



# Mining questions of ‘what’ and ‘who’: deepening discussions of the seabed for future policy and governance

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## Abstract

In spite of a proliferation of academic and policy-oriented interest in deep sea mining (DSM), this paper argues that two underlying questions remain underexplored. The first relates to *what* exactly the seabed *is*; the second to *who* the stakeholders *are*. It is argued that a greater interrogation of how the seabed is defined and understood, and a deeper consideration of how stakeholders are identified and the politics of their inclusion, is crucial to the enactment of policy and planning techniques. Through the analysis of current regulations to govern DSM in both national and international jurisdictions, this paper critically examines these seemingly banal but vital questions in different contexts. It is contended that most regulations are ‘fuzzy’ when it comes to addressing these questions, with the result that different understandings of the seabed and the implications of mining are ignored and that who stakeholders are and how they are defined causes many relevant voices to be unheard. It is argued, therefore, that it is imperative to address these often-overlooked questions directly in order to inform future seabed policy and governance.

**Keywords** Seabed · Deep sea mining (DSM) · Policy · Governance · Ontological questions · Stakeholder · Participation

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## Introduction

Deep sea mining (DSM) is currently a ‘hot’ topic in applied areas as diverse as resource extraction, global and regional governance, and marine environmental management. DSM has in turn attracted growing academic attention, in fields of oceanography, geochemistry, and ecology, to law, policy, geography, and beyond. DSM refers to the process of retrieving mineral deposits from the seabed. Such mining is arguably lucrative given ‘depleting terrestrial deposits for metals such as copper, nickel, aluminum, manganese, zinc, lithium and cobalt, coupled with rising demand for these metals to produce high-tech applications such as smartphones and green technologies such as wind turbines, solar panels and electric storage batteries’ (IUCN, 2018, n.p).

Until recent decades, interest in DSM has focused on manganese nodules, clumps of manganese, nickel, cobalt, and copper that naturally occur on the surface of the seabed beyond the continental shelf. Although manganese nodules were initially discovered in the 1870s, it was only in the 1960s that commercial mining of manganese nodules became foreseeable. The apparent imminence of a ‘scramble’ for the seabed was one of the factors that gave rise to the United Nations Convention on the Law of the

Sea (UNCLOS), which was negotiated between 1973 and 1982. With some exceptions, UNCLOS designates the seabed beyond the continental shelf as ‘The Area’: a space beyond national jurisdiction where mining activities are to be governed by the International Seabed Authority (ISA) as the ‘common heritage of [hu]mankind’ (CHM). In recent decades, increased attention has turned to other forms of deep seabed minerals: seafloor massive sulphides, which appear around hydrothermal vents along oceanic ridges, and cobalt-rich ferromanganese crusts, which appear on, as well as beyond, continental shelves (Miller et al., 2018). Each mineral type can be found in the Area (to date, the ISA has issued 19 exploration contracts for manganese nodules, 7 for seafloor massive sulphides and 5 for cobalt-rich ferromanganese crusts (International Seabed Authority, n.d.)). However, each also appears in states’ exclusive economic zones (EEZs) and extended continental shelves (ECSs), the areas out to 200 nautical miles (or further, in instances of wide continental shelves), where a coastal state has exclusive, sovereign rights to seabed resources. Thus, in addition to the ISA (and, to some extent in parallel with it), a number of states have been involved in developing codes for licensing the exploration and extraction of deep seabed resources.

DSM has been the focus of frequent industry conferences, inter-governmental forums, and technical workshops (Singh, 2021). It is also a recurrent topic of interest in academic debates (see particularly Childs, 2020a, 2020b and Zalik, 2018, 2021). Although much of this debate concerns either DSM’s environmental impact or the legal meaning of key terms such as ‘common heritage of mankind’ or the ‘precautionary approach’ (see, for example, Bourrel et al., 2018; Hunter et al., 2018; Jaeckel et al., 2017; Lallier & Maes, 2016; Levin et al., 2016; Niner et al., 2018; Ovesen et al., 2018; Tunnicliffe et al., 2018; Van Dover et al., 2011), critical social scientists have sought to locate the turn to the seabed as a source of mineral resources within broader political economic trends. Recent work has shown how the seabed becomes ripe for exploration through its construction as a ‘frontier’ (see Zalik, 2018), or how seabed mining zones are constituted through complex data politics (see Sammler, 2016), rendering decision-making far from neutral or apolitical. Work has also aimed to take seriously the spatial dimensions of the seabed (see Carver et al. 2020; Childs 2020a; Peters, 2020) as deep, voluminous, 4D, analyzing in turn what the character of the seabed means for how it is used (or potentially used). Some work has also acknowledged the fundamental mismatch between modes of governance (law) and the object of governance (the seabed), with Hunter et al. (2018, no page) noting that ‘the deep sea and the legal landscape look vastly different’.

Yet in spite of this proliferation of interest in DSM, there are two seemingly straightforward, overlooked, and arguably taken-for-granted questions relevant to the drafting and

enacting of policy in this area. The first shortcoming relates to conceptions of *what* exactly the seabed *is*; the second to *who* stakeholders *are*. These ontological questions are not purely philosophical. As other authors have shown, raising ontological questions is vital for practical policy work, particularly in marine environments (see, Dixon, 2016 and Neilson & São Marcos, 2019), and with specific reference to seabed mining (see, Zalik, 2018 and Carver et al., 2020). By mining our knowledge of taken-for-granted ontologies, we can open space for more critical understandings that enhance how we go about formulating and enacting policy for DSM.

