ and declared by some to be an ‘emerging customary duty under international law’.¹⁰⁵

While there is widespread agreement on the importance of stakeholder participation in environmental management generally, there is an even more compelling argument for participation in the management of seabed resources in the Area. As noted, UNCLOS designates mineral resources in the Area as the ‘common heritage of [hu]mankind’ and ‘vested in [hu]mankind as a whole’,¹⁰⁶ thus logically necessitating a level of civil society participation that exceeds business as usual.¹⁰⁷ For this reason, the term ‘stakeholder’, when used to identify persons entitled to participatory rights concerning seabed mining, must extend to all humankind without restriction.¹⁰⁸

While the draft regulations contain several mechanisms that promote participatory rights, legal commentators have highlighted various shortcomings in the seabed mining framework in this regard. In 2018, Ardron, Ruhl and Jones observed that the ISA’s Mining Code placed greater emphasis on data confidentiality than transparency.¹⁰⁹ Similarly, Willaert noted that ‘though all activities on the deep seabed should in principle serve the interests of mankind as a whole ... little attention seems to be paid to transparency, public participation and access to justice for third parties’.¹¹⁰ In particular, he notes several specific shortcomings. Under the ISA’s exploration regulations, there is no process for third parties to object to, or submit comment on, the issuance of an exploration contract.¹¹¹ Additionally, although the draft exploitation regulations do invite public comment on aspects of applications for exploitation contracts,¹¹² the LTC is simply bound to ‘consider’ these inputs, with no guarantee that it affords them any weight in formulating a recommendation for the Council.¹¹³ The value of stakeholder contributions is further undermined by the pervading lack of transparency concerning decision-making processes within the LTC.¹¹⁴ Furthermore, the Council, in issuing its final decision on an exploitation contract application, need not adhere to the recommendations of the LTC, even though such recommendations may reflect stakeholder views expressed through public comment.¹¹⁵ Moreover,

the draft exploitation regulations do not provide any mechanism for third parties to contest the issuance of exploitation contracts.¹¹⁶

Looking beyond the contract approval process, the draft regulatory framework does take steps to foster participation, such as by listing access to data, accountability, transparency and public participation as key principles guiding the ISA’s efforts at environmental protection.¹¹⁷ However, it also provides that ‘confidential information’ will not be made publicly available.¹¹⁸ While this is a necessary pronouncement, it remains to be seen how widely this caveat will be used, and unfortunately, the seabed mining regime does not include any recourse mechanism for third parties to contest the designation of information as confidential.¹¹⁹ This is problematic considering designation of data as ‘confidential’ has been used as a loophole to hide information across disparate regimes, to the detriment of human rights.¹²⁰

With these weaknesses in mind, in its current form, the legal regime for seabed mining cannot be considered compliant with State obligations to facilitate procedural rights under the right to health. To strengthen transparency and participation, ISA member States should facilitate greater transparency regarding decision making within the LTC, develop clear and restrictive parameters for the designation of information as confidential and establish mechanisms for third parties to challenge the issuance of exploitation contracts, in addition to the designation of information as confidential.¹²¹ Similarly, sponsoring States should ensure transparency and stakeholder participation around decision-making processes concerning the sponsorship of contractors.

5 | CONCLUSIONS

It is now incontrovertible that human health, and enjoyment of the human right to health, is dependent on marine biodiversity. On this basis, States are subject to a package of obligations under the right to health concerning the protection of marine biodiversity. This includes obligations to develop and diffuse scientific research into human health–marine biodiversity linkages to facilitate their protection and to facilitate public participation in decision-making processes that will impact marine biodiversity. Applied to the context of seabed mining, there are still many uncertainties concerning the extent to which seabed mining will impact marine biodiversity and, by extension, human health. However, it can be said with certainty that there is at least cause for concern that such risks will materialize, thus necessitating application of the precautionary approach. Given the potential for seabed mining to impair enjoyment of the right to health, States are

¹⁰³Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (adopted 25 June 1998, entered into force 30 October 2001) 2161 UNTS 445 arts 4–9.

¹⁰⁴HRC, ‘Report of the Special Rapporteur on the Issue of Human Rights Obligations Relating to the Enjoyment of a Safe, Clean, Healthy and Sustainable Environment’ UN Doc A/HRC/34/49 (19 January 2017) para 27.

¹⁰⁵JA Ardron, HA Ruhl and DOB Jones, ‘Incorporating Transparency into the Governance of Deep-seabed Mining in the Area beyond National Jurisdiction’ (2018) 89 Marine Policy 58, 63; K Willaert, ‘Public Participation in the Context of Deep Sea Mining: Luxury or Legal Obligation?’ (2020) 198 Ocean and Coastal Management 105368, 105371.

