The International Seabed Authority and Marine Environmental Protection: A Case Study in Implementing the Precautionary Principle

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The International Seabed Authority and Marine Environmental Protection: A Case Study in Implementing the Precautionary Principle

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Abstract

The deep oceans house astonishingly high levels of biodiversity and are critical to the Earth's ecological health and human well-being. Venturing into this extraordinary environment, human exploration for raw materials has reached new depths with mineral deposits being explored on the deep ocean floor, up to 6000 meters below the surface. Commercial-scale mining of seabed minerals is likely to start in the near future and presents a range of uncertainties as well as risks of significant environmental harm. The International Seabed Authority (ISA) has exclusive competence over minerals on the international seabed. It is critically important that the ISA applies a precautionary approach to deep seabed mining to ensure environmental harm will not exceed an acceptable level once mining commences.

This thesis examines the environmental mandate of the ISA and the implementation of the precautionary principle by the ISA in its regulation and management of deep seabed mining. In doing so, the analysis is not limited to an examination of the inclusion, or otherwise, of the precautionary principle into the legal framework of the ISA. Rather, this thesis examines the actual implementation of the principle in practice through the work of the ISA. In particular, this thesis examines the ISA's ongoing work on the development of a system of environmental protection standards and measures as well as procedural safeguards and decision-making processes that facilitate risk assessment and risk management. Synthesising the literature on the meaning and implementation of the precautionary principle, this thesis develops a set of steps, identified as an implementation cycle, by which the precautionary principle can be operationalised. This implementation cycle is then used as the framework against which the ISA's risk assessment and risk management measures are analysed and evaluated.

This thesis identifies strengths in the manner and extent to which the ISA is implementing the precautionary principle. However, it also reveals significant weaknesses and lacunae in the existing regulatory framework of the ISA. This thesis identifies a range of protective measures as well as procedural and institutional arrangements that may be adopted to ensure the precautionary management of deep seabed mining by the ISA.

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List of Abbreviations

ABNJ	Areas beyond national jurisdiction
AIS	Automatic Identification System
APEI	Areas of Particular Environmental Interest
ATS	Australian Treaty Service
BAT	Best available technology
BBNJ Working Group	United Nations Working Group to Study Issues Relating to the Conservation and Sustainable Use of Marine Biological Diversity Beyond Areas of National Jurisdiction
BEP	Best environmental practices
CBD	Convention on Biological Diversity
CCZ	Clarion-Clipperton Zone
CenSeam	Census of Marine Life on Seamounts
CIA	Central Intelligence Agency
CLCS	Commission on the Limits of the Continental Shelf
cm	Centimeter
COP	Conference of the Parties
CRAMRA	Convention on the Regulation of Antarctic Mineral Resource Activities
Crusts Exploration Regulations	Regulations on Prospecting and Exploration for Cobalt-rich Ferromanganese Crusts Regulations in the Area
DNA	Deoxyribonucleic acid
DOALOS	Division for Ocean Affairs and the Law of the Sea at the United Nations
DOSI	Deep Ocean Stewardship Initiative
EC	European Community
ECJ	European Court of Justice
ECOSOC	United Nations Economic and Social Council
ECR	European Court Reports
EIA	Environmental impact assessment
EMP	Environmental management plan
EMP-CCZ	Environmental Management Plan for the Clarion-Clipperton Zone
EU	European Union
FAO	Food and Agricultural Organisation of the United Nations

FSA	Fish Stocks Agreement (Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks)
GATT	General Agreement on Tariffs and Trade
GEF	Global Environment Facility
GIS	Geographic Information System
IA	Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea
IAEA	International Atomic Energy Agency
ICAO	International Civil Aviation Organization
ICJ	International Court of Justice
ICRW	International Convention for the Regulation of Whaling
ILA	International Law Association
ILC	International Law Commission
ILM	International Legal Materials
IMF	International Monetary Fund
IMO	International Maritime Organisation
IO	International organisation
ISA	International Seabed Authority
ITLOS	International Tribunal for the Law of the Sea
IUCN	International Union for the Conservation of Nature
km	Kilometers
LOSC	United Nations Convention on the Law of the Sea
LTC	Legal and Technical Commission
MIDAS	Managing Impacts of Deep-seA reSource exploitation (research project)
MPA	Marine protected area
MSR	Marine scientific research
NEAFC	North-East Atlantic Fisheries Commission
NGO	Non-governmental organisation
Nodules Exploration Regulations	Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area
OECD	Organisation for Economic Co-operation and Development
OPCW	Organisation for the Prohibition of Chemical Weapons
Part XI	Part XI of the United Nations Convention on the Law of the Sea

RFMO	Regional Fisheries Management Organisations
RSR	Reciprocating States Regime
SDC	Seabed Disputes Chamber
SEA	Strategic environmental assessment
Sulphides Exploration Regulations	Regulations on Prospecting and Exploration for Polymetallic Sulphides in the Area
UK	United Kingdom of Great Britain and Northern Ireland
UN	United Nations
UNCLOS III	Third United Nations Law of the Sea Conference
UNEP	United Nations Environment Programme
UNGA	United Nations General Assembly
UNSC	United Nations Security Council
UNTS	United Nations Treaty Service
US	United States of America
USD	United States Dollars
WHO	World Health Organisation
WSSD	World Summit on Sustainable Development
WTO	World Trade Organisation
WWF	World Wildlife Fund
WWII	World War II

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1987 *Declaration on the Second International Conference on the Protection of the North Sea* (London, 24-25 November 1987), articles VII, XV(ii), XVI(1)

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PART I: CONTEXT – SEABED MINING, THE MARINE ENVIRONMENT, AND PRECAUTION

Chapter 1: Seabed Mining and the Marine Environment

1.1 Setting the Scene: The Onset of Deep Seabed Mining

'Deep-seabed mining, while holding enormous promise, is extremely challenging. Mining takes place at a depth of more than 15,000 feet in the open ocean, thousands of miles from land, making it a risky and extremely expensive endeavour.'[1]

The deep ocean remains a mysterious place that has inspired our imagination.[2] Covering more than 50 percent of the Earth's surface, research into this alien world has revealed astonishing discoveries. Instead of being an azoic desert as once thought, 'what little we know indicates that the deep sea supports one of the highest levels of biodiversity on Earth.'[3] The deep ocean, an integral part of our global commons, also sequesters atmospheric carbon dioxide and recycles major nutrients.[4] In short, '[i]t is an immense, remote biome, critical to the health of the planet and human well-being.'[5]

The deep ocean is the setting for an ambitious human endeavour likely to commence in the near future: mining the deep seabed for precious metals and minerals. Indeed, at present, exploration work for minerals is underway at more than 25 sites across the world's oceans, covering a total area approximately the size of Peru. Seabed mining could present significant economic opportunities, yet also brings with it the risk of causing significant harm to deep ocean ecosystems and their biodiversity.[6]

The seabed in areas beyond national jurisdiction (ABNJ) is in a privileged position vis-à-vis most global commons in that it is subject to the unique legal regime established by Part XI of the 1982 *United Nations Convention on the Law of the Sea* (LOSC or Convention)[7] as amended

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[1] *Proceedings of the Twentieth Anniversary Commemoration of the Opening for Signature of the United Nations Convention on the Law of the Sea*, New York, 9 and 10 December 2002 (UN, 2003), page x.

[2] Julian Anthony Koslow, *The Silent Deep: The Discovery, Ecology and Conservation of the Deep Sea* (University of Chicago Press, 2007).

[3] E Ramirez-Llodra et al, 'Deep, Diverse and Definitely Different: Unique Attributes of the World's Largest Ecosystem' (2010) 7 *Biogeosciences* 2851–2899, page 2852; see also Brigitte Ebbe et al, 'Diversity of Abyssal Marine Life' in Alasdair D McIntyre (ed), *Life in the World's Oceans: Diversity, Distribution, and Abundance* (Wiley-Blackwell, 2010) 139–160, page 139.

[4] Kathryn J Mengerink et al, 'A Call for Deep-Ocean Stewardship' (2014) 344 *Science* 696–698.

[5] Ibid, page 696.

[6] ECORYS, *Study to Investigate the State of Knowledge of Deep-Sea Mining - Final Report to the European Commission under FWC MARE/2012/06 - SC E1/2013/04*, (28 August 2014), <https://webgate.ec.europa.eu/maritimeforum/sites/maritimeforum/files/FGP96656_DSM_Final_report.pdf>

[7] *United Nations Convention on the Law of the Sea* (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 3 (LOSC),

by the 1994 *Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea* (IA).[8]

Central to the Part XI regime is the International Seabed Authority (ISA or Authority) which was established as an independent organisation to regulate and govern the use of mineral resources on the seabed in ABNJ.[9] Whilst coastal states retain jurisdiction over the minerals on their continental shelves, the ISA has exclusive competencies in respect of minerals in the 'Area',[10] that is, 'the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction.'[11] All states parties to the LOSC are *ipso facto* members of the Authority.[12] Crucially, Article 136 LOSC declares that '[t]he Area and its resources are the common heritage of mankind.' The Convention further unambiguously provides that '[a]ll rights in the resources of the Area are vested in mankind as a whole, on whose behalf the Authority shall act.'[13] Thus, in exercising its role, the ISA is mandated to organise, carry out, and control activities in the Area on behalf of all of humankind.[14] 'Activities in the area' is a term of art, defined as 'all activities of exploration for, and exploitation of, the resources of the Area.'[15]

Despite controlling access to raw material on the vast international seabed, and having celebrated its 20th anniversary in 2014, the ISA is a chronically overlooked institution. This lack of attention stems from the delay in the onset of seabed mining. Although interest in seabed minerals increased in the 1960s and 1970s, this trickled away due to the financial costs and enormous technological challenges involved in mining in the deep oceans. However, since 2011, 'the level of interest in deep seabed mining has increased rapidly and significantly after decades of being 'on hold'.[16] Thus, as a result of technological advancements and changing economic realities, seabed mining appears to be on the cusp of becoming a reality.

Currently, no legal framework exists to ensure the environmental sustainability of commercial deep seabed mining. This presents a window of opportunity, in advance of actual commercial operations commencing, for the ISA to develop the regulatory framework and institutional capacity needed to ensure that harm to deep ocean ecosystems and their biodiversity will not exceed agreed limits once commercial seabed mining commences.

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[8] *Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea*, (adopted 28 July 1994, entered into force 28 July 1996) 1836 UNTS 3.

[9] LOSC, articles 156, 157.

[10] LOSC, article 137.

[11] LOSC, article 1(1)(1).

[12] LOSC, article 156(2).

[13] LOSC, articles 137(2), 153(1).

[14] LOSC, article 153(1).

[15] LOSC, article 1(1)(3).