In many cases, what the seabed is and who stakeholders are is *implicit* in literature and policy concerned with DSM, and thus the full meaning of assumed definitions remains unexplored. Yet questions of *what* and *who* strike to the very heart of DSM policy. For instance, whether the seabed is viewed in the context of submarine geology, the water column, the earth-ocean-atmosphere system, or a coastal economic system influences whether mining policy will be developed using a framework of localised mining codes, the integrated management of a Marine Protected Area, global ocean governance, or coastal development, respectively.

Notwithstanding these examples, our aim here is not to develop a comprehensive typology of answers to the *what* and *who* questions. Nor is our aim to critique specific policies as ‘flawed’ because they rely on constraining assumptions — or to argue for a more ‘appropriate’ alternative. Rather, in this article we draw on national and international policy and law to explore the assumptions regarding the *what* and *who* questions that underpin a range of seabed mining policies that have been implemented, or that are being developed, by individual states or the ISA. The paper builds from our own conceptual and empirical earlier work, including field research, as well as a review of the literature discussing these issues. The examples represent a breadth of alternatives, not a comprehensive list of the universe of policies in place. In other words, our goal is not to build a case for one approach or another but to inspire the reader to think about the assumptions that underpin *all* approaches to DSM. More broadly, we urge the reader to consider how unspoken answers to implicit questions shape approaches to marine governance. As we point to in the conclusion, it is imperative for policy makers to confront these questions of *what* and *who* directly, so as to design regulatory mechanisms for the ocean environment and the myriad lifeforms (including humans) who depend on it.

To that end, the remainder of this article consists of two main sections: one that illustrates the range of assumptions regarding the *what* question in DSM and a second that turns to the *who* question. In the conclusion, we reflect on this exercise to consider the policy options — in both sovereign space and beyond the limits of sovereign jurisdiction — that arise when one asks questions of *what* and *who*.

## Questioning the ‘what’: defining the seabed

Whenever political or economic systems extend to new frontiers, new mechanisms for conceptualising and governing space are required (Havice & Zalik, 2018; Peters et al., 2018). At a practical level, this requires the development or adaptation of regulatory institutions, laws, and methods for stakeholder incorporation and risk assessment, alongside a range of other functions. However, even before these practical developments or adaptations are made, fundamental decisions must be enacted about what precisely this place *is vis-à-vis* established political-economic and regulatory norms, for the seabed has some qualities of land (it is a *seabed* with some degree of fixity), but it is also *at sea* (that wet, volatile, moving space), beyond habitable land, as well as beneath the ocean’s surface. This ontological question is therefore paramount. Understanding and framing *what* is being governed is a vital precursor to defining *how* planning and, ultimately, policy implementation, will occur.

For instance, the seabed could be perceived, and subsequently managed, as an *extension* of land, with relatively little significance given to the fact that this offshore land happens to be covered by water rather than by air. From this perspective, onshore mining regulations might be turned to as a model for regulating DSM. Alternately, the seabed could be understood as land that exists *beneath* water, effectively acknowledging that this soil environment is fundamentally different (geophysically and geopolitically) from soil beneath air. If one were to take this approach, existing systems for regulating offshore oil and gas extraction might provide appropriate models for seabed mining policy. A third option would be to consider the seabed neither as an *extension of land* nor as *land beneath the ocean* but as *part of the ocean*. In this case, models for best practice in seabed mining management might be adopted from forms of marine management (e.g. Marine Protected Areas).

These ontological conceptualisations of the deep seabed mirror debates over its precise definition. For example, in UNCLOS, which establishes the framework for the regime of the Area (where much DSM is likely to occur), the deep seabed’s extent is never clearly specified. Article 1 of UNCLOS defines the Area as ‘the sea-bed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction’, but never specifies how one determines subsoil depth or defines its limits in a submarine environment. Similarly, Article 145 charges the ISA with ‘the prevention, reduction and control of pollution and other hazards to the marine environment, including the coastline, and of interference with the ecological balance of the marine environment...[and] the protection and conservation of

the natural resources of the Area and the prevention of damage to the flora and fauna of the marine environment’. Here, although definitions are proffered for the horizontal extent of the Area (the reference to the coastline defines the extent of the area to be considered when seabed mining is being regulated) as well as some of the objects to be protected (flora and fauna), no effort is made to define the *vertical* extent, either upward or downward, to be considered, beyond the broad term ‘marine environment’.

This omission speaks to a longstanding problem in mining codes that ignore the fundamental reality that mineral extraction occurs in voluminous space, where material and its effects seep from the underground through Earth’s surface, and on into the water column and up into the air (Bridge, 2013, 2015). This reflects a broader tendency in political thought and legal reasoning, where the space controlled by the state is understood as an ‘areal’ extent, a flat, plottable surface for demarcation and control (Elden, 2010). Yet this ontological understanding of space is called into question not only when we consider the practice of mining but also when we consider the ocean. The ocean is deep, dynamic, and motionful and is far from the fixed, static, flat ‘ideal’ that dominates understandings of governance (Peters, 2020; Steinberg & Peters, 2015). The seabed, although a surface, exists beneath and within volumes, both geophysically and politically. Furthermore, seabed mining, although sometimes characterised as scraping that surface, creates disturbances to both the earth below and water column above, and to the biota dependent on these environments (Levin et al., 2016; Niner et al., 2018; Van Dover et al., 2011).

