
Introduction

1.1 Background: Development of Deep Seabed Mining and the Legal Regime

It was in 1873, during the *HMS Challenger* expedition (1872–1876), that polymetallic nodules were first discovered on the seabed.¹ Yet, it was not until the 1960s that the economic value of these nodules became an issue of international interest.² Soon, exploration for and exploitation of the mineral resources on the seabed area beyond national jurisdiction (the ‘Area’) – that is, deep seabed mining (DSM) – appeared as a topic on the agenda of the United Nations General Assembly. From 1967, under the auspices of the UN, negotiations began for an international DSM legal regime. The final outcome of the long-lasting negotiations was Part XI of the 1982 United Nations Convention on the Law of the Sea (UNCLOS).³ However, owing to the disapproval of industrial countries of the contents of Part XI of the UNCLOS, the Convention did not enter into force until Part XI was amended by the 1994 Agreement.⁴

¹ International Seabed Authority: Exploration Contracts. International Seabed Authority (isa.org.jm).

² In 1962, John Mero said that ‘the nodules are indicated to be forming at an annual rate of 6×10^6 metric tons in [the Pacific] ocean’. The same estimation was repeated in his influential book *The Mineral Resources of the Sea*. According to this estimation, the potential economic value of manganese nodules would be huge. Although it turned out to be far too exaggerated, this estimation stimulated great international interest in deep seabed mining. John Mero, ‘Ocean Floor Manganese Nodules’ (1962) 57 *Economic Geology* 747, 756–758; John Mero, *The Mineral Resources of the Sea* (Elsevier 1965) 235.

³ Adopted on 10 December 1982; entered into force on 16 November 1994.

⁴ Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982, adopted on 28 July 1994, entered into force 28 July 1996 (the ‘1994 Agreement’). States’ divergent attitudes were exemplified in the unilateral national legislation of a group of industrialized countries, and in the mini-treaty arrangement between these states in the 1980s. See Yuwen Li, *Transfer of Technology for Deep Sea-Bed Mining: The 1982 Law of the Sea Convention and Beyond* (Martinus Nijhoff 1994) 87–90. The unilateralism movement created a crisis in the international DSM legal

The International Seabed Authority (ISA) was established upon Part XI's entry into force in 1994, and came into operation in 1996. The ISA is empowered under the UNCLOS to 'organize and control activities in the Area, particularly with a view to administering the resources of the Area'.⁵ It controls activities in the Area by granting permits in the form of contracts.⁶ As of the 27th session of the ISA in July 2022, the ISA has signed 31 contracts for exploration in the Area.⁷ Behind these 31 contracts, there are 22 contractors that fall within three categories: States, publicly funded companies or institutions and private companies.⁸ Private companies were not involved in exploration in the Area until 2011 when Nauru Ocean Resources Inc. (sponsored by Nauru) signed a contract with ISA as the first private company. Thereafter, more private companies joined, which brought the total number of private contractors to ten. All these private companies are currently conducting exploration for polymetallic nodules in the Area.

regime. As a response, the then Secretary-General of the UN initiated a series of informal consultations (1990–1994) which resulted in the amendment of Part XI of the UNCLOS. See ISA, *Secretary-General's Informal Consultations on Outstanding Issues Relating to the Deep Seabed Mining Provisions of the United Nations Convention on the Law of the Sea: Collected Documents* (Collected Documents, ISA, 2002) 1.

⁵ Article 157, UNCLOS.

⁶ Article 153(3), UNCLOS.

⁷ The 2022 report of Secretary-General of the ISA, ISBA/27/A/2. The up-to-date data is available online at: <https://isa.org/jm/exploration-contracts>.

⁸ There are four contractors in the first category: the governments of India, South Korea, Russia and Poland.

Eight contractors belong to the second category: Interoceanmetal Joint Organization (IGO); JSC Yuzhmorgeologiya; China Ocean Mineral Resources Research and Development Association (COMRA); Japan Oil, Gas and Metals National Corporation (JOGMC); Deep Ocean Resources Development Co., Ltd (DORD); Federal Institute for Geosciences and Natural Resources of the Federal Republic of Germany; Institut Français de Recherche pour l'Exploitation de la Mer; and Companhia De Pesquisa de Recursos Minerais.