[16] Nii Allotey Odunton, 'Statement of the Secretary-General at the Launching of UK Seabed Resources (14 March 2013) <http://isa.org.jm/files/documents/EN/SG-Stats/NAO-Statement.pdf>.

The ISA has the mandate to do so. The LOSC provides for both 'the development of the resources of the Area'[17] and for the protection of the marine environment and tasks the ISA with striking the balance. Article 145 LOSC specifically requires the ISA to take 'necessary measures […] to ensure effective protection for the marine environment from harmful effects which may arise' from activities in the Area.[18] To fulfil this extensive mandate, states equipped the ISA with unusually broad and far-reaching competencies. The ISA not only controls access to minerals in the Area but also has law-making competencies, enforcement powers, and a dispute settlement mechanism. Its extensive environmental mandate and far-reaching competencies, together with its obligation to act on behalf of humankind, and its exclusive jurisdiction over minerals in the Area, provides a unique opportunity for the ISA to foster sustainable use of natural resources. Indeed, the ISA has been described as 'the result of an uncharacteristic attempt by States to adopt a precautionary approach and ensure rational and equitable utilization of the resources of the seabed through regulating the mining industry before the need for regulation had been generally recognized. Part XI was thus ahead of its time [...].'[19]

To date, the ISA has adopted one set of regulations on prospecting and exploration for each of the three types of mineral deposits in which interest has thus far been shown (polymetallic nodules, polymetallic sulphides, and ferromanganese crusts) in 2000,[20] 2010,[21] and 2012,[22] respectively. Collectively, these are referred to as *Exploration Regulations* and they form part of the ISA's 'Mining Code', which refers to the rules, regulations and procedures issued by the ISA pursuant to its law-making mandate. With these *Exploration Regulations*, the ISA established a contractual system, as foreseen in the LOSC,[23] for the initial exploration for minerals. Pursuant to this system, the public or private entity carrying out the exploration work receives a contract from the ISA, granting them exclusive rights over a particular area for 15 years. Each contractor must be sponsored by a member state of the ISA of which it is a national.[24] Since 2001, the ISA has approved 27 applications for contracts to explore minerals in

[17] LOSC, article 150(a).

[18] LOSC, article 145.

[19] Christopher W Pinto, 'The United Nations Convention on the Law of the Sea: Sustainable Development and Institutional Implications' in Peter Bautista Payoyo (ed), *Ocean governance: Sustainable Development of the Seas* (United Nations University Press, 1994) 3–27, page 16.

[20] *Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area*, ISBA/6/A/18 (13 July 2000), amended by ISBA/19/A/9; ISBA/19/A/12 (25 July 2013) and ISBA/20/A/9 (24 July 2014) (*Nodules Exploration Regulations*).

[21] *Regulations on Prospecting and Exploration for Polymetallic Sulphides in the Area*, ISBA/16/A/12/Rev.1 (15 November 2010), amended by ISBA/19/A/12 (25 July 2013) and ISBA/20/A/10 (24 July 2014) (*Sulphides Exploration Regulations*).

[22] *Regulations on Prospecting and Exploration for Cobalt-rich Ferromanganese Crusts in the Area*, ISBA/18/A/11 (27 July 2012), amended by ISBA/19/A/12 (25 July 2013), regulation 1(3)(a)-(b) (*Crusts Exploration Regulations*).

[23] LOSC, article 153.

[24] LOSC, article 153(2)(b), annex III article 4(3).

the Area. With the first exploration contracts expiring in the coming years, the ISA is now faced with the significant challenge of needing to develop the regulatory framework for commercial-scale exploitation of minerals in the Area. This regulatory framework will not only be a prerequisite for the commencement of commercial-scale mineral exploitation, but will also allow the ISA to set the environmental, social, and also financial parameters for what 'could ultimately be the largest scale human activity to impact the deep-sea floor directly.'[25]

In this context, seabed mineral mining presents not only a potentially imminent challenge but also a momentous opportunity. The ISA is in a unique position to create a new benchmark for ocean governance and natural resource management. In the words of ISA Secretary-General Nii Allotey Odunton, uttered in 2014:

> With the current transition from exploration to exploitation, the next three to five years will be a key period for deep sea-bed mining activities, as well as for the Authority to discharge its mandate faithfully.[26]

Against this background, the present chapter examines what is at stake in the context of adding seabed mining to the catalogue of existing anthropogenic impacts on marine spaces and ecosystems. Section 1.2 explores the problem which this thesis addresses: the need for appropriate regulation and management of the environmental risks of seabed mining. In doing so, Section 1.2.1 introduces the deep ocean environment and the mineral resources therein, followed by Section 1.2.2, which sets out the environmental risks and uncertainties associated with seabed mining. Building on this discussion, Section 1.2.3 makes the case for a precautionary approach to the regulation and administration of seabed mining. Section 1.3 then sets out the objectives of this thesis while Sections 1.4, 1.5, and 1.6 respectively provide information on the terminology, methodology, and structure of this thesis.

1.2 Exploring the Problem

1.2.1 The Marine Environment of the Deep Seabed and its Mineral Resources

Despite their importance and size, 'the oceans and the life they contain are seriously understudied.'[27] In fact, only around five percent of the oceans have been systematically

[25] Eva Ramirez-Llodra et al, 'Man and the Last Great Wilderness: Human Impact on the Deep Sea' (2011) 6 *PLoS ONE* e22588.

[26] Nii Allotey Odunton, 'Current Developments Related to Mining in the Area and the Work of the International Seabed Authority' (28 January 2014) <https://www.isa.org.jm/files/documents/EN/Press/Japan-Jan2014.pdf>.

[27] Meryl Williams et al, *Scientific Results to Support the Sustainable Use and Conservation of Marine Life: A Summary of the Census of Marine Life for Decision Makers* (Census of Marine Life International Secretariat, 2011), page 2.

explored by humans.[28] This portion becomes infinitesimal when assessing only seabed environments,[29] though research efforts have been increasing.[30] What we have learned about the deep oceans suggests that they house millions of yet-to-be-discovered species and play crucial roles for ecological processes as well as carbon and nutrient recycling.[31]

The ocean floor covers over 71 percent of the Earth's surface with approximately 90 percent of the oceans being deep sea,[32] generally defined as below 200 meters. The mean water depth is 3800 meters and 50 percent of the oceans are below 3000 meters depth.[33] Despite these staggering figures, we know very little about the deep sea. In fact, the deep sea 'is the largest and least known ecosystem on the planet.'[34]

Although characterised by darkness, enormous pressure, and low concentrations of oxygen, research has found the deep oceans to be teeming with life. Deep oceans house a series of different habitats, such as mid-ocean ridges, canyons, seamounts, cold-water coral reefs, hydrothermal vents, and abyssal plains, each supporting specific microbial and faunal communities that are distinct from the fauna found in the upper ocean.[35] Discoveries from marine scientific research have been astonishing. 'Since 1840, 28 new habitats/ecosystems have been discovered from the shelf break to the deep trenches and discoveries of new habitats are still happening in the early 21st century.'[36]

The Census of Marine Life, a major 10-year research project has added significant information to the knowledge base.[37] The project's findings that '[t]oday, fisheries, hydrocarbon, and mineral extraction have the greatest impact [on the deep sea], '[38] is particularly relevant when it is considered that, as illustrated in Figure 1-1, seabed mining will reach up to 6000 meters in depth.

[28] Ibid.

[29] Stephen Widdicombe and Paul J Somerfield, Marine Biodiversity: Its Past Development, Present Status, and Future Threats, in Martin Solan, Rebecca J Aspden, and David M Paterson (eds), *Marine Biodiversity and Ecosystem Functioning: Frameworks, Methodologies, and Integration* (Oxford University Press, 2012) 1-15, page 1.

[30] Ramirez-Llodra et al (n 3).

[31] Mengerink et al (n 4).

[32] Ramirez-Llodra et al (n 3), page 2854.

[33] Ibid, page 2852.

[34] Williams et al (n 27), page 4.

[35] Ramirez-Llodra et al (n 3).

[36] Ibid, page 2851.

[37] Williams et al (n 27).

[38] Ibid, page 3.

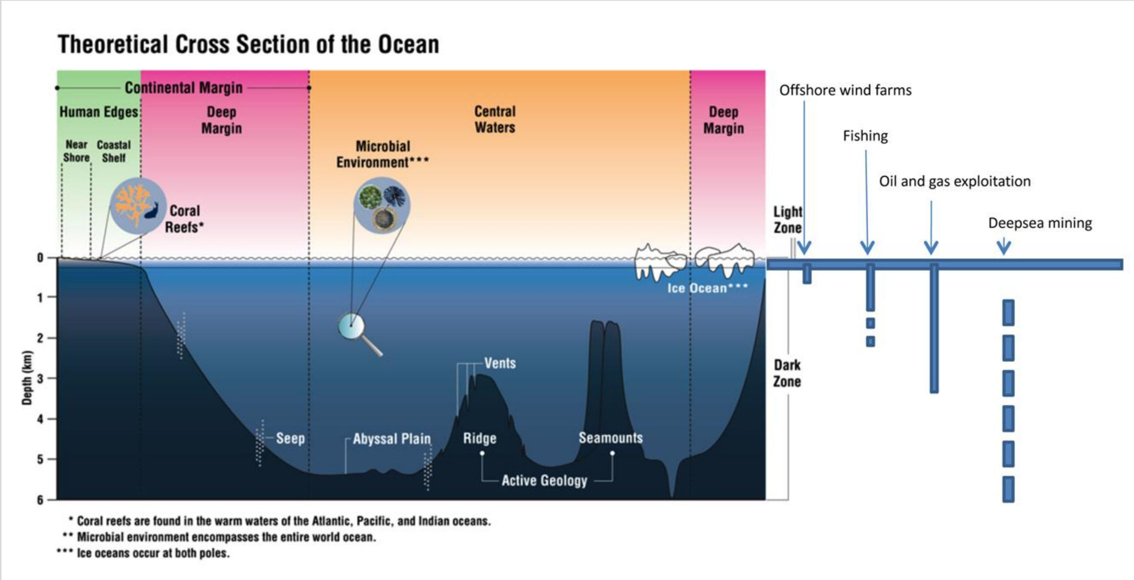

Figure 1-1: Schematic cross-section of the ocean.
The figure indicates ocean realms and current (solid line) and proposed (broken line) depths of exploitation for fishing, oil and gas, deep-sea mining, and wind-farms.
Source: Meryl J Williams et al, 'Making Marine Life Count: A New Baseline for Policy' (2010) 8(10) *PLoS Biology* 1–5.

The work of the ISA currently focuses on three types of mineral resources found on the vast expanses of the deep ocean floor: polymetallic nodules, polymetallic sulphides, and ferromanganese crusts.