To approach the seabed as lying within a volume, it is useful to turn to a growing body of work calling for a ‘volumetric’ approach to governance. This literature highlights how the seabed has historically come to be legally constructed as distinct from the water column (Ranganathan, 2019) and how its governance requires sensitivity to how it is simultaneously a voluminous mass from which minerals are extracted, a ‘surface of earth’ below a ‘surface of water’, and a ‘vibrant place...where earth’s hydrosphere, lithosphere and biosphere are in dynamic interaction with each other at different speeds’ (Childs, 2020a, 199).

This directs our attention to other frames through which the seabed is known. The geosciences, for example, classify (ontologically) the seabed as separate from the rest of the ocean. Scientists recognise a clear distinction between the Benthic zone (related to the bottom of a body of water or the seafloor) and the Pelagic zone (related to the water column of the open oceans or seas), with each zone hosting different species, with different lifespans and essential biological characteristics (UNESCO, 2009). Even though it is acknowledged that ‘many uses and impacts carried out or occurring in one of the two realms, affects both realms’ (UNESCO, 2009, 15), scientists have tended to disregard

these interactions; for instance, Soetaert et al. (2000) note that mutual interactions between the water column and sediments have been largely ignored by biogeochemical models. These interactions, however, are highly relevant to understanding the possible environmental impacts of DSM (Aley-nik et al., 2017; Coulin et al., 2017), with recent research suggesting that sediment could take longer to resettle and probably travel farther in the water column (Gillard et al., 2019).

In addition to these legal and scientific perspectives on the seabed, the ontological *what* question is further complicated by cultural beliefs. For example, when Childs asked members of the Duke of York Tribes of Papua New Guinea what the seabed was to them, they responded by referencing a relational cosmology that includes ‘the ocean as part of the earth’: the people, the fish, and the *masalai* (spirits) (Childs, 2020b, 120). One of these spirits, the *Tamaidok*, was described as the volcano god who ‘defends the sea’ and is the ‘protector of the seabed’s treasures’ (Childs, 2020b, 123). Such visions not only contrast with the corporate vision of fixed riches ready to be exploited from the seabed (as constructed through economic ontologies) but also with the notion of ‘depth’ and the division of the ocean into layers posed by scientists and lawyers. Instead of a space of emptiness, the Duke of York islanders pointed to an interconnected ocean (including the seabed), inhabited by spiritual beings.

It should be clear, then, that neither legal, scientific, nor cultural perspectives can, on their own, capture the many relations of the seabed with marine ecosystems, geologic structures, and coastal economies. That is why we are suggesting that these perspectives receive explicit attention, so that they can be considered when designing and assessing approaches to regulating DSM. Historically, planners and jurists have failed to explicitly ask these foundational questions when extending industrial activity to the ocean, having borrowed largely from spatial metrics developed for governing land. For instance, in the mid-twentieth century, states seeking to develop regulations for offshore oil and gas drilling similarly faced the question of whether existing regulations developed for regulating *onshore* drilling were fit for the offshore environment (Dam, 1965; Young, 1965). Writing specifically with reference to emergent British regulations for offshore oil and gas extraction in the North Sea, Dam notes that onshore protocols were turned to for inspiration, even though that was ‘determined as much by tradition as by logic’ (Dam, 1965, 54) and even though the adoption of onshore regulations required significant modifications due to the unique conditions of the offshore environment. To date, attempts at governing the ocean (e.g. through marine spatial planning) have tended to use land-based references such as demarcation, zoning, and ‘parcelling’ to define surficial areas of marine space, even when applied to resources

(e.g. fish stocks) that move beneath the surface (see Peters, 2020). However, this areal perspective on marine policy is increasingly critiqued by planners who argue for a consideration of the ocean as a ‘dynamic’ or ‘lively space’ (e.g. Duck, 2012; Jay, 2018; Kidd & Ellis, 2012). This alerts us to the need to better interrogate the fundamental question of what is being governed. The specific context of DSM — where exploration sites for manganese nodules in particular cover huge areal swathes of ocean-space on an entirely different scale than found in land-based mining — suggests that the onshore ‘tradition’ may not be so appropriate. Yet in national law, the most common framework for understanding the deep seabed seems to be as an extension of land, whereby regulatory models are fashioned on land-based mining and implementation is overseen by mining administrators rather than ocean management authorities.

