INTERNATIONAL ENVIRONMENTAL OBLIGATIONS AND LIABILITIES IN DEEP SEABED MINING

Should deep seabed mining (DSM) stop or proceed? The international community is now facing a difficult choice. No matter what decision is made, environmental consideration is the core of the issue. This book tackles the compelling question of how to secure the marine environmental protection in DSM from an international law perspective. It deals with two major research questions: what are the international environmental requirements of participants – the contractor, the sponsoring State and the International Seabed Authority (ISA)? And what are the legal consequences for them when environmental damage occurs? In doing so, it analyses the international DSM legal regime and general international environmental principles, observes the functioning of the ISA, and draws on law and practice of various environmental treaty mechanisms. The examination reveals the practical difficulties as well as fundamental obstacles in the application of international environmental rules and principles in the specific context of DSM.

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To my parents and brothers
with love, laughter and tears

CONTENTS

FOREWORD

This book addresses a highly pertinent topic: the merits and the pitfalls of engaging in deep seabed mining and what international law has to say on this. On the one hand, currently there appear to be some shining prospects for the technological and economic feasibility to mine and process at last a considerable harvest of polymetallic nodules from deep seabed areas beyond the limits of national jurisdiction (also called the Area). Such exploitation can be meaningful for a variety of purposes, including facilitating the much-warranted energy transition from fossil fuels to renewable resources by enhancing the capacity of stockpiling of energy in batteries produced partly with lithium and other rare metals extracted from the polymetallic nodules from the deep seabed. Yet, there is still significant scientific uncertainty about the actual environmental effects of deep seabed mining on the other. What will be the potential pollution, the disturbance of vital marine ecological systems and the loss of marine biological diversity caused by these deep seabed mining activities? Based upon her in-depth research and supplemented by the experience of her encounters with practitioners, the author of this book takes the audacious position that by now the international community could proceed towards actually initiating deep seabed mining, albeit under strict environmental regulations and close international management and supervision.

Dr Linlin Sun's book meticulously builds upon and rearticulates the international law principle of the common heritage of humankind as the fundamental principle for any deep seabed mining regime. Its basic tenets are well known and include: non-appropriation, an international legal regime, sharing of benefits, use for peaceful purposes only, and respect for the rights of future generations. Consequently, Dr Sun finds that this principle implies not only rights and benefits but also obligations and burdens, reflecting a delicate balance between development in the public interest of the international community and conservation of nature and protection of the environment. She demonstrates that by now

the environmental dimension of the principle is an integral and inherent restrictive element of the principle of the common heritage of humankind, thus also highlighting its capacity to respond to a fundamental change of circumstances if compared with the time of its inception. Moreover, she convincingly argues that international environmental obligations in deep seabed mining are of an *erga omnes* character, which means that they can also be invoked by non-injured third States and other international actors. It also means that all activities as well as their evaluation must rely upon solid marine scientific knowledge and the best and most environmentally friendly techniques. However, the current status of marine sciences continues to signify great gaps of marine scientific knowledge, which also in the author's view constitutes a fundamental impediment to the speedy development of deep seabed mining as well as its environmental protection. In this way, her book highlights both the crucial role of marine sciences and the necessity to respond to its shortcomings. In doing so, the author delves into the precautionary approach and an administrative approach to the liability of the contractor as two specific legal responses when those from marine sciences are silent or reach their limits.

The book explains in considerable detail the role each participant plays in the marine environmental protection in deep seabed mining, be it a state, a contractor or an international organ. Dr Sun advocates a dual-track regulatory system. The International Seabed Authority (ISA), as established under Part XI of the UN Convention on the Law of the Sea, is regarded as the primary regulator which exercises international public authority *vis-à-vis* the contractor directly. The sponsoring State plays a complementary regulatory role. The latter should focus on enforcement of the regulations at the national level and as a backup to the practical capacity of the ISA. Furthermore, it is up to the contractor as the main operator of deep seabed mining activities, albeit subject to regulations of both the ISA and the sponsoring State, to follow the rules, regulations, procedures, standards and guidelines concerning deep seabed mining. The contractor should do so at both the international and the national level. However, all participants in deep seabed mining may actually contribute, independently or collectively, to marine environmental damage during deep seabed mining activities, although playing different roles and of different nature. Therefore, to prevent and minimize risks or mitigate damage, they all must observe essentially the same international environmental obligations. Most prominently, they are all required to apply the principle of prevention, the precautionary approach, conduct

or review EIAs, prepare for and respond to an environmental emergency, and take seriously the obligation to cooperate. Furthermore, all participants must adhere to and endorse the overarching goal of sustainable development as encapsulated in the World Agenda for 2030.