Polymetallic nodules were first described by the HMS Challenger expedition of 1872-1876.[39] They are potato-sized concretions found on the seafloor, often partially buried in soft sediments, over vast areas of abyssal plains. Formed around a core, such as a shark tooth or fragments of other nodules,[40] their concentric layers of iron and manganese hydroxides accumulate very slowly 'in the order of a few millimetres per million years.'[41] Polymetallic nodules contain an array of metals, including nickel, copper, cobalt, and manganese.[42] Nodules occur in stable environments and are associated with 'high species diversity, with organisms living in the fine sediment on the seafloor, on the surface of the sediment, attached and within nodules, and in the overlying water column.'[43]

[39] WWF/IUCN, *The Status of Natural Resources on the High-Seas* (WWF/IUCN, 2001), page 39.

[40] Peter Halbach, Günther Friedrich, and Ulrich von Stackelberg (eds), *The Manganese Nodule Belt of the Pacific Ocean: Geological Environment, Nodule Formation, and Mining Aspects* (Enke Publishing, 1988), page 58.

[41] WWF/IUCN (n 39), page 39; Hjalmar Thiel et al, *Environmental Risks from Large-Scale Ecological Research in the Deep Sea: A Desk Study*, (Commission of the European Communities, 1997), page 8.

[42] ECORYS (n 6), page 95.

[43] For example ECORYS (n 6), page 96.

Polymetallic sulphide deposits were only discovered in 1979.[44] Sulphide deposits occur in small areas around hydrothermal vents along mid-ocean ridges and in back arc basins associated with volcanic chains.[45] Mineral-rich and super-heated fluid, of up to 400 degrees Celsius, emanates from vents and the minerals precipitate on the surrounding seafloor.[46] Polymetallic sulphides contain inter alia zinc, copper, and gold.[47]

Hydrothermal vents also offer habitat for chemosynthetic ecosystems that are powered by chemical energy instead of sunlight and include 'luxuriant communities of beautiful and strange invertebrates in an otherwise barren seascape.'[48] Their discovery was described as being 'among the greatest scientific discoveries of the 20th century.'[49] These ecosystems exhibit a high degree of endemism, have 'astoundingly high productivity'[50], and include many species belonging to higher-level taxa not previously known to science.[51] They offer insights 'ranging from Earth processes […] to an understanding of the various ways life can exist in the absence of sunlight and oxygen, […] to defining the lowest branches of the 'Tree of Life' and possibly the origin of life itself on Earth and on other planets.'[52] Moreover, they could provide commercially interesting information for biomedical and biotechnological research.[53]

The third type of deposit, cobalt-rich ferromanganese crusts, occur on seamounts and can be up to 25 centimetres thick. Similar to nodules, crusts form through very slow precipitation of dissolved metals in seawater.[54] They contain a variety of minerals including cobalt, nickel, and

[44] J Francheteau et al, 'Massive Deep-Sea Sulphide Ore Deposits Discovered on the East Pacific Rise' (1979) 277 *Nature* 523-528.

[45] Verena Tunnicliffe, S Kim Juniper, and Myriam Sibuet, 'Reducing Environments of the Deep-Sea Floor', in P A Tyler (ed) *Ecosystems of the Deep Oceans* (Elsevier, 2003) 81-110.

[46] *Marine Mineral Resources: Scientific Advances and Economic Perspectives* (DOALOS and ISA, 2004), pages 48-51.

[47] Sven Petersen and James R Hein, 'The Geology of Sea-Floor Massive Sulphides', in Elaine Baker and Yannick Beaudoin (eds), *Deep Sea Minerals: Sea-Floor Massive Sulphides, a Physical, Biological, Environmental, and Technical Review* (Vol. 1A, Secretariat of the Pacific Community, 2013) 7-18, page 8.

[48] CL Van Dover, 'Tighten Regulations on Deep-Sea Mining' (2011) 470 *Nature* 31–33.

[49] C L Van Dover et al, *Environmental Management of Deep-Sea Chemosynthetic Ecosystems: Justification of and Considerations for a Spatially-Based Approach (Technical Study No 9)* (ISA, 2011), page 2; Maria C Baker et al, 'Biogeography, Ecology, and Vulnerability of Chemosynthetic Ecosystems in the Deep Sea' in Alasdair McIntyre (ed), *Life in the World's Oceans: Diversity, Distribution, and Abundance* (Wiley-Blackwell 2010) 161–182.

[50] HW Jannasch, 'The Chemosynthetic Support of Life and the Microbial Diversity at Deep-Sea Hydrothermal Vents' (1985) 225 *Proceedings of the Royal Society of London. Series B Biological Science* 277–297, page 292.

[51] Van Dover et al (n 49), page 2.

[52] Ibid.

[53] UNGA, UN Doc A/59/62 (4 March 2004), para 243.

[54] ECORYS (n 6), page 98.

rare earth elements.[55] Seamounts also provide habitat for diverse biological communities, including cold water corals.[56] However, '[t]he level of knowledge of seamount ecosystems at depths at which cobalt crusts may be mined is extremely limited.'[57]

As this overview demonstrates, knowledge of the deep oceans is rudimentary, yet estimates suggest around 10 million species living on the seabed beyond the continental margin.[58] Exploring this deep and dark space is an enormous task not least because of the mindboggling scale of the deep sea. Whilst significant advancements in scientific discovery have been made, seabed mining will most likely occur alongside scientific research. Indeed, as will be shown in Chapter 6.2, mineral exploration can generate important new scientific knowledge about the habitat to be mined and its associated species.

As yet, at least three types of mineral deposits relevant for commercial mining have been found on the deep seabed; each being intricately linked with particular habitat for magnificent deep sea ecosystems. This then leads to the question: what is at risk if (or when) commercial-scale seabed mining commences?

1.2.2 The Environmental Risks and Uncertainties of Deep Seabed Mineral Mining

Mineral mining in the deep ocean presents a potential major new stressor on the marine environment. Although some environmental harm may be caused by exploration work, especially since it can include test mining, most environmental damage is expected to be caused during the exploitation phase. Mining seabed mineral deposits will require the removal of ore at ocean depths between 800 to 6500 meters and the pumping of ore to the surface through a lifting system that may be several kilometres in length. This could cause a range of environmental impacts, which are outlines in the following paragraphs.[59]

Removal of minerals is likely to cause destruction of habitat and associated fauna as well as the creation of massive near-bottom sediment plumes lasting for weeks or months, which may lead

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[55] Ibid; James R Hein, 'Cobalt-rich ferromanganese crusts: global distribution, composition, origin and research activities', in ISA, *Polymetallic Massive Sulphides and Cobalt-Rich Ferromanganese Crusts: Status and Prospects (ISA Technical Study No 2)* (ISA, 2002) 36-89.

[56] Marine mineral resources: scientific advances and economic perspectives (n 46), pages 62-64, 69; ECORYS (n 6), pages 99-100.

[57] ECORYS (n 6), page 99.

[58] UN Doc A/59/62 (n 53), paragraph 224.

[59] For a detailed discussion of the impacts, see International Council for the Exploration of the Sea (ICES), *Report of the ICES/NAFO Joint Working Group on Deep-Water Ecology*, 16-20 February 2015, Portugal, ICES CM 2015/ACOM:27, pages 44-45; ECORYS (n 6), pages 94-110; Cindy Lee Van Dover, 'Mining Seafloor Massive Sulphides and Biodiversity: What Is at Risk?' (2010) 68 *ICES Journal of Marine Science* 341–348.

to alterations in the seabed and water column communities and affect food availability.[60] The distance that plumes will travel is not known.[61]

Additionally, the mining of sulphide deposits will likely release toxic chemicals into the plumes, the impact of the toxicity of which is currently unknown.[62] A study prepared for the European Commission summarises the impacts in relation to nodules: 'It is expected that many organisms living on the sea floor within the top 50cm of the sediment will be destroyed.'[63]

Environmental effects on the midwater column and surface waters can be caused by plumes created by returned water, following the pumping of ore to the surface.[64]

> Such plumes may have a high density of small particles and may also contain toxic chemicals. They may cause changes in pH and temperature. Their potential impact on midwater organisms is unknown. If this returned water is warmer than the ambient water, the plumes may rise in the water column and potentially affect the plankton by reducing light levels. Alternatively, the presence of iron in the plume may enhance plankton growth and change the nature of the plank- tonic communities.[65]

Furthermore, impacts may be caused by noise and light pollution from the mining equipment which could affect marine mammals.[66] Lastly, accidents could result in leakage of oil, sewage and other contaminants from the lifting system or the surface vessels.[67]

In addition to these impacts, each type of mineral deposit presents particular environmental challenges. For polymetallic nodules, the scale of mining is especially problematic.

> The vast spatial scales planned for nodule mining dwarf other potential direct human impacts. Nodule-mining disturbance will likely affect tens to hundreds of thousands of square kilometres with ecosystem recovery requiring many decades to millions of years (for nodule regrowth).[68]

For polymetallic sulphides, mining is expected to 'create permanently (in terms of human timescale) disturbed areas at the mine site.'[69] Although some recovery of vent ecosystems may

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[60] Hjalmar Thiel, 'Evaluation of the Environmental Consequences of Polymetallic Nodule Mining Based on the Results of the TUSCH Research Association' (2001) 48 Deep Sea Research II 3433; B S Ingole, S Pavithran, and Z A Ansari, 'Restoration of Deep-Sea Macrofauna after Simulated Benthic Disturbance in the Central Indian Basin' (2005) 23 *Marine Georesources & Geotechnology* 267–288.

[61] ICES (n 59), page 44.

[62] Ibid; R E Boschen et al, 'Mining of Deep-Sea Seafloor Massive Sulfides: A Review of the Deposits, Their Benthic Communities, Impacts from Mining, Regulatory Frameworks and Management Strategies' (2013) 84 *Ocean and Coastal Management* 54–67.

[63] ECORYS (n 6), page 97.

[64] Malcolm Clark and Samantha Smith, 'Environmental Management Considerations', in Elaine Baker and Yannick Beaudoin (eds), *Deep Sea Minerals: Manganese Nodules, a Physical, Bio- Logical, Environmental, and Technical Review* (Vol. 1B, Secretariat of the Pacific Community, 2013) 27-42.

[65] Ibid; ICES (n 59), page 44.

[66] ECORYS (n 6), pages 100-109; ICES (n 59), page 44.

[67] ICES (n 59), page 44.