Ten private contractors in the third category as follows: Nauru Ocean Resources Inc. (2011, sponsored by Nauru); Tonga Offshore Mining Limited (2012, sponsored by Tonga); G TEC Sea Mineral Resources NV (2013, sponsored by Belgium); UK Seabed Resources Ltd (2013, sponsored by the UK); Marawa Research and Exploration Ltd (2015, sponsored by Kiribati); Ocean Mineral Singapore Pte Ltd (2015, sponsored by Singapore); Cook Islands Investment Corporation (2016, sponsored by Cook Islands); China Minmetals Corporation (2017, sponsored by China); Beijing Pioneer Hi-Tech Development Corporation (2019, sponsored by China); and Blue Minerals Jamaica Ltd (2021, Jamaica).

The involvement of private companies⁹ resulted in diverse contractors. More importantly, private investment served as a strong impetus to bringing DSM into the exploitation stage. Unlike States or publicly funded companies or institutions that might have strategic goals and long-term plans for DSM, private companies are normally commerce-oriented. For them, the viability of making profits in a relatively short term is of significance. Along with private companies, there were also calls from some developing countries for progress in the exploitation stage.¹⁰ The likely incentive underlying their suggestions was the potential benefits they might share in accordance with the principle of the common heritage of mankind (CHM). Additionally, the ISA itself was of the opinion that ‘commercialization of marine minerals in the [Area] . . . [was] well within reach and could be attained in the foreseeable future’.¹¹ Thus, it seems that, in spite of the existence of obstacles such as gaps in marine scientific knowledge,¹² the nascency of technology,¹³ fluctuations

⁹ In Dingwall’s opinion, ‘the UNCLOS DSM regime is an unlikely hybrid of capitalist and communist values, embracing the role of private actors while enshrining principles of resource distribution’. Private companies’ prioritizing the protection of investment and economic benefits would cause a sharp tension with the requirements of environmental protection and equitable share of benefits. See Joanna Dingwall, *International Law and Corporate Actors in Deep Seabed Mining* (OUP 2021).

¹⁰ This position was vividly exhibited at the 22nd annual session of the ISA during a discussion of the Legal and Technical Commission’s report on ‘applications for extension of contracts for exploration of polymetallic nodules’. Brazil maintained that it was necessary that the draft decision pertaining to extensions be reworded to ensure that contractors proceed to the exploitation stage at the end of the five-year exploration stage. Cameroon, Chile, Kenya and South Africa supported the position of Brazil. See: ISA, ‘Seabed Council Approves Plan of Work for Crusts Exploration by the Republic of Korea; Delays Approval of Five-Year Extension of Six Exploration Contracts’ (Press Release, SB/22/8, 18 July 2016).

¹¹ ISA, ‘Commercialization of Marine Minerals in Deep Seabed Well within Reach, International Seabed Authority Secretary-General States as he Introduces Annual Report’ (Press Release, SB/22/11, 19 July 2016) 1.

¹² Reference to Section 2.4.2.

¹³ Ecorys, ‘Study to Investigate the State of Knowledge of Deep-Sea Mining’ (Final Report, 28 August 2014) 55–71; Elaine Baker and Yannick Beaudoin (eds.), ‘Sea-Floor Massive Sulphides — A Physical, Biological, Environmental, and Technical Review’ (Review, Secretariat of the Pacific Community, 2013) 43–48. Available at: http://dsm.gsd.spc.int/public/files/meetings/TrainingWorkshop4/UNEP_vol1A.pdf; Elaine Baker and Yannick Beaudoin (eds.), ‘Manganese Nodules: A Physical, Biological, Environmental, and Technical Review’ (Review, Secretariat of the Pacific Community, 2013) 43–48. Available at: http://dsm.gsd.spc.int/public/files/meetings/TrainingWorkshop4/UNEP_vol1B.pdf; Elaine Baker and Yannick Beaudoin (eds.), ‘Cobalt-Rich Ferromanganese Crusts: A Physical, Biological, Environmental, and Technical Review’ (Review,

in the metals market¹⁴ and the absence of Exploitation Regulations (in the process of development),¹⁵ DSM is in a crucial transitional period moving towards the exploitation stage.