For example, Papua New Guinea (PNG) is generally recognized as the country that first initiated attempts at undertaking seabed mining since it granted the world’s first DSM licence in 2011. While the company that was granted that initial licence went bankrupt before commercial mining started, the PNG case is still instructive due to its pioneer status. Permits issued in PNG were based on an extension of onshore mining protocols that, for purposes of the seabed, redefined ‘land’ as ‘the offshore area being the seabed underlying the territorial sea from the mean low water springs level of the sea to such depth as admits of exploration for or mining of minerals’ (Mining Act, 1992, Part I, Sect. 2, “land” d). Many other states, including Namibia and a host of industrialized countries including Japan, Canada, and most members of the European Union, have considered extending existing onshore mining law to the seabed should offshore mining commence in areas of sovereign jurisdiction (Ecorys, 2014). In PNG, environmentalists stress that this framing of the seabed as land has led to a general disregard for impacts on the water column above (PNGGASEM, 2013), and it seems likely that similar objections would be raised elsewhere if seabed mining were to be governed in this way. This demonstrates that examining the question of what the seabed is believed to be is crucial. Indeed, advocates of a cautious approach to seabed mining in the Area have advocated that the ISA should adopt a holistic approach to the marine ecosystem that draws on marine spatial planning initiatives (Tunnicliffe et al., 2018).

Meanwhile, a report produced by the European Union’s MIDAS project repeatedly highlights oil and gas industry standards and practices as potential models for seabed mining industry regulation (MIDAS, 2015). Consistent with that recommendation, Norway has modelled its 2019 Seabed Minerals Act (Norwegian Petroleum Directorate, 2021) on its offshore petroleum legislation, and its seabed mining licencing system is managed by the Norwegian Petroleum Directorate (Schjødt, 2021).

As a point of contrast, New Zealand has developed and applied regulations on seabed mining that, rather than taking land as the (ontological) reference point or turning to offshore drilling as the reference point for industrial practice, place seabed mining within New Zealand's overall marine management strategy (EEZ Act, 2012). Building on a recognition of the divisions within New Zealand's maritime space — the territorial sea, exclusive economic zone, and extended continental shelf, as well as in consideration for the role of the ocean (including the seabed) in Māori lifeways — New Zealand mandates that when permitting seabed mining 'the [Environmental Protection Authority] must take into account the...effects that may occur in New Zealand or in the waters above or beyond the continental shelf' (EEZ Act, 2012). Likewise, the United States' Deep Seabed Hard Minerals Resources Act (DSHMRA), which was implemented to permit participation by United States entities in DSM in areas beyond national jurisdiction in lieu of U.S. ratification of UNCLOS, explicitly extends the remit of environmental impact analyses to include not only 'major benthic organisms' and 'deep seabed biota' but also 'midwater and surface organisms most likely to be affected by commercial recovery activities' (DSHMRA, 2002, Sec. 109). This directive is considerably more detailed than UNCLOS', which simply calls for the ISA to adopt rules to secure effective protection of an unspecified 'marine environment' (UNCLOS, 1982, Art. 145; Annex III, Art. 17). The differences in approaches undertaken by the USA, New Zealand, PNG, and the ISA illustrate the impact that defining (or failing to define) the scope, character, and relative location of a geographic frontier like the seabed can have on the laws and policies that aim for environmental protection.

Finally, even as some legislation has begun to account for the seabed's location in vertical space, relative to the volume of the water column, few states have considered the verticality of the seabed itself. This is likely because most legislation, including that establishing the ISA, was oriented toward the extraction of manganese nodules, which lie at the surface of the seabed. The only piece of legislation that we are aware of that contains an explicit definition of the seabed's depth is the United States' DSHMRA, which defines the applicable area as extending to a depth of 10 m beneath the seabed's surface (DSHMRA, 2002, Sec. 4). The issue of seabed depth will likely require further attention in the future as miners increasingly turn to the extraction of cobalt-rich crusts and polymetallic sulphides that would require greater seabed surface disturbance and as scientists increasingly understand the impacts that this disturbance (and resulting sediment plumes) are likely to have on the water column and species within it (Heffernan, 2019).

## Questioning the 'who': defining the stakeholders

Just as the question of *what* the seabed is has been generally overlooked in the rush to examine questions of possible policy formulation, so too has a careful examination of *who* is subject to the processes and outcomes of potential DSM activities. Although there has been an increasing interest in, and attention to, 'stakeholders' — how they might engage in DSM Environmental Impact Assessments and their limited participation (see Jaeckel et al., 2017; Lallier & Maes, 2016), or as part of a wider ecosystem approach (Vierros et al., 2006) — a careful analysis of *who* stakeholders *are* (and could be) in this context remains underexplored.

A stakeholder can be defined as 'a person, organisation or group with an interest (professional or societal) or an influence on the marine environment or who is influenced directly or indirectly by activities and management decisions' (Newton and Elliot, 2016, 2; see also Pomeroy and Douvere, 2008). Currently, many states, as well as the ISA, are in the process of developing regulations for seabed exploration and exploitation. Therefore, it is paramount to interrogate *who* is identified and recognized as having a connection or interest, as well as the access they have in the drafting of regulations or their level of meaningful participation in other aspects of policy development and governance.

Vierros et al. (2006) explore the identification of stakeholders for areas beyond national jurisdiction. They propose a methodology where the first step involves circulating questionnaires to interested organisations, and where data from these questionnaires is weighed up relative to a set of criteria in order to classify stakeholders' involvement. Evaluating Vierros et al.'s methodology, Ritchie and Ellis (2010, 710) find that it provides a good starting point, but they fear that it can miss relevant stakeholders as well as their main interests, as a questionnaire-based methodology assumes that 'researchers or policy experts have perfect knowledge' of all stakeholders and their demands and expectations, delivering 'privileged' stakeholders through their categorisation.