[68] Adrian G Glover and Craig R Smith, 'The Deep-Sea Floor Ecosystem: Current Status and Prospects of Anthropogenic Change by the Year 2025' (2003) 30 *Environmental Conservation* 219–241, page 219.

occur, because active hydrothermal vents are subject to frequent disturbance and seismic activity, this may depend on the frequency and scale of mining.[70] Extracting polymetallic sulphides could result in *inter alia* the loss of habitat for chemosynthetic ecosystems, extinction of endemic or rare taxa, decreased diversity at all levels, and decreased seafloor primary production.[71] However, some researchers doubt the resource, and hence also economic, potential of polymetallic sulphide deposits, highlighting another uncertainty with respect to the mining of sulphides on the seabed.[72]

Extracting ferromanganese crusts is especially technologically challenging as it requires separating the crust from the underlying rock substrate. This could destroy fauna on the crusts themselves[73] as well as habitat. Whilst the mined areas will likely be smaller than for nodules, some researchers expect a high potential for species extinctions owing to the suspected endemic nature of seamount biota, including cold water coral.[74] However, much remains uncertain as we still 'have a poor understanding of global seamount biodiversity.'[75] It has been demonstrated that even shallower seamount fauna damaged by bottom trawling does not recover within human time scales.[76] Indeed, corals on seamounts at depths in which mining could occur may be as old as 2300 years.[77]

It is clear that seabed mining, like its land-based cousin, will likely cause long-lasting, and potentially irreversible, environmental damage, in particular to marine biodiversity. These risks are aggravated by the potential of pollution to transfer throughout the water column and wider seabed area. Herring summarises the concern: 'the physical continuity of the habitat and the motion of the fluid within it will ultimately transfer the effects of a perturbation at one location round the entire system.'[78] In addition, numerous uncertainties remain,[79] including uncertainty

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[69] ECORYS (n 6), page 93.

[70] Van Dover (n 48), page 33.

[71] Van Dover (n 59).

[72] Sven Petersen, 'Deep-Sea Massive Sulfide Deposits May Not Represent a Major Resource Potential' in *IFM-GEOMAR Annual Report*, 2011 34–35; M Hannington et al, 'The Abundance of Seafloor Massive Sulfide Deposits' (2011) 39 *Geology* 1155–1158.

[73] Glover and Smith (n 68), page 231

[74] Ibid; J A Koslow et al, 'Seamount Benthic Macrofauna off Southern Tasmania: Community Structure and Impacts of Trawling' (2001) 213 *Marine Ecology Progress Series* 111–125.

[75] Mireille Consalvey et al, 'Life on Seamounts' in Alasdair D McIntyre (ed), *Life in the World's Oceans: Diversity, Distribution, and Abundance* (Wiley-Blackwell, 2010) 123–138, page 123.

[76] F Althaus et al, 'Impacts of bottom trawling on deep-coral ecosystems of seamounts are long-lasting' (2009) 397 *Marine Ecology Progress Series* 279-294.

[77] M Carreiro-Silva et al, 'Variability in Growth Rates of Long-Lived Black Coral Leiopathes Sp. from the Azores' (2013) 473 *Marine Ecology Progress Series* 189–199.

[78] Peter Herring, *The Biology of the Deep Ocean* (Oxford University Press, 2001), page 254.

[79] For a detailed list of gaps of knowledge, see ECORYS, *Study to Investigate State of Knowledge of Deep Sea Mining*, Revised Interim report for the European Commission (28 April 2014), pages 125-127.

as to the cumulative effects of repeated habitat disturbances from seabed mining as well as interaction with other activities.[80] In light of our limited knowledge, an accurate prediction of the environmental impact of seabed mining is impossible.[81] As the Secretary-General of the ISA summarised in 2011: 'The current level of understanding of deep-sea ecology is not yet sufficient to allow conclusive risk assessment of the effects of large-scale commercial mining.'[82]

1.2.3 The Need for a Precautionary Approach to Seabed Mining

The previous sections clearly demonstrate the factual urgency to regulate and manage the risks and uncertainties associated with seabed mining. As the discussion also highlights, the present situation presents a momentous opportunity because a competent institution, the ISA, already exists and is specifically mandated to balance seabed mining with environmental protection. In order to achieve its mandate, it is suggested that the ISA must apply the precautionary principle to the regulation and management of seabed mining in the Area. As Smith summarises:

> Anthropogenic impacts in the deep sea have substantially outstripped the predictive abilities of scientists, and this situation will worsen with accelerated human exploitation of the deep ocean. Environmental protection in the deep sea, perhaps more than in any other habitat, will require application of the 'precautionary principle', in which reasonable conservation measures are implemented prior to detailed scientific understanding of the ecosystem.[83]

The precautionary principle has developed as a legal tool to respond to situations that create risks of (environmental) harm. It requires decision-makers to adopt measures to address these risks, even where uncertainties remain. As such, it plays a crucial role in the regulation and management of seabed mining, a topic area perforated with uncertainties as to the technology to be used, the economic case for seabed mining,[84] the precise environmental consequences, and the potential for ecosystem recovery. As a report for the European Commission highlights: 'A cautious approach is thus a vital consideration when considering the topic of deep-sea mining, in order to avoid repeating destructive practices evident in the deep sea from, for instance, bottom trawling.'[85]

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[80] Van Dover (n 48), page 33.

[81] Glover and Smith (n 68).

[82] ISA, ISBA/12/A/2 (13 June 2011), para 68; see also Jochen Halfar and Rodney M Fujita, 'Danger of Deep-Sea Mining' (18 May 2007) 316 *Science* 987; Van Dover (n 59), page 342.

[83] Craig R Smith et al, 'The Near Future of the Deep-Sea Floor Ecosystems', in Nicholas V C Polunin (ed), *Aquatic Ecosystems: Trends and Global Prospects* (Cambridge University Press, 2008) 334-349, page 349.

[84] 'Briefing: Sustainability Issues Related to Deep-Sea Mining', Summary of the workshop *Deep-Sea Mining: an Uncertain Future?* (Institute for Advanced Sustainability Studies, 20 May 2015).

[85] ECORYS (n 6), pages 22, 90.

The application of the precautionary principle has become accepted as a key tool to address the challenges associated with regulating and governing the protection of marine biodiversity in areas beyond national jurisdiction.[86] It is one of the most fundamental, widely accepted, yet, thanks to its vagueness, 'especially controversial', principles of international law.[87] Consensus on the need to apply a science-based precautionary approach to the conservation and management of marine biodiversity in ABNJ has been at the core of discussions in the *UN Ad hoc Open-ended Informal Working Group to study issues relating to the conservation and sustainable use of marine biological diversity beyond areas under national jurisdiction* (BBNJ Working Group). As early as 2006, the BBNJ Working Group considered the precautionary principle to be one of the 'fundamental principles, which had received wide acceptance within the international community', but whose implementation was characterized by significant gaps.[88] Describing the meaning of the precautionary principle, delegations in the BBNJ Working Group

> cautioned that a lack of comprehensive understanding of marine biological diversity and of conclusive scientific research should not lead to delays in the adoption of cost-effective measures aimed at preventing further loss of marine biological diversity. This implied a call to take proactive, rather than reactive measures, based on the best available scientific information.[89]

In sum, states have accepted that achieving the protection of marine biodiversity, and marine ecosystems more broadly, requires the application of the precautionary principle to those activities that impact on the marine environment. Thus, it is important to breathe meaning into the precautionary principle by identifying mechanisms for its application and implementation in practice.[90] As Rayfuse notes, 'the challenge remains of crafting and implementing management and governance regimes genuinely capable of achieving the objectives of precautionary management.'[91]

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[86] UNGA, UN Doc A/Res/66/288 (27 July 2012), paragraphs 158, 162; BBNJ Working Group, UN Doc A/61/65 (20 March 2006), paragraph 33, annex I paragraph 5; Kevin Noone, Rashid Sumaila, and Robert J Diaz (eds), *Valuing the Ocean - Draft Executive Summary* (Stockholm Environment Institute, 2012), page 14; David Freestone, 'Principles Applicable to Modern Oceans Governance (Editorial)' (2008) 23 *The International Journal of Marine and Coastal Law* 385–391, page 391; Tullio Treves, 'Principles and Objectives of the Legal Regime Governing Areas Beyond National Jurisdiction' in Alex G Oude Elferink and Erik Jaap Molenaar (eds), *The International Legal Regime of Areas beyond National Jurisdiction: Current and Future Developments* (Martinus Nijhoff Publishers, 2010) 7–25, page 21.

[87] Duncan French, 'From the Depths: Rich Pickings of Principles of Sustainable Development and General International Law on the Ocean Floor - the Seabed Disputes Chamber's 2011 Advisory Opinion' (2011) 26 *The International Journal of Marine and Coastal Law* 525–568, page 549.

[88] UN Doc A/61/65 (n 86), paragraph 33.

[89] Ibid.

[90] Treves (n 86), page 24.

[91] Rosemary Rayfuse, 'Precaution and the Protection of Marine Biodiversity in Areas beyond National Jurisdiction' (2012) 27 *The International Journal of Marine and Coastal Law* 773–781.

Effective implementation of the precautionary principle requires an in-depth knowledge of the manner in which the principle is being operationalized in existing regimes. Indeed, the BBNJ Working Group has advocated such focus on existing regimes to identify experiences and best practice.[92] Although precautionary thinking 'is strongly entrenched' in the conservation arena,[93] this may be less so for extractive industries. For example, in contrast to the *United Nations Fish Stock Agreement* (FSA),[94] which identifies elements of a precautionary approach to high seas fisheries, Part XI of the LOSC on the seabed mining regime contains no comparable provision. Nevertheless, in order to ensure that the precautionary principle guides the protection of marine biodiversity, it must be applied by organisations, such as the ISA, which regulate and govern activities that have impacts on marine biodiversity. Indeed, as early as 2003, the UN General Assembly called upon actors including the ISA to investigate how they can integrate precautionary biodiversity protection into their work, calling on:

> the relevant global and regional bodies, in accordance with their mandates, to investigate urgently how to better address, on a scientific basis, including the application of precaution, the threats and risks to vulnerable and threatened marine ecosystems and biodiversity in areas beyond national jurisdiction.[95]

More recently, the Seabed Disputes Chamber strongly endorsed the implementation of precaution by the ISA. In its 2011 landmark Advisory Opinion on the *Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area* (*SDC Advisory Opinion*), the Chamber supported a proactive and precautionary approach to seabed mining.[96]

These calls from states as well as an eminent international judicial body, demonstrate the importance of, and urgency for, precautionary environmental management. They also underline a key conclusion; that the ISA must adequately manage the risk of seabed mining with the need to protect deep sea biodiversity in a precautionary manner. However, although the precautionary principle is regarded as crucial in the context of marine environmental protection, it is

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[92] *BBNJ Working Group*, UN Doc A/67/95 (13 June 2012), annex paragraph 8(ii); UN Doc A/61/65 (n 86), annex I paragraph 50.