In June 2021, Nauru requested the ISA to complete the framing and adoption of Exploitation Regulations within two years, thereby paving the way for granting permit for exploitation in the Area.¹⁶ Such a request, dubbed as the trigger for the ‘two-year deadline’,¹⁷ has provoked a storm of protest from those who are concerned with and would give priority to the protection of the marine environment. The concerned individuals and groups rallied and strong reactions followed. In September 2021, IUCN World Conservation Congress voted for ‘Motion 069’, calling for a moratorium on deep seabed mining.¹⁸ For the very first time there were two diametrically opposing positions towards DSM. This abrupt change seems to indicate that DSM has come to a crossroads.

It merits noting that the conflicting positions with respect to DSM are by no means a new phenomenon. Since the environment became an international concern in the 1970s, the struggle between the ‘development’ camp and the ‘conservation’ camp has almost never failed to manifest itself in the political and legal contestation concerning the utilization of natural resources. Experience shows that mostly compromise between the two camps was reached in the end, but there were exceptions too. The bridled mineral resource and whaling activities in

Secretariat of the Pacific Community, 2013) 41–45. Available at: http://dsm.gsd.spc.int/public/files/meetings/TrainingWorkshop4/UNEP_vol1C.pdf.

¹⁴ Ecorys, ‘Study to Investigate the State of Knowledge of Deep-Sea Mining’ (Final Report, 28 August 2014) 112–136.

¹⁵ Reference to Section 3.5.1.

¹⁶ By the letter dated 25 June 2021: <https://isa.org.jm/files/files/documents/NauruLetterNotification.pdf>, ‘Nauru requests the President of ISA Council to complete the adoption of rules, regulations and procedures necessary to facilitate the approval of plans of work for exploitation in the Area’, ISA News: <https://isa.org.jm/news/nauru-requests-president-isa-council-complete-adoption-rules-regulations-and-procedures>.

¹⁷ See Pradeep A. 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. The trigger of the ‘two-year deadline’ has also provoked a strong reaction from international lawyers who are concerned with the readiness of Exploitation Regulations in such a rush.

¹⁸ IUCN World Conservation Congress ‘Motion 069’: www.iucncongress2020.org/motion/069 for the voting record, see: www.savethehighseas.org/momentum-for-a-moratorium/. Later, on 14 December 2021, at the 26th session of the Assembly of the ISA, DSCC requested for a moratorium on DSM in its intervention: https://isa.org.jm/files/files/documents/DSCC_item9.pdf.

Antarctica are two examples. Here, questions arise, ‘Will the polarized positions towards DSM activities, as exemplified by Nauru’s request and IUCN’s call, respectively, bring a dreadful “either/or” question before all participants in DSM? ‘Can compromise be achieved? ‘Which way to take for DSM in the future? One needs to wait and see what answers turn out to these questions. This book does not attempt to conduct systematic analyses of these questions of a contingent nature, but the position taken by this book is explained in the following paragraph.

This book does not favour a moratorium on DSM for the sake of marine environmental protection, nor does it favour a rush towards the exploitation stage. It rejects an environmentalist’s proposition of moratorium because such a position gives priority to marine organisms, species, communities and ecosystems but fails to take human conditions and welfare into consideration. The deep seabed appears as a new source of mineral resources that has the potential to meet, to some extent, the growing demand for metals in general, and for certain critical metals for the development of innovative technologies necessary for tackling climate change in particular. True, DSM activities may have (significant) detrimental effects on the deep-sea environment, and historically, we human beings ourselves are causes for ecologic crisis, global warming and other environmental problems we are facing now.¹⁹ To capture the pervasive human influence on nature, Crutzen coined the well-accepted concept ‘Anthropocene’.²⁰ We should certainly learn lessons from history and protect the marine environment in DSM as possible as we can. Nonetheless, to impose a moratorium on DSM is to swing the pendulum to an extreme. In a ‘risk society’,²¹ (environmental) risk cannot be avoided in its entirety but must be managed or regulated. Refusing to take any (environmental) risks would mean a denial of all chances for satisfying human needs. That is a price too high to afford. What is the human reality now? There is a huge and growing world population who are aspiring for a better life and there is a need to resort to innovative

¹⁹ Lynn White Jr., ‘The Historical Roots of Our Ecologic Crisis’ (1967) 155(3767) *Science* 1203. White investigated the relationship between religion, particularly Christianity, and attitudes towards nature. In particular, he considered the Christian human-centred idea as a deep root reason accounting for the ecologic crisis.