¹⁰⁶UNCLOS (n 1) art 136.

¹⁰⁷Ardron et al (n 105) 59; M Guilhon, F Montserrat and A Turra, ‘Recognition of Ecosystem-based Management Principles in Key Documents of the Seabed Mining Regime: Implications and Further Recommendations’ (2021) 78 ICES Journal of Marine Science 884, 893.

¹⁰⁸Willaert (n 105) 105372.

¹⁰⁹Ardron et al (n 105) 59.

¹¹⁰Willaert (n 105) 105368.

¹¹¹ibid 105370.

¹¹²ISA Draft Regulations (n 94) reg 11.

¹¹³Willaert (n 105) 105370.

¹¹⁴ibid 105371; Jaeckel (n 38) 260–263

¹¹⁵Willaert (n 105) 105370; ISA Draft Regulations (n 94) reg 16.

¹¹⁶Willaert (n 105) 105370.

¹¹⁷ISA Draft Regulations (n 94) reg 2(e).

¹¹⁸ibid reg 89(1).

¹¹⁹Willaert (n 105) 4105371.

¹²⁰UNGA, ‘Principles on Human Rights and the Protection of Workers from Exposure to Toxic Substances: Report of the Special Rapporteur on the Implications for Human Rights of the Environmentally Sound Management and Disposal of Hazardous Substances and Wastes’ UN Doc A/HRC/42/41 (17 July 2019) paras 60–63.

¹²¹Willaert (n 105) 4105371.

obligated to factor health considerations into the formulation of the seabed mining regime and to exercise their decision-making powers in the formulation of the seabed mining regime, in a manner that is compatible with their obligations under IHRL. Analysis of the draft regime for the exploitation phase of seabed mining suggests that, thus far, States have failed to discharge their responsibilities under the right to health, as evidenced by several areas of inconsistency, two of which are highlighted in this article.

First, States are under an implicit obligation to advance research into the ways in which seabed mining may impact human health through harm to marine biodiversity and disruption of ecosystem services. To date, no such mandate exists in the draft seabed mining regime. To address this omission, the draft regulations should include an explicit research mandate on the ISA, member States, sponsoring States and contractors to take steps to advance knowledge through, inter alia, funding research and mandating health impact assessments for proposed mining activities. Second, States are obligated under the right to health to facilitate public participation in decisions that may impact human health, which will include issuance of exploitation contracts. At present, the seabed mining regime falls short on all three pillars of public participation: transparency, participation in decision-making and access to remedies.¹²² To improve on this, the seabed mining regime should impose clear limits on which information may be designated as confidential, increase the transparency of the LTC and establish mechanisms for third parties to challenge decisions of the ISA. Similarly, sponsoring States should also embed strong stakeholder participation mechanisms in their national seabed mining legislation.

In conclusion, there is work still to be done to achieve alignment between the seabed mining regime and IHRL, and to ensure that States, when developing the seabed mining regime, are acting in a manner compatible with their obligations under IHRL. To facilitate stronger awareness and protection of these health–biodiversity linkages, working relationships should be developed between the ISA, Convention on Biological Diversity, World Health Organization and UN Environment Programme to promote collaboration on issues at the interface of public health, biodiversity and seabed mining. Similarly at a national level, sponsoring States should promote cooperation between the public institutions responsible for administration of seabed mining and those responsible for public health and the environment.

In closing, there is a logical affinity between the common heritage of humankind doctrine—which guides seabed mining activities in the Area—and IHRL, on the basis that both seek to benefit humanity as a whole. It is therefore essential to achieve alignment between the two regimes so that they may mutually support (rather than hinder) one another in pursuing this shared objective. Only through strengthened awareness of health–biodiversity linkages and the threats posed by

seabed mining, combined with adequate legal protections, can we hope to benefit from natural resources in the Area, without simultaneously hindering enjoyment of the right to health.

DATA AVAILABILITY STATEMENT

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ORCID

Graham J. Hamley  <https://orcid.org/0000-0002-8975-4356>

AUTHOR BIOGRAPHY

Graham J. Hamley is a PhD candidate at the University of Strathclyde and a member of the One Ocean Hub. He has worked as a consultant to the Food and Agriculture Organization of the United Nations, the World Bank Group and the World Organization for Animal Health. Graham's research focuses on the intersection of human rights and environmental law, with particular attention to the relationship between the international human right to health and marine biodiversity.

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¹²²E Morgera and H Lily, 'Public Participation at the International Seabed Authority: An International Human Rights Law Analysis' (2022) 31 *Review of European, Comparative and International Environmental Law*.