[93] Rosie Cooney and Barney Dickson, 'Precautionary Principle, Precautionary Practice: Lessons and Insights' in Rosie Cooney and Barney Dickson (eds), *Biodiversity and the Precautionary Principle: Risk, Uncertainty and Practice in Conservation and Sustainable Use* (Routledge, 2005) 287–298, page 289.

[94] *Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks*, (adopted 4 August 1995, entered into force 11 Dec 2001) 2167 UNTS 3, article 6, annex II.

[95] UNGA, UN Doc A/RES/58/240 (23 December 2003), paragraph 52.

[96] *Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area* (Advisory Opinion) (Seabed Disputes Chamber, Case No 17, 1 February 2011), paragraphs 125-135.

characterised by implementation and governance gaps.[97] This has been extensively discussed in relation to the challenges of protecting marine biodiversity in ABNJ.[98] Defined mechanisms and dedicated institutions are needed to give practical effect to this legal principle.

In the context of deep seabed mining, the ISA is the responsible institution, charged with implementing the precautionary principle in the context of deep seabed mining in order to protect and preserve the marine environment from its adverse consequences. The challenge lies in identifying ways and means through which the precautionary principle can be given practical effect.[99]

Given the potential imminence of exploitation activities commencing, an analysis of the ISA's work regarding environmental protection is overdue. Moreover, even if seabed mining is postponed for economic reasons or otherwise, it remains imperative that the risk assessment and risk management framework for seabed mining be developed as soon as possible. Indeed, a core element of the precautionary principle is *timely* action. As such, the significance of this research remains.

1.3 Objectives of the Thesis

The objective of this thesis is to analyse the manner and extent to which the ISA is implementing the precautionary principle in the deep seabed mining context. In doing so, this thesis takes a comprehensive approach to the analysis, examining not just the inclusion of the principle into the legal framework of the ISA, but also its actual application and implementation in the work of the ISA as a practical matter. This includes the development of a system of adequate environmental protection standards and measures as well as procedural safeguards and decision-making processes that facilitate risk assessment and risk management in line with the precautionary principle.

This thesis therefore provides a valuable contribution to the meaning of risk management in the marine biodiversity context and to the content and application of the precautionary principle more generally. In particular, the analysis of the implementation of the precautionary principle by the ISA conducted in this thesis identifies gaps and lacunae in its application and

[97] UN Doc A/61/65 (n 86), paragraph 33.

[98] UN Doc A/67/95 (n 92), paragraphs 34-45; Kristina M Gjerde et al, *Regulatory and Governance Gaps in the International Regime for the Conservation and Sustainable Use of Marine Biodiversity in Areas beyond National Jurisdiction* (IUCN, 2008), page 1.

[99] David Vanderzwaag, 'The Precautionary Principle and Marine Environmental Protection: Slippery Shores, Rough Seas, and Rising Normative Tides' (2002) 33 *Ocean Development & International Law* 165–188.

mechanisms through which precautionary management of deep seabed mining can be better implemented in the future.

This thesis is the first to comprehensively and critically examine the implementation by the ISA of its environmental mandate during the exploration phase for seabed minerals in the Area. In doing so it focuses specifically on whether the current decision-making structures and institutional capacities of the ISA allow for risk assessment and risk management through protective measures and procedural safeguards, in line with the precautionary principle. The specific aims of this study are fourfold:

1. to comprehensively analyse the ISA's environmental mandate, as currently developed in the Mining Code;
2. to shed light on the mandate and workings of the ISA, a powerful international organisation that controls access to vast amounts of raw materials and sits at the centre of what has been described as 'one of the least understood, and so far least operational, international regimes for the utilization of some of the remotest and least accessible natural resources;'[100]
3. to contribute to the knowledge pool a specific example of how precaution can be translated into practice by a regulatory and administrative body;
4. to identify protective measures as well as procedural and institutional arrangements that are and/or can be adopted to ensure the precautionary management of deep seabed mining by the ISA.

The importance of this thesis lies not just in its content, but also in its timing. There is currently a window of opportunity to set in place environmental parameters and safeguards *before* commencement of commercial mining in the Area. In this context, it is imperative to analyse the ISA's successes and challenges with respect to implementing the various elements of the precautionary principle during the mineral exploration phase. This analysis will inform the development of the future regulatory framework for the commercial-scale *exploitation* of minerals. Thus, the findings of this thesis will be crucial in assisting the ISA to adopt a proactive, precautionary approach to what 'represents one of the most significant conservation challenges in the deep sea.'[101]

[100] French (n 87), pages 526-527.
[101] Glover and Smith (n 68), page 219.

1.4 Terminology

Some clarifications regarding terminology are necessary. Throughout the study, reference is made to the *Mining Code*, a collective term for the evolving regulations and recommendations adopted by the ISA. The Mining Code is the primary means through which the ISA develops its mandate conferred by the LOSC and the IA. As noted above, the ISA has currently adopted several sets of recommendations as well as three sets of regulations on prospecting and exploration, one each for polymetallic nodules, polymetallic sulphides, and ferromanganese crusts, referred to throughout the study as the *Exploration Regulations*.

The Mining Code regulates all three phases of seabed mining: prospecting, exploration, and exploitation. These phases are defined in the *Exploration Regulations* as follows.[102] *Prospecting* is akin to marine scientific research and refers to 'the search for deposits of polymetallic nodules in the Area, including estimation of the composition, sizes and distributions of deposits of polymetallic nodules and their economic values, without any exclusive rights.' The term *exploration* is defined broadly and comprises 'the searching for deposits of polymetallic nodules in the Area with exclusive rights, the analysis of such deposits, the use and testing of recovery systems and equipment, processing facilities and transportation systems and the carrying out of studies of the environmental, technical, economic, commercial and other appropriate factors that must be taken into account in exploitation.' Finally, *exploitation* is the recovery for commercial purposes of the relevant mineral deposits in the Area and 'the extraction of minerals therefrom, including the construction and operation of mining, processing and transportation systems, for the production and marketing of metals.' Whilst exploration rights are granted in form of a contract, the prospective contractor applies to the ISA with a *plan of works*, detailing the proposed exploration work.

Some clarifications are also required regarding the use of the terms precautionary *approach* and precautionary *principle*. There has been a somewhat dormant debate around the differences of and preferences for using either term. One possible distinction between *approach* and *principle*, argued by the late Judge Laing, is that an *approach* entails more flexibility.[103] Indeed, there has been a trend in recent practice to opt for *approach*.[104] This is especially true in the fisheries sector,[105] where Marr argues the term *approach* is viewed as allowing for more flexibility and

[102] *Exploration Regulations*, regulation 1(3).

[103] *Southern Bluefin Tuna Cases (New Zealand v Japan; Australia v Japan)* (Provisional Measures) (ITLOS Cases No 3 & 4, 27 August 1999), paragraph 19 (Judge Laing); see also the separate opinion of Judge Ad Hoc Shearer.

[104] Alex G Oude Elferink, 'Governance Principles for Areas beyond National Jurisdiction' (2012) 27 *The International Journal of Marine and Coastal Law* 205–259, page 225; see also the use of 'approach' in *SDC Advisory Opinion*.

[105] David Freestone, 'Implementing Precaution Cautiously: The Precautionary Approach in the Straddling

comprising socio-economic considerations, such as cost-effectiveness of any measures.[106] In the *EC Biotech* case before the World Trade Organization, the US argued for the use of the term *approach* instead of *principle*, which might imply a legally binding nature.[107]

However, when it comes to substantive differences, both concepts have little divergence beyond the terminology itself.[108] As Hey notes, 'if substantial differences were intended, the delineation has not been pursued systematically.'[109] Based on his extensive survey of precaution under customary law,[110] Trouwborst summarized that 'no substantive differences exist between commitments to apply the 'precautionary principle' and commitments to apply the 'precautionary approach.''[111] Moreover, the two most important instruments for present purposes, the *Rio Declaration on Environment and Development* (*Rio Declaration*)[112] and the *Exploration Regulations*, are not terminologically consistent. The French version of the Principle 15 of *Rio Declaration* refers to 'des mesures de précaution' whilst the English version uses 'the precautionary approach.' Similarly, the French text of the *Exploration Regulations* mentions 'le principe de précaution' whereas the English version refers to 'a precautionary approach.'[113]

Consequently, this study follows the conclusions drawn by others that the debate over terminology is mainly a 'semantic squabble.'[114] Therefore, again as others do,[115] this study uses *principle*, *approach*, and plain *precaution* interchangeably. After all, Fitzmaurice highlights the debate around terminology 'is without merit' as the concept means different things in different

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and Highly Migratory Fish Stocks Agreement' in Ellen Hey (ed), *Developments in International Fisheries Law* (Kluwer Law International, 1999) 287-325, pages 304-322.

106 Simon Marr, *The Precautionary Principle in the Law of the Sea: Modern Decision Making in International Law* (Martinus Nijhoff, 2003), page 17.

107 WTO, *European Communities - Measures Affecting the Approval and Marketing of Biotech Products,* WT/DS291- 293/INTERIM (29 September 2006), paragraph 4.541.

108 Oude Elferink (n 104), page 225.

109 Ellen Hey, 'The Precautionary Concept in Environmental Policy and Law: Institutionalizing Caution' (1992) 4 *Georgetown International Environmental Law Review* 303–318, page 304.

110 Arie Trouwborst, *Evolution and Status of the Precautionary Principle in International Law* (Kluwer Law International, 2002), pages 3-5, 186.

111 Arie Trouwborst, 'The Precautionary Principle in General International Law: Combating the Babylonian Confusion' (2007) 16 *Review of European Community & International Environmental Law* 185–195; see also Marr (n 106), pages 17-21.

112 *Rio Declaration on Environment and Development* (adopted 14 June 1992) 31 ILM 874.

113 *Nodules Exploration Regulations,* regulation 31(2); *Sulphides* and *Crust Exploration Regulations,* regulation 33(2).

114 Nicolas De Sadeleer, *Environmental Principles: From Political Slogans to Legal Rules* (Oxford University Press, 2002), page 92; see also Rosie Cooney, 'A Long and Winding Road? Precaution from Principle to Practice in Biodiversity Conservation' in in Elizabeth Fisher, Judith Jones, and René von Schomberg (eds), *Implementing the Precautionary Principle: Perspectives And Prospects* (Edward Elgar Publishing, 2006) 223-244, page 224.

115 Trouwborst (n 111), page 186; Cooney (n 114), page 224.

contexts.[116] Thus, instead of dwelling on terminology, this thesis focuses on analysing precaution in the specific context of the ISA.

1.5 Methodology and Limits of the Thesis

The answer to the research question investigated in this thesis is developed primarily through an analysis of the practice of the ISA as revealed in its decisions, reports, and procedures. These instruments, documents, and structures are examined in the context of the legal framework of the seabed mining regime, established by the LOSC, the IA, and the ISA Mining Code, as well as judicial clarification provided by the Seabed Disputes Chamber. Frequent comparisons are drawn with other international legal regimes to provide context for the ISA's mandate and work.