²⁰ Paul Crutzen, ‘Geology of Mankind’ (2002) 415(6867) *Nature* 23. In Crutzen’s opinion, we have entered into a new geological period of ‘Anthropocene’ since late eighteenth century when the curtain of industrialization era opened.

²¹ Ulrich Beck, *Risk Society: Towards a New Modernity*, translated by Mark Ritter (Sage 1992). The book was originally published in German in 1986.

technologies to fight climate change. If the world population is not to decrease, if people's aspiration for better life is not to be discouraged and if the transition from fossil fuels to clean energies is not to discontinue, then DSM is worth trying.²² This book embraces the concept of 'conservation science' which recognizes 'the dynamics of coupled human-natural systems'.²³ On the other hand, it rejects the private contractors' commerce-oriented approach because such a position gives priority to investment and profits but disregards everything else of vital value to humanity and ecology. In a word, this book takes the position that DSM should proceed but with extreme care with respect to the protection of the deep-sea environment.

1.2 Research Questions and the Scope

Against this background, this book addresses two major research questions concerning all participants in DSM. First, what are the international environmental obligations of the participants in DSM? Second, what are the legal consequences for them when environmental damage occurs? (this is the international environmental liability issue). The scope of research of the book can be defined by the following three dimensions. First, it discusses the subject matter of DSM at the international level. Second, it deals only with the environmental aspects of DSM. Marine environmental protection constitutes an inherent restraint to the development of DSM. Yet, unlike other restraint elements such as mining technologies and the metals market, the environmental aspects are expected to become increasingly challenging and complex with the advancement of DSM. Third, it addresses the issue of protection of the

²² Kim argued that 'more fundamental societal transformation should be sought after to cope with the foreseeable shortage of metals and guard them against future exhaustion'. He also argued that metal recycling and more efficient governance could be ways to tackle the problem of shortage of metals. See Rakhyun Kim, 'Should Deep Seabed Mining Be Allowed?' (2017) 82 *Marine Policy* 134–137, 135 and 136. Similar arguments were also raised by those who suggested or supported a moratorium on DSM. However, one would be reasonably dubious about the practicability of a fundamental change of the way of life of people as well as the extent to which recycling and more efficient governance would work in meeting the demand of metals. That said, it does not mean that these ways are not worth trying but that they cannot be sufficient reasons for excluding other ways, such as seeking for new sources of mineral resources in the seabed – DSM.

²³ Peter Kareiva and Michelle Marvier, 'What Is Conservation Science?' (2012) 62(11) *BioScience* 962–969, 962.

marine environment in DSM from a legal perspective. And the legal analysis revolves around the two core concepts: obligation and liability.

1.3 Terminology

1.3.1 *Obligation*

As it is stated,

The notion of a legal obligation is fundamental both for the understanding of the legal regulation of conduct and for the analysis of other concepts used in the description and exposition of the law, such as rights, powers and trusts, property, possession and conveyance.²⁴

Indeed, the concept of ‘legal obligation’ is central to law, no matter which school of law one follows. However, there are different understandings of ‘obligation’. For Pufendorf, a proponent of pure natural law, the concept of obligation is the key to turning the natural state into a moral sphere: Obligation has ‘an operative moral quality’ and ‘it places a kind of moral bridle upon our liberty of action’.²⁵ For Bentham and his disciple Austin, obligation exists in both legal and moral contexts, and a key feature of a legal obligation is the probabilistic sanctions in case of disobedience.²⁶ However, in Hart’s opinion, it is of utmost importance to perceive obligation from ‘an internal point of view’.²⁷ A legal obligation necessarily implies the existence of a rule or law. ‘Law’, as per Hart’s narrative, is not imperative order backed with threat, but ‘a combination of primary rule of obligation and the secondary rules of recognition, change and adjudication’.²⁸

Then, in what sense does this book employ the word ‘obligation’? First of all, ‘obligation’ is not discussed in a moral but a legal context. Second, in general this book takes a positivist approach in the sense that the main source of obligation is found in positive international law. Third, this

²⁴ H. L. A. Hart, *Essays on Bentham: Jurisprudence and Political Philosophy* (OUP 1982) 127.