Indeed, in going back a step to ask *who* the stakeholder is, we can identify how geo-political, spatial, and temporal dimensions (Childs, 2019), as well as social and historical aspects, shape how stakeholders are defined, identified, and included in decision-making processes — in policy and planning — that follow. The term itself reveals a normative focus as it has traditionally been used in corporate governance (Post, 2003). Analysing stakeholder participation in marine spatial planning, Tafon (2017) shows how certain knowledges and groups are marginalized,

delimiting the policy outcomes and sustaining neoliberal logics in marine resource management. Whilst the term can potentially be used to involve a wide range of parties, an appeal to ‘incorporating stakeholder interests’ in itself carries little meaning, as it depends on how stakeholders are defined and included in each organisation or policy making process (Fletcher, 2007).

This is further complicated by the understanding of how the stakeholder concept is applied to DSM, where people have different connections to and dependencies on ocean space. Since human beings neither settle in ocean space nor establish exclusive ownership over maritime zones beyond national jurisdiction, it is often unclear who is affected by seabed mining. We outline three factors that exemplify this complexity. First, whilst it may be easier to establish the traditional uses of ocean *surface* area up to a certain depth (for example, as is the case with fishing activities), such claims are more difficult to extend to use of the seabed below the depths most typically used by humans. Second, the separation of the seabed from the water column is fundamentally a *legal* construction dividing the two spaces in terms of their regulation and use. This severance can significantly impact who is included or excluded as a seabed stakeholder. Finally, stakeholder definition depends on the proposed mining activity’s proximity to the coast and whether it is within national jurisdiction or in an area beyond national jurisdiction. To illustrate these points, the remainder of this section explores the politics of stakeholder definition in examples of DSM regulation, turning to areas of state control as well as the Area, where ISA regulations are being developed. The cases have been selected to exemplify differences in status of mining activities (planned, ongoing, or rejected); status of DSM regulations (under development, enacted, or non-existing); and methods for defining stakeholders and facilitating their input.

To begin, despite some gaps and criticisms (de Wit & Barton, 2014), New Zealand has developed one of the most complete regulations to ‘promote the sustainable management of natural resources’ in its territorial waters and Exclusive Economic Zone (EEZ Act, 2012). The regulations enacted in 2012 provide for a Māori Advisory Committee that can ‘advise’ and ‘comment on’ regulation changes as well as proposed projects to the Environmental Protection Authority (EPA). The iwi community are not the only ones consulted; ‘submissions’ supporting or opposing a marine project can be submitted by *any person* in New Zealand. The EPA thus casts a wide net on *who* stakeholders are: the affected ministries, iwi authorities, customary marine title groups and protected customary rights groups, regional councils, and any other person that the EPA considers to ‘have existing interests that may be affected by the application’ (EEZ Act, 2012, 46–47). The EPA provides all stakeholders that meet this wide definition with a copy of a

given marine mining proposal and, moreover, ‘must conduct a hearing on an application if the applicant or a submitter requests a hearing’ or if the EPA considers it necessary (EEZ Act, 2012, 51). This was the case for the Trans-Tasman application to mine iron sands 20 km south of Taranakii Bight. After 4680 public notices were submitted opposing the project — garnered through the broad stakeholder definition — a robust hearing process took place during 2014 that resulted in the rejection of the application. A new mining application was submitted followed by a second round of submissions and hearings in 2017. This culminated in approval for the project. At this point, another provision of the EEZ Act (2012, 105–113), which called for another round of stakeholder involvement, went into force, as the High Court heard further objections made by a coalition of iwi, conservation, and fishing interests. After the hearing, the project was stopped by the High Court in 2018 and rejected again in 2021 after the company appealed to the Supreme Court. Despite concerns, such as the short time periods provided by the EEZ Act regulations for all parties, in the case of New Zealand the breadth of identification of *who* a stakeholder has allowed for a wide participation of experts as well as concerned groups and everyday individuals in four different hearing processes. The history of seabed mining in New Zealand suggests that when stakeholders are broadly defined and a transparent process is established for incorporating their views, a high threshold is set before seabed mining can take place.

In a different example, the Cook Islands is like many states (and also the ISA) in that, although they do have a broad scope for the definition of stakeholder and a mandate to include their input, there are few specifics regarding how stakeholders will be defined or identified, or how their contribution will be incorporated into decision making. The Cook Islands Seabed Minerals Policy, enacted in 2014, states that ‘the entire nation and its people are the “community” affected by seabed mining activities and that related decisions are best-handled with participation of all concerned citizens, at the relevant level’ (Cook Islands, 2014, 5). The draft Seabed Minerals Policy Act 2019 exploitation regulations reiterate this commitment to ensure ‘participation and consultation with other relevant Government agencies and the Cook Island Community’ (Kung, 2019). However, after a major public consultation process that resulted in numerous submissions, the majority of concerns raised were not addressed. The approved Bill only dedicates a short section on consultations (amending the Environmental Act 2003) that lacks detailed procedures or specific time periods. It does include the ‘Cook Islands Seabed Minerals Advisory Committee’ whose aim is to provide the ‘perspective from the community’ to the Cook Islands Seabed Minerals Authority (Seabed Minerals Act, 2019, 35(2)). This committee is to be composed of at least seven members of whom

‘at least four members [are] appointed by the responsible Minister to present a range of community perspectives or expertise relevant to the achievement of the purpose of this Act’ (Seabed Minerals Act, 2019, 36(b)). Concerns about these regulations and the lack of representation and transparency of the appointees of the Committee have been raised (Cook Islands News, 8<sup>th</sup> March 2013). In particular, opponents of the Bill noted that it grants full authority to the minister responsible for seabed minerals to grant the exploration licence (Asia Miner News, 23 January 2020) and that the minister can remove council members for public dissent. Kung (2019, 14) warns that these provisions could ‘illustrate a scenario of suppression of public opinion’.