Against this backdrop of scientific uncertainty about the impact of deep seabed mining, the obligation to apply the precautionary approach is of the utmost importance. The book highlights the fact that the ISA takes the lead in applying the precautionary approach. An international consensus about the contours and the specific meaning and implications of the precautionary approach in the field of deep seabed mining is in the making but still to be achieved. This is at the centre of concern in the ongoing negotiations on the Mining Code: Draft Exploitation Regulations. Nonetheless, in recent years, the ISA has been able to employ already various environmental management tools as they emerged in practice. This distinctive way of applying the precautionary approach reflects a new result-oriented thinking of the ISA with respect to the discharge of its environmental mandate. The sponsoring State is squarely expected to follow the ISA's example in applying the precautionary approach. It should also endorse the EIA guidelines issued by the Legal and Technical Commission of ISA and cooperate with the ISA in adopting and implementing regulations. Moreover, it is widely considered that also general or customary international environmental law is incumbent upon States, by analogy to the application to the ISA and the contractor. New regulatory rules and practices in the context of deep seabed mining DSM in their turn also contribute to the emergence of new developments in international environmental law. As for the contractor, it is now well established that they are required to conduct continuously EIAs and submit environmental impact statements (EISs) and maintain environmentally responsible management and monitoring. Notably, the contractor plays an active role in dealing with environmental emergency by making and implementing 'Emergency Response and Contingency Plan'. In sum, the contractor is under the obligation to meet the highest environmental standards.

However, this is not to say that determination of breaches of environmental obligations of participants is not a difficult task of a scientific character. Therefore, such determination leaves for the time being considerable room for wide margins of appreciation. Even if breaches of environmental obligations are identified, this is not automatically enough for triggering liabilities of participants. For the book demonstrates that international environmental liabilities are still preconditioned on the

actual occurrence of environmental damage and their goal of restoring or compensating environmental damage. In practice, international environmental liabilities of the three principal participants should be taken together as they result into common environmental damage. Nevertheless, evaluation and attribution of environmental damage in deep seabed mining will be far from an easy task. Hence, the author cautions that the role of the liability regimes for marine environmental protection in deep seabed mining should not be overestimated in view of the formidable practical difficulties in the satisfaction of each of these three constituent elements for establishing liabilities. These include internationally wrongful act, environmental damage and the causal link between the act and the damage. Yet, such liability regimes are still badly needed because their very existence could probably serve the function of prevention or deterrence. Considering the difficulties in the application of liability, alternative mechanisms of allocation of loss and damage, including compulsory insurance and the establishment of an environmental compensation fund, and the further development of the administrative approach towards liability of the contractor are explored. So far, the international environmental liability is placed primarily on the contractor as the operator.

These are only some of the takeaways of this rich and well-written book, based as it is upon in-depth academic study and analysis with interesting flashes of their tests in the practice of policy and standard-setting in deep seabed mining. A major contribution of this study is that it presents not only a clear and comprehensive picture of deep seabed mining as a topical issue of the twenty first century, but also explores, analyses and even outlines the newest development of international environmental law in this frontier area of an international legal regime for deep seabed mining. However laudable this already is, in my view the highlight of the book lies in the liability part. This clarifies the concept of international environmental liability through a historical account of the work of the International Law Commission on the topic of 'international liability' and scrutinizes the landmark 2011 advisory opinion by the Seabed Disputes Chamber of the International Tribunal of the Law of the Sea. The author analyses the existing environmental liability regimes in the context of deep seabed mining and examines for this purpose in a comparative way a large number of relevant multilateral environmental treaties and related institutional arrangements. Equally important, Dr Sun also lifts the veil of the practical difficulties in implementing the environmental liability regimes. Her systematic analysis of the liability

issue from the three constituent elements mentioned above deepens the understanding of international environmental liability regimes in general and in the context of deep seabed mining in particular. In doing so, the book also provides highly valuable guidance to their operations in the practical realm.

It is with deep respect and admiration for the research efforts by Dr Linlin Sun that I recommend a wide readership of academics, policy makers and practitioners to take note, and learn from, the analysis and findings of this fine book.

Nico Schrijver
Professor of International Law and former Academic Director of the Grotius Centre for International Legal Studies, Leiden University, The Netherlands.