The framework for assessing the implementation of the precautionary principle, developed in Chapter 2, is chiefly based on a synthesis of academic literature and primary legal sources. This framework is then used in Part III to assess the protective measures adopted by the ISA as well as its procedural and institutional structures against the assessment framework developed in Chapter 2.

In delineating the scope and limitations of this thesis, it must be noted that this study does not follow an empirical methodology but bases its analysis and conclusions on the aforementioned methods. This method was selected for its suitability for legal research, as well as its feasibility, given that most of the ISA's deliberations and assessments occur in closed session and details on the contractor's progress and environmental studies are largely kept confidential.

The focus of this thesis lies on the implementation of the precautionary principle by the ISA. As such, it is not concerned with whether or not sponsoring states and contractors are acting in accordance with their obligations. Where reference is made to these actors, it is only in the context of the ISA's role in the relevant situation. However, that is not to reject the importance of states parties. The decision-making organs of the ISA, the Council and the Assembly, are comprised of representatives of member states. As such, decisions taken 'by the ISA' are in fact taken by a group of member states; although, as Chapters 3 and 5.2 explore, ISA decisions do not necessarily reflect the opinions of all member states. Nevertheless, as with any international organisation, while the member states occupy a crucial position, the ISA, as an organisation, is more than the sum of its parts.

[116] Malgosia Fitzmaurice, *Contemporary Issues in International Environmental Law* (Edward Elgar Publishing, 2009), page 8; See also the discussion in Patricia Birnie, Alan Boyle, and Catherine Redgwell, *International Law and the Environment* (Oxford University Press, 3rd ed, 2009), pages 154-157.

A further important point is the relationship between the ISA, the contractors, and the sponsoring states. This constellation of public and private as well as national, international, and multinational actors is without precedent. Much about the interactions between these relationships, in particular, the role of sponsoring states, their precise legal obligations and potential opportunities, is yet to be explored. Although sponsoring states occupy an important role in the framework, as no exploration contract can be obtained without a sponsoring state, the legal implications of this role invite further inquiry. Issues include, for example, the role of sponsoring states in judicial proceedings between a private mining corporation and the ISA. A further question relates to the responsibilities and potential liability of a sponsoring state in case of environmental harm, including the question of liability for damages in cases where the sponsoring state may have fulfilled its due diligence obligations but the contractor is unable to pay. Consideration of each of these issues will be important in ensuring the development of a comprehensive legal framework for seabed mining. These issues are, however, beyond the scope of this thesis. Similarly, while this thesis identifies several shortcomings of the ISA's current regulatory and institutional framework and suggests and briefly discusses some options for addressing these shortcomings, a detailed analysis of these options is beyond the scope of this thesis and will have to be provided in future research.

1.6 Structure of the Thesis

The thesis adopts the following structure. Part I establishes the context and analytical framework for the study. This chapter has explored the problem addressed in this thesis, by discussing the state of knowledge of the deep ocean environment, summarising the environmental risks of seabed mining as well as the remaining uncertainties, and making the case for a precautionary approach to seabed mining.

Chapter 2 provides the analytical framework for this thesis. Chapter 2 examines the precautionary principle as a principle of international law and discusses its meaning, development, status, and content. Here, emphasis is placed on what the implementation of the principle entails in practice. The Chapter discusses the role of both scientific research, to inform the risk assessment and the development of appropriate management measures, and of subjective values, which are relevant for addressing uncertainties and determining conservation objectives. The Chapter identifies three dimensions involved in the implementation of precaution: the institutional and procedural dimensions, as well as the taking of protective measures. Building on these dimensions, a set of steps is developed to operationalise the precautionary principle, illustrated as an implementation cycle. These steps provide the analytical framework to assess whether the ISA is implementing the precautionary approach in practice.

Part II of the study then turns to the ISA. Chapter 3 explores its historical development, institutional organisation, and decision-making processes. The Chapter identifies the ISA's law-making powers and explores its broad mandate to control access to minerals in the Area and to ensure compliance with the regulatory framework.

Chapter 4 complements the discussion by examining the ISA's comprehensive environmental mandate under the LOSC and the IA. However, the LOSC and IA do not settle all legal aspects of seabed mining. Rather, the ISA is equipped with far-reaching competencies to develop the seabed mining regime through the adoption of rules, regulations, and procedures that bind all member states regardless of individual consent. As required under its mandate, the ISA has utilised its law-making powers to *develop* its environmental mandate.

This core competence and development is discussed in detail in Chapter 5. The Chapter examines the individual components of the environmental obligations of the ISA, sponsoring states, and contractors as developed through the Mining Code and examines the integration of the precautionary principle into the Mining Code, which can be regarded as the *first step* of implementing the principle.

Part III of the thesis then proceeds to the core analysis of the implementation by the ISA of the precautionary principle in practice and assesses the manner and extent to which this has occurred to date. Chapter 6 examines the protective measures which the ISA has taken as well as those it has not yet applied in practice but which will be applicable in the seabed mining context. Even though these measures are in some way the 'outcome' of the application of the precautionary principle, it is useful to examine them first to demonstrate what the ISA has done to date.

Chapters 7 and 8 then examine the procedural and institutional structures of the ISA respectively to determine whether these facilitate the adoption of protective measures. Chapter 7 analyses whether the ISA's procedural framework allows for: the assessment of risks and identification of uncertainties; flexible amendment of environmental standards to facilitate adaptive management; transparency and participatory decision-making; an allocation of the burden of proof that ensures effective and equitable implementation of precaution; and compliance monitoring. The Chapter identifies a number of current challenges within the ISA's procedural framework that undermine the implementation of precaution.

Chapter 8 examines the ISA's institutional framework in light of the requirements of the precautionary principle. It analyses the ISA's institutional capacity to assess environmental risks and select appropriate protective measures and ensure compliance by the contractors with the regulatory framework. It highlights the capacity and current limitations of the ISA Secretariat and the ISA’s expert body, the Legal and Technical Commission. The Chapter finishes by discussing options for institutional innovation to address the shortcomings identified.

The concluding Chapter 9 revisits the complexities of implementing the precautionary principle and details the core findings of this thesis. The discussion highlights the elements of the precautionary principle which the ISA has implemented, whilst outlining the numerous remaining challenges, in particular with respect to establishing a procedural framework that facilitates a risk assessment and risk management in line with the precautionary principle. Finally, the thesis offers a summary of the potential measures, identified and discussed throughout this thesis, which could help to better align the ISA’s regulatory framework with the requirements of a precautionary approach.

This thesis is current as of 31 July 2015.

Chapter 2: The Precautionary Principle in International Law

2.1 Introduction

'In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.'[1]

The previous chapter introduced seabed mineral mining as a frontier activity that is characterised by environmental risk and numerous uncertainties. The chapter concluded that in this ocean of unknowns, one thing is certain: the need to apply a precautionary approach. This chapter explores the meaning of precaution in international law and the manner in which it can be implemented, in the context of biodiversity protection and natural resource management. This analysis provides the analytical framework for this thesis.

After two decades of prominence in international environmental law, the precautionary approach, or principle, needs little introduction. At its core, it aims to ensure adequate environmental protection through the taking of *early* action in response to threats of environmental harm, even in the context of scientific uncertainty. Despite this practical motive, the challenge lies in articulating and in assessing what the implementation of precaution entails in any given context.

Consistent with its status as a legal principle, the concept of precaution is deliberately flexible so as to encompass diverse circumstances.[2] Rather than specifying particular measures, it provides a general guide for regulatory, administrative, and judicial action in cases of risk of environmental harm. This flexibility has allowed precaution to become one of the most widely invoked principles while simultaneously blurring its parameters when attempting to formulate general definitions and implementing measures.[3] Fisher et al summarise the dilemma:

> While the literature on the principle is a large one, the challenges involved in its actual and potential application have tended to be underestimated. In particular, the messy business of integrating the principle into existing institutions and relating it to well-established decision-making processes has

[1] *Rio Declaration*, principle 15.

[2] Elizabeth Fisher, Judith Jones, and René von Schomberg, 'Implementing the Precautionary Principle: Perspectives And Prospects' in Elizabeth Fisher, Judith Jones, and René von Schomberg (eds), *Implementing the Precautionary Principle: Perspectives And Prospects* (Edward Elgar Publishing, 2006) 1-16, page 5; David Freestone, 'International Fisheries Law Since Rio: The Continued Rise of the Precautionary Principle' in Alan Boyle and David Freestone (eds), *International Law and Sustainable Development: Past Achievements and Future Challenges* (Oxford University Press, 2001) 135-164, 136.

[3] Malgosia Fitzmaurice, *Contemporary Issues in International Environmental Law* (Edward Elgar Publishing, 2009), page 65.

> not received the attention it should have. Rather, the principle has tended to be dissected in an analytical vacuum, considered from a single disciplinary perspective, or treated in a 'plug and play' manner in that its implementation is characterized as simply requiring the inclusion of the principle into policy or a legislative scheme for it to be effective.[4]

As Fisher et al would have it, the crucial aspect of an analysis of the implementation of precaution must go beyond an examination of its mere articulation in legal documents to an examination of the manner in which precaution has been integrated into institutional and decision-making frameworks.

With this admonition in mind, this chapter discusses the precautionary principle with a focus on its operationalisation. Although offering a general overview of the normative aspects of precaution, the focus lies on those issues that are relevant to the ISA context. To that end, the analysis highlights particularities of implementing precaution not by states, the usual focus of investigation, but by an international organisation, in respect of which at least two distinctions can be made. First, the institutional framework and decision-making process of the ISA differ from domestic governments and institutions which, as will be demonstrated in this thesis, affects the manner in which precaution is incorporated into the decision-making of the ISA. Second, the ISA has the unique obligation to act on behalf of humankind[5] which influences the need for public participation in the decision-making process.

The following section begins with an overview of the rationale, history, and status of precaution in international law and clarifies its relationship with the principle of prevention. Section 2.3 then defines the precautionary approach, while Section 2.4 provides an analysis of the aspects relevant to implementing precaution, which includes identifying the three levels of governance involved in its implementation. Section 2.5 concludes the chapter by identifying criteria to assess the implementation of precaution by the ISA.