The example of the world’s first approved DSM site, the aborted Solwara-1 project in PNG, illustrates that stakeholder identification is not self-evident and that it can stem from a framework of terrestrial mining legislation. Moreover, in this instance imprecise national regulations provided enormous regulatory freedom for the respective company to design policy itself. Solwara-1 was situated within the waters of PNG, approximately 30 km from New Ireland Island and some 50 km from New Britain Island. It had attracted strong interest from the Canadian firm Nautilus Minerals, Inc., which sought to exploit massive sulphide deposits in PNG’s waters. The 1992 Mining Act states that ‘any person may object to the grant (...)’ of a mining lease before a fixed date (Mining Act, 1992, 107) and a ‘Warden’s Hearing’ is to take place that will take into account landholders present as well as ‘other persons as the Warden considers will be affected by the applicant’s programme or proposals’ (Mining Act, 1992, 108). In an apparent recognition that there is no straightforward definition of a marine stakeholder, the Green Paper on Offshore Mining Policy issued by the Department of Mineral Resources published in 1999 acknowledges that ‘major stakeholders in the offshore include the coastal subsistent, artisanal and commercial/industrial fisheries as well as navigators, the tourist industry and so on’ (Green Paper 1999, 75). While the PNG Mineral Resource Authority is responsible for granting mining leases, mining projects also require approvals by the Conservation & Environment Protection Authority (CEPA, previously Department of Environment and Conservation). In order to obtain an environmental permit, which was granted to Nautilus in 2009, formal public consultations that discuss the environmental impact statement with stakeholders are required (Environment Act, 2000, 51, 54, 55). The Act itself does not use the term ‘stakeholders’ but requires consultation with ‘persons who are likely to be affected by carrying out of the activity’ (Environment Act, 2000, 55 c).

Nautilus Minerals emphasized that there were no communities directly affected by their seabed mining projects (Nautilus Minerals, 2015, 23). Yet the tension between supposedly unaffected communities on the one hand, and

national licensing procedures and the interests of provincial governments and local protests on the other, had to be addressed. In other words, the company needed to ‘invent’ a stakeholder identification procedure to demonstrate that persons likely to be affected by its activities had been consulted. The company reached out to some villages selected largely by ‘closeness’ (geographical proximity) to their proposed production sites: New Ireland and the international port proposed to be used on East New Britain (Nautilus Minerals, 2010, 21–22). The main goals of these consultations were to provide information about the Solwara-1 Project, to provide an opportunity for residents to voice concerns, and to comply with national legislation. Later on, the company invented the concept of a ‘Coastal Area of Benefit’, again using proximity as a basis to define an affected stakeholder community (Filer and Gabriel, 2018, 398–399), and negotiated benefit-sharing agreements with the governments of the two provinces closest to its mining areas. In this example, given the lack of legal guidance, the company was ultimately in charge of defining *who* the stakeholders were, which communities to consult, and how. Interrogating this process of *who* the stakeholders are is vital, since in this example it would appear that the interest of the company lay in getting a social license to operate and avoid conflict (as well as comply with regulations) rather than providing a meaningful decision-making process.

Also contentious is the development of seabed mining in Namibia, where offshore diamond mining in shallow waters has occurred since the beginning of the 1940s with no specific seabed mining regulations in place. Although diamond mining operations have increased in size in recent years with investments in new seabed mining vessels (Reuters, 16<sup>th</sup> May 2019), what has raised concerns by environmentalists, as well as the fishing industry, are new plans for phosphate mining near Walvis Bay. Currently, mining is governed by the 1992 Mining Act. In the Act, stakeholder consultations are encouraged as part of the EIA process, yet there is no legal provision for them — nor is there any clear identification of *who* should be involved (IGF, 2018). The Minerals Policy draft made public in 2018 states that ‘the Government will ensure community participation through consultation before companies are allowed to commence metallurgical operations’. However, it is unclear how ‘communities’ are to be defined in the context of the seabed or if ‘metallurgical’ applies to seabed phosphates (Draft Minerals Policy of Namibia, 2018, 3.2). Since the project was licensed in 2011, it has endured a long battle between environmentalist groups and the fishing industry on one side and the Chamber of Mines and the company on the other. A moratorium was set in place in 2013, and the project was given environmental clearance in 2015, but that clearance was subsequently challenged in the courts. The judicial battle that ensued has gone through a consultation process of ‘concerned stakeholders’

(The New Era, 2<sup>nd</sup> November 2016; Benkenstein, 2014); however, *who* these stakeholders are, and how their voices are to be included, is unknown. Presently the High Court has confirmed its mining license but a judge has denied its environmental clearance (The Namibian, 6 July 2021). The battle continues.