PREFACE

The advisory opinion of 1 February 2011 delivered by the Seabed Disputes Chamber of the International Tribunal for the Law of the Sea reignited an interest in deep seabed mining (DSM) among international lawyers. Subsequently, research projects on the topic have been getting increasingly popular. What is interesting is the fact that most of the legal studies had a focus on the environmental aspect as if by prior agreement. Why was the resurgent interest in DSM among international lawyers converged on the issue of marine environmental protection in the twenty-first century? This was because, in spite of advancement in marine technologies, marine scientists (in particular, marine biologists) warned of the big unknowns of the deep sea, which generated a major concern about the risks of serious and/or irreversible environmental damage that would be caused by DSM activities. This environmental concern has become the primary constraint for the development of both DSM activities and the DSM legal regime. Questions arose: if DSM activities are not prohibited or suspended, how should participants in DSM behave to protect the marine environment in a context of scientific uncertainty about their activities' environmental impacts? What would be the legal consequences if they failed to protect this environment?

This book belongs to the research wave just described and takes up the above-mentioned questions. It is a revised version of my PhD thesis, the output of a research project (2012–2017) at the Grotius Centre for International Legal Studies of Leiden University. It adopts a conceptual analysis approach. The aim of the book is to conduct a comprehensive examination of the international environmental obligations and liabilities of all participants in DSM. It examines environmental rules and principles under both the international DSM regime (*lex specialis*) and general international (environmental) law. It attempts to pinpoint the situations where environmental rules and principles are clear and where they are still ambiguous; the difficulties of environmental liability regimes' application in practice; the development or deviation of certain

rules and principles in comparison with the existing international environmental law; and the situations where the contractor would be left with ample room for self-regulation rather than adhering to regulations of either the International Seabed Authority (ISA) or the sponsoring State. In short, this book clarifies the legal meanings of international environmental rules and principles and assesses their practical applicability in the specific context of DSM. It interprets the basic legal framework for perceiving and debating the issue of environmental protection in DSM.

In the process of researching and writing this book, I wanted to check my legal interpretations against practice as much as I could. For that purpose, I conducted internships at the ISA, International Tribunal for the Law of the Sea (ITLOS) and International Maritime Organization (IMO) as well as at China Ocean Mineral Resources Research and Development Association (COMRA, a contractor with the ISA) and I interacted with marine scientists, diplomats, contractors and environmentalists. Those experiences and interactions, in particular the on-site observation of the functioning of the ISA at its twenty-first session (2015), left footprints on this book. Hence, this book should not be taken as a product made solely in quiet libraries or studies; it reflects to some extent the ethos of DSM in the twenty-first century as well.

As this book has been ten years in the making (2012–2022), the ethos of DSM has changed in the process. The initial seemingly optimistic prospect of DSM gave way to divided expectations. Such a change, coinciding with the outbreak of the COVID-19 pandemic, was exemplified by the opposing positions of those who argued for a 'speed-up towards exploitation' and those who called for a 'moratorium'. In the meantime, as the drafting work of Exploitation Regulations proceeds, discussions about DSM are getting increasingly technical. Correspondingly, academic research among international lawyers has turned to an interdisciplinary approach. In spite of those changes, the basic legal framework for environmental protection will remain unchanged and will need constant (re)interpretation, for as long as the very topic of DSM is not disregarded. The information in this book was current as of 4 October 2022.

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This book would not have existed had I not met Professor Nico Schrijver at the Xiamen Academy of International Law in the summer of 2011. That initial acquaintance led me to do PhD research under his supervision in Leiden, starting in September 2012 and finishing at the end of 2017; the PhD defence was taken in June 2018. This book is based on my PhD thesis. As my PhD supervisor, Professor Schrijver set a high academic standard for me to meet but at the same time left me the space to develop on my own. During the five years of my stay in Leiden, Professor Schrijver provided me with the most generous help and strong support. I would like to express my wholehearted thanks to him for all he has done for me. I would also like to extend deep gratitude to my second PhD supervisor Professor Eric de Brabandere. I thank him for his always timely responses to my questions and requests, for the many discussions of my chapters, and above all, for his confidence in me.