2.2 The Precautionary Principle in International Law

2.2.1 From Reactive to Proactive Thinking: the Rationale of Precaution

Traditionally, international environmental law focused on remedying actual damage (reactive) or preventing identified hazards (preventive).[6] Techniques to incorporate the idea of *Vorsorge* or foresight beyond immediate cause and effects, in other words being *pre*-cautious, into environmental law, were lacking. Proactive approaches to potential future harm were not part of

[4] Fisher, Jones, von Schomberg (n 2), page 1.
[5] LOSC, article 137(2).
[6] Jacqueline Peel, *The Precautionary Principle in Practice: Environmental Decision-Making and Scientific Uncertainty* (Federation Press, 2005), page 218.

the legal vocabulary. Instead, 'clear and convincing evidence' of environmental harm was required for instance in the Trail Smelter case.[7]

Emerging consciousness of the delicate nature and vulnerabilities of ecosystems, gave rise to the recognition that this evidence-first approach created several problems. First, it ignored the fact that ecosystems are inherently complex. Consequently, any prediction of the effects of human activities upon them inevitably entails uncertainty, making it difficult if not impossible to provide 'clear and convincing evidence.' Second, it did not take into account the time delay with which many harmful effects become visible in the natural environment.

The concept of precaution operates with a more proactive rationale. It calls for actions at an earlier stage, even in a time of doubt when there is not yet conclusive scientific evidence as to the harmfulness. 'Under the precautionary principle, the benefit of any such doubt is to go to the environment. *In dubio pro natura*.'[8] In addition to its legal function, precautionary thinking influences our attitude towards decision-making over environmental protection and invites us to focus on long-term environmental sustainability.[9]

2.2.2 History of the Precautionary Approach

The history and status of the precautionary approach have been extensively analysed elsewhere,[10] prompting this section to provide only a core summary.

The origins of the modern day precautionary approach can be traced back to domestic environmental law in the form of scattered obligations embedding various precautionary measures.[11] The first explicit reference to the principle was included in German law as the *Vorsorgeprinzip* in the 1970s.[12] In the following decade, the principle made its debut at the

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[7] *Trail Smelter Case (US v Canada) (Arbitration Award,* 16 April 1938 and 11 March 1941) 3 RIAA 1905, 1965.

[8] Arie Trouwborst, 'The Precautionary Principle in General International Law: Combating the Babylonian Confusion' (2007) 16 *Review of European Community & International Environmental Law* 185–195, 187.

[9] David Freestone and Ellen Hey, 'Implementing the Precautionary Principle: Challenges and Opportunities' in David Freestone and Ellen Hey (eds), *The Precautionary Principle and International Law: the Challenge of Implementation* (Kluwer Law International, 1996) 249-268, page 264; Peel (n 6), page 219.

[10] Arie Trouwborst, *Evolution and Status of the Precautionary Principle in International Law* (Kluwer Law International, 2002), pages 7-31; David Freestone and Ellen Hey, 'Origins and Development of the Precautionary Principle' in David Freestone and Ellen Hey (eds), *The Precautionary Principle and International Law: the Challenge of Implementation* (Kluwer Law International, 1996) 3-15; Timothy O'Riordan and James Cameron, *Interpreting the Precautionary Principle* (Earthscan, 1994), part I.

[11] Trouwborst (n 10), pages 16-17.

[12] James Cameron, 'The Status of the Precautionary Principle in International Law' in Timothy O'Riordan and James Cameron (eds), *Interpreting the Precautionary Principle* (Earthscan, 1994) 262-290, page 267; Trouwborst (n 10), page 17.

international level in the context of protecting the marine environment of the North Sea from excessive pollution and waste dumping.[13] Pollution had effectively been tolerated in as much as any legal action had been dependent upon a proven causal link between activity and harm. Precautionary logic meant that uncertainty was no longer a bar to action. Ehlers summarises the persuasive thinking at the time: '[a]s damage to the marine environment can be irreversible, or remediable only at considerable expense and over long periods, it is not prudent to await proof of harmful effects before taking action.'[14] The logic of precaution proved compelling and saw the principle being adopted in numerous international agreements dealing with the protection of the marine environment.[15] Beyond the law of the sea, the principle also rapidly gained momentum and within a few years it was incorporated into virtually every international environmental regime,[16] including on biodiversity,[17] climate change,[18] and biosafety.[19] Its near universal acceptance was sealed with its incorporation in the 1992 *Rio Declaration*.

Support for such momentum came from the wider pursuit of sustainable development, which in turn was fuelled by the 1987 *Brundtland Report*.[20] Precautionary thinking is central to achieving sustainable development and, in particular, sustainable use of the Earth's natural resources.[21] It was incorporated into *Agenda 21*,[22] principle 4 of the International Law Association *New Delhi Declaration of Principles of International Law Relating to Sustainable Development*,[23] the

[13] *Declaration on the Second International Conference on the Protection of the North Sea* (London, 24-25 November 1987), articles VII, XV(ii), XVI(1); *Ministerial Declaration of the Third International Conference on the Protection of the North Sea* (The Hague, 8 March 1990), preamble paragraph 25; Freestone and Hey (n 10), pages 6-7; Trouwborst (n 10), pages 24-25.

[14] Peter Ehlers, 'The History of the International North Sea Conferences' in David Freestone and Ton Istra (eds), *The North Sea: Perspectives on Regional Environmental Co-operation* (Martinus Nijhoff, 1990), page 7.

[15] See for example: *Convention on the Protection of the Marine Environment of the Baltic Sea* (adopted 9 April 1992, entered into force 17 January 2000) 1507 UNTS 167; *Convention for the Protection of the Marine Environment of the North-East Atlantic* (adopted 22 September 1992, entered into force 25 March 1998) 2354 UNTS 67; FSA.

[16] Freestone (n 2), page 135; Trouwborst (n 8), page 187.

[17] *Convention on Biological Diversity* (adopted 5 June 1992, entered into force 29 December 1993) 1760 UNTS 79, preamble.

[18] *United Nations Framework Convention on Climate Change*, (adopted 9 May 1992, entered into force 21 March 1994) 1771 UNTS 107, article 3(3).

[19] *Cartagena Protocol on Biosafety to the Convention on Biological Diversity*, (adopted 29 January 2000, entered into force 22 September 2003) 2226 UNTS 208, preamble paragraph 4, articles 1, 10(6), 11(8).

[20] UNGA, UN Doc A/42/427 (4 August 1987).

[21] See generally Nico Schrijver, *The Evolution of Sustainable Development in International Law: Inception, Meaning and Status* (Martinus Nijhoff, 2008) pages 184-197; Philippe Sands and Jacqueline Peel, Principles of International Environmental Law (Cambridge University Press, 3rd ed, 2012), pages 219-220.

[22] *Agenda 21*, reprinted in UN Doc A/CONF.151/26/Rev.1 (12 August 1992), chapter 17.21.

[23] Nico Schrijver, 'ILA New Delhi Declaration of Principles of International Law Relating to Sustainable Development' (2002) 49 *Netherlands International Law Review* 299–305.

Johannesburg Plan of Implementation,[24] and the Rio+20 outcome document.[25]

Nonetheless, the precautionary principle did not escape criticism.[26] Some commentators dismiss the principle for being too vague[27] or criticize it for lacking normative content regarding the desired level of protection.[28] However, criticizing precaution because it results in diverse outcomes in different contexts fails to consider the inherently flexible nature of a legal principle. Fisher poignantly calls this simplistic approach 'precaution spotting':

> […] 'precaution spotting' has been based on the assumption that the principle is an autonomous transplantable rule. On this basis, the variations in how it is formulated, interpreted, and implemented suggest that the principle is either incoherent or lacking legal content. This characterization, however, is at odds with the fact that the principle is a flexible legal principle shaped by the surrounding legal culture. […] Variation is thus due to different legal cultures, legal issues, and disagreements about those legal issues.[29]

As discussed in Section 2.3 below, this flexibility is essential to, and indeed a strength of, the precautionary principle.

Other critics, such as Sunstein argue that the principle can create paralysis, since it requires action whenever there is a risk of harm. Sunstein argues that although precaution demands regulation of risk, it actually hinders that regulation because precautionary action or inaction may, in turn, carry risks itself which ought to be avoided.[30] According to Arcuri, however, this criticism is based on a 'radical and misconceived definition of the principle' that ignores the precautionary thresholds which ensure that precaution does not apply to every imaginable, small risk.[31] These thresholds are examined below in Section 2.3.4.

These criticism, have not, however, prevented the integration of the precautionary principle into

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[24] *Plan of Implementation of the World Summit on Sustainable Development*, A/CONF.199/20 (4 September 2002), paragraphs 23, 109(f).

[25] UNGA, UN Doc A/Res/66/288 (27 July 2012), paragraph 158.

[26] For discussions on the main criticism of the precautionary principle and their counter-arguments, see Per Sandin et al, 'Five Charges against the Precautionary Principle' (2002) 5 *Journal of Risk Research* 287-299; Alessandra Arcuri, 'Reconstructing Precaution, Deconstructing Misconceptions' (2007) 21 *Ethics & International Affairs* 359-379.

[27] Daniel Bodansky, 'Scientific Uncertainty and the Precautionary Principle' (1991) 33 *Environment*, 4-5, 34-44.

[28] Bénédicte Sage-Fuller, *The Precautionary Principle in Marine Environmental Law: With Special Reference to High Risk Vessels* (Routledge, 2013).

[29] Elizabeth Fisher, 'Precaution, Precaution Everywhere: Developing a "Common Understanding" of the Precautionary Principle in the European Community' (2002) 9 *Maastricht Journal of European and Comparative Law* 7-28, page 8.

[30] Cass R Sunstein, *Laws of Fear: Beyond the Precautionary Principle* (Cambridge University Press, 2005), pages 26-34; William J Mckinney and H Hammer Hill, 'Of Sustainability and Precaution : The Logical, Epistemological, and Moral Problems of the Precautionary Principle and Their Implications for Sustainable Development' (2000) 5 *Ethics and the Environment* 77-87, page 79.

[31] Arcuri (n 26), pages 365-366.

modern environmental law, not least because, as Gullett notes, the principle is based on 'an uncontroversial espousal of commonsense.'[32] The rapid rise of the principle of precaution has naturally prompted high expectations for its influence on decision-making. However, as with any rapidly developing concept, working out the details of its application can take significantly longer than the initial acceptance of the idea behind it. As Freestone highlighted at the turn of the century, the emergence of the precautionary principle was 'one of the most remarkable developments of the last decade.' Now, 'the issue for the next century is the extent to which the rhetoric of the principle can be operationalized.'[33]

2.2.3 Status of the Precautionary Approach in International Law

Given the rapid rise of precaution, the question as to its possible customary international law status has inevitably arisen.[34] Trouwborst's study, published in 2002, found that the core content of the principle had attained the status of a general principle of international environmental law and a customary norm.[35] Numerous scholars broadly concur with the finding of precaution having reached customary status[36] although some controversy remains.[37] Support for the principle by international judicial bodies remains sporadic though it is increasing.[38] For example, in the *Pulp Mills* case Judge Ad Hoc Vinuesa unambiguously stated: '[t]he precautionary principle is not an abstraction or an academic component of desirable soft law, but a rule of law within general international law as it stands today.'[39] The International

[32] Warwick Gullett, 'Environmental Protection and the Precautionary Principle: A Response to Scientific Uncertainty in Environmental Management' (1997) 14 *Environmental and Planning Law Journal* 52–69, 52.