Japan has some of the world's most advanced plans for achieving DSM. In 2017, Japan announced it had successfully carried out a DSM test of an inactive hydrothermal vent off the coast of Okinawa. A year later, Japanese engineers announced that they had identified an estimated 16 million tonnes of rare earth minerals offshore of Minamitori Island. Japan Oil, Gas & Metals National Corporation (JOGMEC) announced in July 2020 that 'it had collected 649 kg of cobalt and nickel-rich seabed crust during a world-first test' (JOGMEC, 21 August 2020). This and future extractions are being carried out under regulations developed according to the mandate of Japan's Third Basic Plan on Ocean Policy, published in 2018. With the double aim of promoting the 'industrial use of the ocean' as well as seeking to 'maintain and protect the maritime environment', the policy, which tackles all aspects of ocean policy, specifically aims at promoting 'commercialisation' of seafloor polymetallic sulphides 'with participation of private-sector corporations after the mid-2020s' (Third Basic Plan, 2018, 6). Although specific regulations for exploration, exploitation, or environmental protection are yet to be developed, it is noticeable that the Basic Plan does not outline *who* the stakeholders of this 'industrial use of the ocean' are or by what participatory mechanisms particular stakeholders might be involved.

We conclude this section by shifting our attention to mineral seabed deposits in areas beyond national jurisdiction, where, as was noted earlier, the International Seabed Authority (ISA) is tasked with managing the seabed as 'the common heritage of [hu]mankind' (CHM). Therefore, in the Area, all of humankind are stakeholders, and thus we may *all* be defined as the 'who' that should participate in the debate. The implementation of this principle, however, has proven problematic. The ISA acts as an *agent* for humankind to administer the exploration and eventual exploitation of seabed minerals; however, no clear guidance has been provided by the ISA for the interpretation of the CHM regime (Bourrel et al., 2018). The ISA faces several challenges in order to define *who* is a stakeholder, *who* forms part of mankind. ISA members are states, so humankind is represented by state governments, but a state government might not represent the perspectives of all voices within the state. Likewise, it is not clear if humankind should include future generations. So *how* can humankind be represented, and should this be left for each state or to the ISA to decide?

On the one hand, the ISA has conducted several rounds of public consultations since 2014 that have allowed for individuals to participate, thus taking a very inclusive

approach. On the other hand, there is no formal mechanism to incorporate stakeholder comments in its decision-making process. The 2020 zero draft on the ISA Communications and Stakeholder Engagement Strategy lists member states, observers to the ISA, contractors, and 'other entities' as recognized categories of stakeholders (ISA 2020, 10). This wording suggests a rather small circle the organisation wishes to engage with. Additionally, although the ISA is an organisation of states, not all states have equal voice. In its central decision-making body, the Council, there are reserved seats for large consumers, major producers as well as 'big' investors in the respective minerals, and for special interests, such as populous or economically disadvantaged states. Only accredited stakeholders may contribute to policy making. Currently, about 25 non-governmental organisations representing wider society interests enjoy observer status, giving them the opportunity to sit in on Assembly and Council sessions. However, they do not have the right to vote and have been excluded from meetings of the Legal and Technical Committee (LTC) (Bourrel et al., 2018), so they too need to lobby governments to have their voices taken into account. Who is included and not, then, is a key question for how each state operates.

Whilst governments should represent a wide pool of stakeholders, businesses tend to dominate this influence via their access to sponsoring governments as well as technical knowledge, and states are sometimes perceived to be proxies for corporate interests. This can be seen, for instance, in the request made by Nauru in June 2021 to initiate a 2-year timeline for the ISA to finalise exploitation regulations. This would allow its contractor, Nauru Ocean Resources Inc. (NORI), to begin exploitation in the portion of the Area where it holds an exploration licence. The government of Nauru has emphasized that this application, which is the first ever for exploitation in the Area, is motivated by its desire to be a leader in an industry that it considers instrumental to combat climate change and to provide legal certainty for the industry to move forward (Government of Nauru, 2021). However, some have speculated that the move was driven at the industry's request (Taipei Times, 2021). In the Area, as in portions of the seabed within national jurisdiction, questions of *who* counts as a stakeholder are interwoven with questions regarding *how* stakeholder participation is facilitated and how differences in social power among different stakeholders are accounted for (Ardron et al., 2018; Bourrel et al., 2018; Lallier & Maes, 2016). It is not simply a case of broader inclusion of stakeholders or improving the mechanisms to *enable* their participation. Before, or alongside these changes, a more careful scrutiny is needed of *who* stakeholders even are — *who should* be involved, *who is not* involved and why, and *who determines* what voices are heard and which perspectives are silenced.