I benefited from talks with many individuals who are highly knowledgeable in either international law or marine sciences. Specifically, first, I greatly benefited from the discussions with Professor Blokker in the writing of Sections 3.3.6, 6.7.1 and 8.3. Secondly, the discussion with Professor Rene Lefeber at Amsterdam University on the environmental liability issue was inspiring for the writing of the liability part of this book. Thirdly, the discussions with the senior legal officer at the International Maritime Organization Jan de Boer and the legal counsel of International Oil Pollution Compensation Funds Kensuke Kobayashi were helpful in writing Section 5.3. Fourthly, the long talks with marine geologist Dr Sven Peterson at GEOMAR were very valuable in giving me a basic understanding of marine sciences. Fifth, I also benefited from the talks with the Secretary-General of the ISA Michael Lodge on various occasions. Sixth, a part of the published article titled 'Dispute Settlement Relating to Deep Seabed Mining: A Participant's Perspective' was incorporated in Sections 1.1, 8.2.5 and 8.3.3. That article was completed under the supervision of the associate legal officer Dr Naomi Burke during my

internship at the International Tribunal for the Law of the Sea (ITLOS). Judge Liesbeth Lijnzaad at the ITLOS, Professor Seline Trevisanut at Utrecht University and Professor Marcel Brus at Groningen University served as members of the reading committee for my PhD thesis; they gave me invaluable advice for improvement of the manuscript. So did the anonymous reviewers. To all of them I would like to express my sincere gratitude.

Meanwhile, credit should go to the following institutions as they furnished me with the necessary conditions for conducting research and writing a book. The China Scholarship Council funded my PhD research for a period of four years (2012–2016); Leiden University Fund financially supported me to do the field study at the ISA in the summer of 2015; and ITLOS granted me a Nippon Scholarship for the three-month internship at ITLOS in the winter of 2016. From the Peace Palace Library at The Hague, I found almost all the books I needed. The Grotius Centre for International Legal Studies of Leiden University was the best academic home I could ever imagine. It is during my Assistant Professorship at the Law School of Zhongnan University of Economics and Law since August 2018 that I managed to transform my PhD thesis into a book.

The making of this book has taken a long time. I am much indebted to many friends. I thank the former principal legal officer of the ISA Dr Kening Zhang, the current senior legal officer of the ISA Yongsheng Cai, Professor Yuwen Li at Erasmus University Rotterdam, and my former PhD fellows at Leiden, Ruben, Vid, Andrea, Hanna, Floris, Xuechan, Yudan, Hilde, Qiuyin and Xiang, for their various kinds of help, encouragement and companionship. Cecily was generous enough to share with me her experience of academic writing and publication. Nico reminded me from time to time to get this book done when the focus of my work drifted away from deep seabed mining upon my graduation from Leiden; so did Xiangxin. In this respect, I owe special thanks to my editor Joe Ng for his tolerance, patience and gentle push. Additionally, I am grateful to my colleagues and students at Zhongnan for the many hours we spent together at table tennis courts and in classrooms; these activities have been vital for me to maintain a stable psychological state, especially during the difficult time of the COVID-19 pandemic. Last but not least, the unreserved love, sacrifice and expectations of my family are the ultimate source of strength for me to overcome all kinds of difficulties in this long journey. This book is dedicated to them.

ABBREVIATIONS

ABMTs	area-based management tools
AJIL	American Journal of International Law
APEIs	areas of particular environmental interest
ARIO	Articles on the Responsibility of International Organizations
ASR	Articles on State Responsibility
ATCM	Antarctic Treaty Consultative Meeting
AustYBIL	Australian Yearbook of International Law
B.C. Envtl. Aff. L. Rev.	Boston College Environmental Affairs Law Review
B.C. Int'l & Comp.	Boston College International and Comparative Law Review
BASE	best available scientific evidence
BATs	best available technologies
BEPs	best environmental practices
BGR	Federal Institute for Geosciences and Natural Resources (of Germany)
BYIL	British Yearbook of International Law
CBD	Convention on Biological Diversity
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
CCZ	Clarion–Clipperton (Fracture) Zone
CDR	Central Data Repository
CEE	Comprehensive Environment Evaluation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Chinese JIL	Chinese Journal of International Law
CHM	common heritage of mankind
CIL	customary international law
CLC	International Convention on Civil Liability for Oil Pollution Damage
COP	Conference of Parties
Cornell Int'l L. J.	Cornell International Law Journal