²⁵ Samuel Pufendorf, *Two Books on the Elements of Universal Jurisprudence*, translated by William Abbott Oldfather (Oxford: Clarendon Press 1931). Pufendorf used about one-quarter of Book I to clarify ‘obligation’ as one out of twenty-one important definitions.

²⁶ H. L. A. Hart, *Essays on Bentham* (OUP 1982).

²⁷ H. L. A. Hart, *The Concept of Law* (OUP 1961) 79–88.

²⁸ *Ibid.*, 89–97. Please note that the terms of ‘primary rule’ and ‘secondary rule’ used by Hart in *The Concept of Law* should be distinguished from the same terms used by Ago in the ILC’s work on ‘State responsibility’.

book aims at furthering the understanding of legal obligation seen from participants' perspective, which is an internal point of view. Namely, it elucidates the rules which the participants in DSM perceive as binding on them or the rules that constitute the reason for the participants to act in conformity with certain guidelines and other obligations. Additionally, it is noted that the terms 'duty', 'responsibility' and 'requirement' are used in some contexts which bear the same meaning as the term 'obligation'.

1.3.2 Liability

However, the very use of the concept of 'liability' invites confusion: at the national level, its legal meaning differs between States (particularly between States following common law and those following civil law traditions), and at the international level, it has an intricate relationship with the concept of 'State responsibility'. Considering the same concept of liability is used at both the national and international levels and in different contexts, the meaning of the concept is indeed very confusing.²⁹ For this reason, it is necessary to define the concept of 'liability'. In this book, the concept of 'liability' is employed and used in the same sense as the International Law Commission (ILC) in its work on the topic of 'international liability for injurious consequences arising out of acts not prohibited by international law' ('international liability') because DSM is a specific kind of 'activity not prohibited by international law'. The remainder of this subsection will elaborate on the conceptual evolution of 'international liability' in the work of the ILC, which automatically explains the meaning of the term used in this book.

1.3.2.1 State Liability *Sine Delicto* as Primary Obligation under International Law

The topic of international liability emerged out of State responsibility. In 1970, the then special rapporteur Roberto Ago emphasized that the issue of 'responsibility for risk' should be treated separately from State responsibility.³⁰ His explanation for doing this was that since the basis of responsibility for risk is totally different from that of State responsibility,

²⁹ Nathalie Horbach in her dissertation examines the various meanings of the concept of liability in different contexts in great detail. See Nathalie Horbach, *Liability versus Responsibility under International Law, Defending Strict State Responsibility for Transboundary Damage* (S.l.: s.n. 1996) [Proefschrift Rijksuniversiteit te Leiden].

³⁰ The 1970 report on State responsibility of Ago, UN. Doc. A/CN.4/233.

the nature, content and forms of the rules governing them should also be different. A joint examination of them would create confusion. In his opinion, responsibility for risk arises out of ‘the exercise of an activity which is in itself lawful’, while State responsibility relates to ‘the breach of a legal obligation’.³¹

In 1978, the ILC approved the new topic on international liability and appointed Quentin-Baxter as the first special rapporteur. Yet, doubts about the autonomous status of the new topic existed from the very moment of its inception. Hence Quentin-Baxter was faced with the challenge of defending the autonomy of international liability. In his first three reports,³² he addressed the conceptual basis of international liability. He found that

[t]he regime of liability in respect of acts not prohibited does not detract from the universality of the regime of responsibility for wrongful acts, because the two regimes exist upon different planes. Obligations arising in respect of acts not prohibited are the product of particular ‘primary’ rules: the violation of these or any other ‘primary’ rules brings into play the ‘secondary’ rules of State responsibility for wrongful acts.³³

Identifying international liability as primary rules provided Quentin-Baxter with ‘an iron-clad’ separation wall³⁴ to prevent international liability from ‘trespassing into the Commission’s topic of responsibility’³⁵ which dealt exclusively with the secondary rules. In this manner, Quentin-Baxter defended the autonomous status of the topic of international liability *vis-à-vis* that of State responsibility.