## Conclusions

We have argued that a greater interrogation of how the seabed is defined and understood, and a deeper consideration of how stakeholders are identified and the politics of their inclusion, is crucial to the enactment of policy and planning techniques. We have shown that far from being ‘given’, particular (ontological) ways of thinking about the very nature of the seabed and the very identity of stakeholders reflect assumed ‘ways of knowing’. As such, these ‘deeper’ questions require greater consideration to enable more critical, fair, inclusive, and just approaches to the development and regulation of DSM. Indeed, defining what the seabed is — a surface, a volume, an extension of land, a space beneath the ocean, a part of the ocean, a space that is necessarily far removed from human settlement — is not just an academic exercise. Aside from shaping regulatory models, specific *definitions* of the seabed are likely to influence governance in national and international settings, from what particular ministry is given lead regulatory authority, to the scope of Environmental Impact Assessments, to the calculation of risk, and a host of related decisions that are made when designing and implementing regulations. As we have shown, policies undertaken if, for instance, the seabed is considered as an extension of land may ignore the specific impacts seabed mining can cause, which range from the destruction of entire species and communities to causing irreparable damage to important ecosystem functions that can affect carbon sequestration or fisheries production (see for example Levin et al., 2016). Additionally, and in conjunction, who stakeholders are — how they are politically defined in acts and policies and how their voices may then be heard or marginalized — must be addressed in order to consider the political and social implications of DSM. Our review of several examples has highlighted that different regulating authorities have taken different decisions on these matters, and in consequence drafted different policies. Depending on different contexts, the definition of stakeholders who benefit from the seabed (or who could be impacted by its disturbance) can range from all of society to a local fishing community.

The risk of not seriously questioning what the seabed is, and of not examining the politics of who stakeholders even are, is great. A lack of clarity regarding what the seabed is and who can participate in its governance can favour business interests that have the power and knowledge to construct the seabed according to their will, potentially overriding environmental, social justice, or more localized concerns. Moreover, where stakeholders are defined by states and businesses, the voices of many stakeholders may go unheard. In this sense, most cases analyzed in this paper

show that there has been a reliance on ‘fuzzy’ or incomplete accounts of what the seabed is and who a stakeholder should be and how their views should be incorporated. For now, this fuzziness has all too often resulted in seabed policy relying on landed conceptions of mining laws and codes that fail to appreciate the complexity of extraction in this very particular, underwater, environment (e.g. PNG), on a lack of clarity of who a stakeholder is (e.g. Namibia), on how a stakeholder can influence a process (e.g. Cook Islands), or through broadly ‘fuzzy’ regulations for DSM (e.g. Japan). For now, this fuzziness has led either to mining companies organising their own ‘stakeholder’ identification (e.g. Nautilus in PNG) or civil society organisations speaking on behalf of stakeholders (Ovesen et al., 2018).

To conclude, we raise some key points for what such ontological discussions can do for the practical work of policy making and implementation. First, the efforts of this paper to seriously question the often ‘given’ understandings of what the seabed is and who stakeholders are needs continual reflection. As Peters notes in relation to marine conservation policies, ‘[i]t is not sufficient to raise ontological examinations once, as if ways of understanding what “is” are finished and complete, and not always in the making’ (2020, 8). As DSM continues developing, it is paramount to keep a check on how the seabed is being defined by whom for what purpose. For the acceptance of a new technology, it is also important to be aware of how stakeholders are defined and included. What the seabed is and who stakeholders are are not static, unchanging, or immovable ‘facts’ but socio-political, legal, and economic constructions that will lead to specific social, economic, and environmental outcomes through their enrolment into policy outcomes and governance regimes. We thus urge, further, ongoing and continual work in interrogating these often-assumed questions.

Second, within this remit, identifying the ways that the seabed and stakeholders are understood may enable us to practically enact policy differently. For example, what might be the implication of defining the seabed as part of the ecosystem above and below the seabed’s surface? How might policy be enhanced by taking into account cultural or spiritual understandings of ‘what’ the seabed is, or by including likewise emergent geospatial/geologic or biological and chemical understandings of the constitution of the benthic environment? Seriously interrogating what the seabed is will enable policy to better take into account different forms of knowledge that may in turn improve how DSM is undertaken.

The definition of the seabed also has important implications for how stakeholders are defined. A comprehensive consideration of the politics of ‘who’ stakeholders are may permit a greater transparency, equity, and justness to participation. Revisiting some of the cases reviewed

in this article, for instance, we might ask how a consideration of local cosmologies, regional policies for integrating ocean-space into coastal management policies, and national ocean strategies redefine the identification of stakeholders and, consequently, the concerns that are brought to the table. Why not go one step further and universalise the concept of stakeholder (as New Zealand and the ISA have sought to do, albeit in different ways and to varying effect)? In this respect (and following Vierros et al., 2006), given the wide range of ‘uses’ of the seabed and the implications seabed mining can have, a more critical and open view of who a stakeholder is should not only be determined by policymakers and scientists, but arguably needs to involve a wider range of actors and spaces (Ritchie & Ellis, 2010).

In order to forestall what Ranganathan (2019) calls an ‘ocean floor grab’, we need to think seriously about the *what* and *who* in visions of the seabed as essential guidance for emergent policy and for promoting outcomes to achieve a fair and sustainable DSM planning. Before arriving at the question of *how* to govern, *how* to incorporate stakeholders, or *how* to create modes of participation, there must be a discussion of *what*, ontologically, we understand the seabed to be as space of governance, and *who* the stakeholders even ‘are’ — *who* will profit, *who* will suffer, *who* will protect, *who* will exploit, *who* will govern, and to what ends.

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## Declarations

**Conflict of interest** The authors declare no competing interests.

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