CRAMRA	Convention on the Regulation of Antarctic Mineral Resource Activities
CUP	Cambridge University Press
CVM	contingent valuation methodology
DSM	deep seabed mining
ECF	environmental compensation fund
ECJ	European Court of Justice
EIA	environmental impact assessment
EIS	environmental impact statement
EJIL	European Journal of International Law
EMMP	environmental management and monitoring plan
EMP	environmental management plan
EMS	environmental management system
EPC	Economic Planning Commission
EU ELD	EU Environmental Liability Directive
EU	European Union
FinnishYBIL	Finnish Yearbook of International Law
Front. Mar. Sci.	Frontiers in Marine Science
GDV	German Insurance Association
Geo. Int'l Envtl. L. Rev.	Georgetown International Environmental Law Review
GESAMP	Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection
GIP	Good Industry Practice
GRIR	Geneva Papers on Risk and Insurance Review
GSR	Global Sea Mineral Resources NV
Harv. Int. Law J.	Harvard International Law Journal
HELR	Harvard Environmental Law Review
HNS	hazardous and noxious substances
ICJ	International Court of Justice
ICLQ	International and Comparative Law Quarterly
IDI	International Law Institute (Institut de Droit International)
IEE	Initial Environment Evaluation
IEL	International Environmental Law
IJMCL	International Journal of Marine and Coastal Law
ILA	International Law Association
ILC	International Law Commission
ILM	International Legal Materials
IMMS	International Marine Minerals Society
IMO	International Maritime Organization
Ind. J. Global Legal Stud.	Indiana Journal of Global Legal Studies

INEA	International Environmental Agreements: Politics, Law and Economics
IOLR	International Organizations Law Review
IOPC	International Oil Pollution Compensation
IPCC	Intergovernmental Panel on Climate Change
IRZs	impact reference zones
ISA	International Seabed Authority
ISO	International Organization for Standardization
ITLOS	International Tribunal for the Law of the Sea
JEM	Journal of Environmental Management
JMLC	Journal of Maritime Law and Commerce
JOGA	Journal of Ocean Governance in Africa
JPI-O	Joint Programming Initiative-Oceans project
JYIL	Japanese Yearbook of International Law
La. L. Rev.	Louisiana Law Review
LJIL	Leiden Journal of International Law
LTC	Legal and Technical Commission (of the ISA)
MARPOL	International Convention for the Prevention of Pollution from Ships
MaxPlanckUNYB	Max Planck Yearbook of United Nations Law
Mich. J. Int'l L.	Michigan Journal of International Law
Mich. L. Rev.	Michigan Law Review
MIDAS	Managing Impacts of Deep-Sea Resource Exploitation project
MJECL	Maastricht Journal of European and Comparative Law
MJIL	Melbourne Journal of International Law
MPEPIL	Max Planck Encyclopedia of Public International Law
MPIL	Max Plank International Law
MSR	marine scientific research
N.Y.U. Envtl. L. J.	New York University Environmental Law Journal
NEPA	US National Environmental Policy Act
NGOs	non-governmental organizations
NIEO	New International Economic Order
NILR	Netherlands International Law Review
Nordisk Tidsskrift Int'l Ret	Nordisk Tidsskrift for International Ret (Nordic Journal of International Law)
NRDA	Natural Resources Damage Assessment
NYIL	Netherlands Yearbook of International Law
NZYIL	New Zealand Yearbook of International Law
Ocean Coast Manag.	Ocean & Coastal Management
ODIL	Ocean Development and International Law
OECD	Organisation for Economic Co-operation and Development

OPA	US Oil Pollution Act
OUP	Oxford University Press
PCA	Permanent Court of Arbitration
PCIJ	Permanent Court of International Justice
PRZs	preservation reference zones
RdC	Hague Academy (of International Law) Collected Courses (Recueil des cours de l'Académie de la Haye)
RECIEL	Review of European Community & International Environmental Law
REMPs	regional environmental management plans
RIAA	Reports of International Arbitral Awards
SDC	Seabed Disputes Chamber (of the ITLOS)
SEA	Strategic Environmental Assessment
SIMPLY	The Scandinavian Institute's Maritime and Petroleum Law Yearbook
SJILC	Syracuse Journal of International Law and Commerce
SPC	The Pacific Community
Stan. Envtl. L. J.	Stanford Environmental Law Journal
Tex. Intl. L. J.	Texas International Law Journal
Tul. L. Rev.	Tulane Law Review
UN	United Nations
UNCC	United Nations Compensation Commission
UNCLOS	United Nations Convention on the Law of the Sea
UNECE	UN Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO-IOC	International Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization
UNFCCC	UN Framework Convention on Climate Change
UNGA Res.	UN General Assembly Resolution
US	The United States
Utrecht L. Rev.	Utrecht Law Review
Va. J. Int'l L.	Virginia Journal of International Law
Va. Law Rev.	Virginia Law Review
Vand. L. Rev.	Vanderbilt Law Review
WTAC	willingness to accept compensation
WTP	willingness to pay
WULQ	Washington University Law Quarterly
YILC	Yearbook of International Law Commission
YIntlEnvL	Yearbook of International Environmental Law