Despite its structural advantages, this approach had its Achilles’ heel. Quentin-Baxter argued for international liability as primary rules that did not require a wrongful act, that is, State liability *sine delicto*. It meant that States were liable in the event damage occurred. However, States resisted this proposition during the negotiations within the Commission. Treaty practice as well as international judicial practice did not support this idea either.³⁶ The resistance of States during the negotiation and a paucity of

³¹ Ibid., para. 6.

³² The preliminary report, 1980 (UN. Doc. A/CN.4/334); the second report, 1981 (UN. Doc. A/CN.4/346); and the third report, 1982 (UN. Doc. A/CN.4/360 and Corr.1).

³³ The preliminary report of Quentin-Baxter, 1980 (UN. Doc. A/CN.4/334), para. 21.

³⁴ The second report of Quentin-Baxter, 1981 (UN. Doc. A/CN.4/346), para. 15.

³⁵ Julio Barboza, *The Environment, Risk, and Liability in International Law* (Martinus Nijhoff 2011) 78.

³⁶ See especially the two surveys of State practice relevant to international liability prepared by the Secretariat in 1985 (UN. Doc. A/CN.4/384) and in 1995 (UN. Doc. A/CN.4/471).

treaty and judicial practice eventually prompted the second special rapporteur Barboza to completely abandon the effort to codify or progressively develop a general rule on State liability *sine delicto*. Barboza further developed the concept of international liability along two different paths. On the one hand, State liability *sine delicto* gave way to State liability *ex delicto* which requires a breach of the obligation of prevention and is triggered by environmental damage. As a consequence, State liability *ex delicto* fell within the scope of State responsibility. On the other hand, State liability was substituted with what is known as the civil liability system, which imposed liability primarily on the operators; this latter path was afterwards further developed into a notion of ‘allocation of loss’.

1.3.2.2 State Liability *Ex Delicto*’s Falling within the Scope of State Responsibility

The understanding of State liability changed within the Commission; the ILC moved from State liability *sine delicto* to State liability *ex delicto*.³⁷ That change was mainly due to the different views on the relationship between prevention and liability among the three special rapporteurs. As described by Barboza,³⁸ Quentin-Baxter did not want the topic of international liability to be assimilated into State responsibility. He therefore broadened its scope to include obligations of prevention from the very beginning. As to the relationship between prevention and liability, Quentin-Baxter saw them as ‘compound primary obligations’. He envisioned State liability as ‘a continuum’ that started with prevention and minimization and then ended with compensation. In addition, Quentin-Baxter adopted a ‘soft approach’ with respect to the legal effect of the obligations of prevention and international liability (the obligation of reparation).³⁹ In his view, failure to take preventive measures, such as providing information, ‘shall not in itself give rise to any right of action’.⁴⁰ In other words, the prevention obligations were just ‘soft’ obligations. Consequently, no legal consequence ensued from their

³⁷ The phrase ‘liability for wrongful acts’ appeared in the tenth report of Barboza, 1994 (UN. Doc. A/CN.4/459) for the first time.

³⁸ Julio Barboza, *The Environment, Risk, and Liability in International Law* (Martinus Nijhoff 2011) 78; see also the fourth report of Quentin-Baxter, 1983 (UN. Doc. A/CN.4/373 and Corr.1 and 2.), para. 39.

³⁹ The fourth report of Quentin-Baxter, 1983 (UN. Doc. A/CN.4/373 and Corr.1 and 2.), para. 43.

⁴⁰ The third report of Quentin-Baxter, 1982 (UN. Doc. A/CN.4/360 and Corr.1), para. 8 and section 2 of the schematic outline.