[33] Freestone (n 2), page 135.

[34] Daniel Bodansky, 'New Developments in International Environmental Law: Remarks' (1991) 85 *Proceedings of the Annual Meeting (American Society of International Law)* 413–417, 413.

[35] Trouwborst (n 10).

[36] Sands and Peel (n 21), page 228; James Cameron and Juli Abouchar, 'The Status of the Precautionary Principle in International Law' in David Freestone and Ellen Hey (eds), *The Precautionary Principle and International Law: the Challenge of Implementation* (Kluwer Law International, 1996) 29-52, pages 30-31; Nicolas De Sadeleer, *Environmental Principles: From Political Slogans to Legal Rules* (Oxford University Press, 2002), pages 92, 100, 318-319; Freestone (n 2), page 137; Alex G Oude Elferink, 'Governance Principles for Areas beyond National Jurisdiction' (2012) 27 *The International Journal of Marine and Coastal Law* 205–259, pages 226-227; Owen McIntyre and Thomas Mosedale, 'The Precautionary Principle as a Norm of Customary International Law' (1997) 9 *Journal of Environmental Law* 221–241, pages 222-223, 241.

[37] Ole W Pedersen, 'From Abundance to Indeterminacy: The Precautionary Principle and Its Two Camps of Custom' (2014) 3 *Transnational Environmental Law* 323–339.

[38] Aline Jaeckel and Tim Stephens, 'Sustainable Development Principles in the International Tribunal for the Law of the Sea', in Judge C G Weeramantry and Marie-Claire Cordonier Segger (eds), *Sustainable Development Principles in the Decisions of International Courts and Tribunals 1992-2012* (Routledge, *forthcoming*).

[39] *Case Concerning the Pulp Mills on the River Uruguay (Argentina v* Uruguay) *(Provisional Measures)* [2006] ICJ Rep 113, 152 (Judge Ad Hoc Vinuesa).

Tribunal for the Law of the Sea (ITLOS), in the *Bluefin Tuna* cases, held that ‘the parties should in the circumstances act with prudence and caution to ensure that effective conservation measures are taken to prevent serious harm to the stock of southern bluefin tuna.’[40] Despite this implicit endorsement of the precautionary approach, the Tribunal refrained from confirming a customary the status of precaution.[41] This changed in 2011, when the Seabed Disputes Chamber expressly found a ‘trend’ towards the precautionary approach becoming customary law.[42] Although this is still no conclusive statement as to the customary nature of precaution, it provides the latest confirmation of the central importance of precaution, especially in the marine context. For the purpose of this thesis, the applicability of the precautionary principle is taken as beyond doubt, not least because the principle is specifically incorporated into the ISA’s *Exploration Regulations.*[43] Instead of dwelling on the legal status, the focus here is on the way forward, ‘the circumstances in which the precautionary principle is applied and variations in its implementation.’[44]

2.2.4 Overlapping Principles: Precaution and Prevention

Completing the introductory discussion on precaution requires a brief look at the link between the precautionary principle and the preventative principle. Both principles share a common aim: to prevent environmental harm, albeit with different philosophical underpinnings. A common, yet oversimplified, distinction asserts that prevention seeks to avert known or foreseeable harm, whereas precaution requires such action at an earlier stage, even where potential effects remain uncertain,[45] provided the threshold for gravity and likelihood of harm are met.[46] This alludes to two interlinked factors that distinguish prevention and precaution: timing and uncertainty.

First, international law has long required preventive action once damage has been determined. The precautionary approach seeks to shift the focus to an earlier point in time, even though there might still be uncertainties as to the potential harm. ‘The new element is that of timing, rather than the need for, remedial action.’[47] However, there is no reason to believe that precaution

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[40] *Southern Bluefin Tuna Cases (New Zealand v Japan; Australia v Japan)* (Provisional Measures) (ITLOS Cases No 3 & 4, 27 August 1999), paragraph 77; See also *The MOX Plant Case (Ireland v UK)* (Provisional Measures) (ITLOS Case No.10, 3 December 2001), paragraph 84.

[41] *Southern Bluefin Tuna Cases* (n 40), paragraph 9 (Judge Treves) and paragraph 16 (Judge Laing).

[42] *SDC Advisory Opinion*, paragraph 135.

[43] Chapters 5.4.6.

[44] Fitzmaurice (n 3), page 6.

[45] Trouwborst (n 10), pages 36-37; Nigel Haigh, ‘The Introduction of the Precautionary Principle in the UK’ in Tim O’Riordan and James R Cameron (eds), *Interpreting the Precautionary Principle* (Earthscan, 1994) 229-251, 241; De Sadeleer (n 36), page 222.

[46] Chapter 2.3.4.

[47] Freestone and Hey (n 10) page 13.

finishes at a particular point on the time scale, as long as the thresholds for harm are met. To assume that precaution only applies up to the point in time after which prevention takes over is an oversimplification as it rests on (a) a purely abstract distinction based on uncertainty, and (b) a misinterpretation of the role of uncertainty. This leads to the second commonly drawn distinction.

Second, the presence of scientific uncertainty is often cited as the difference between precaution and prevention.[48] However, this distinction is purely abstract. Not only is the idea of scientific certainty a myth,[49] but any sharp distinction between prevention and precaution is hardly operable in practice.[50] Prevention, which seeks to address quantifiable or 'known' risks, still embodies a degree of uncertainty. 'Uncertainty is obviously inherent in the very notion of risk.'[51] As such, all measures to address risks include precautionary elements.[52] In the words of Haigh: 'Since there is likely to be uncertainty about when uncertainty disappears there will also be uncertainty about whether to talk of the principle of precaution rather than of prevention.'[53]

Moreover, as Trouwborst notes, precaution applies not <u>because</u> of uncertainty, but <u>in spite</u> of it. To remind ourselves, Principle 15 of the *Rio Declaration* reads: 'Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.' In other words, protective actions should not be impeded by uncertainty. The trigger for precaution is the concern over environmental harm, not uncertainty itself.[54]

Here, it is also worth noting an easy mis-perception, namely that prevention relies on science whereas precaution does not.[55] This is not true. Scientific considerations lie at the heart of the precautionary principle as it relies on an in-depth assessment of scientific knowledge,[56]

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[48] Nicolas De Sadeleer, 'The Principles of Prevention and Precaution in International Law: Two Heads of the Same Coin?' in Malgosia Fitzmaurice and others (eds), *Research Handbook on International Environmental Law* (Edward Elgar Publishing, 2010) 182-199, page 186.

[49] *Nicholls v Director General of National Parks and Wildlife* (1994) 84 LGERA 397, 419; William R Freudenburg, Robert Gramling, and Debra J Davidson, 'Scientific Certainty Argumentation Methods (SCAMs): Science and the Politics of Doubt*' (2008) 78 *Sociological Inquiry* 2-38; Mark Monaghan, Ray Pawson, and Kate Wicker, 'The Precautionary Principle and Evidence-Based Policy' (2012) 8 *Evidence & Policy* 171–191, page 185.

[50] Harald Hohmann, *Precautionary Legal Duties and Principles of Modern International Environmental Law: The Precautionary Principle : International Environmental Law Between Exploitation and Protection* (Graham & Trotman, 1994), page 334.

[51] Arie Trouwborst, 'Prevention, Precaution, Logic and Law: The Relationship between the Precautionary Principle and the Preventative Principle in International Law and Associated Questions' (2009) 2 *Erasmus Law Review* 105–127, page 118.

[52] Ibid.

[53] Haigh (n 45), page 241.

[54] For a detailed discussion including a survey of the various formulations of precaution, see Arie Trouwborst, *Precautionary Rights and Duties of States* (Martinus Nijhoff, 2006), pages 91-96.

[55] For a detailed discussion of this criticism see De Sadeleer (n 36), page 174-180.

[56] Laurence David Mee, 'Scientific Methods and the Precautionary Principle' in David Freestone and

including any remaining uncertainties.[57] Similarly, as discussed in Section 2.4, furthering scientific research is an integral part of the precautionary approach.

In conclusion, the distinction between precaution and prevention is blurry at best. It is clear that precaution starts to apply at an earlier stage and that some degree of uncertainty is characteristic of both concepts. For this reason, Trouwborst argues that the precautionary principle has 'absorbed' the preventive principle.[58]

In any event, to bring this abstract discussion back to the topic at hand: it is submitted that seabed mining falls squarely within the category of activities requiring the implementation of precaution. As discussed in Chapter 1, seabed mining carries risks of serious environmental harm involving high degrees of uncertainty. These include the severity and spatial extent of harm, recovery rates, and cumulative impacts.[59] Thus, the question is not whether precaution applies but how it can be implemented.

2.3 Defining the Precautionary Principle: Three Elements

It order to assess its implementation, it is first necessary to define what the precautionary principle entails. The rich literature on precaution offers numerous descriptions in that regard. The most structured and comprehensive analysis is provided by Trouwborst, who illustrates precaution by way of a tripod with the legs being the three widely agreed components of (a) threat of environmental harm, (b) uncertainty, and (c) action.[60]

2.3.1 Threat of Environmental Harm

The presence of a threat of environmental harm is the very reason behind the development of the precautionary approach and thus a crucial element of it. However, in order to exclude instances of minor concern, the threat has to reach a certain threshold before the precautionary approach is triggered.[61] Thus, it is closely linked to the concept of risk,[62] which can be described

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Ellen Hey (eds), *The Precautionary Principle and International Law: the Challenge of Implementation* (Kluwer Law International, 1996) 109- 131, pages 127-131; John S Gray, 'Integrating Precautionary Scientific Methods into Decision-Making' in David Freestone and Ellen Hey (eds), *The Precautionary Principle and International Law: the Challenge of Implementation* (Kluwer Law International, 1996) 133-146, pages 143-146.

[57] De Sadeleer (n 36), pages 174-180; Commission of the European Communities, *Communication from the Commission on the precautionary principle*, COM(2000) 1 final (2 February 2000), page 12.

[58] Trouwborst (n 51).

[59] See Chapter 1.2.2.

[60] Trouwborst (n 54), pages 21-35; see also Stephen M Gardiner, 'A Core Precautionary Principle' (2006) 14 *Journal of Political Philosophy* 33-60; Cameron and Abouchar (n 36), page 45.

[61] Trouwborst (n 54), pages 43-44, 66-67.

as the product of the probability of a certain harm arising, times the gravity of such harm. In short:

Risk = gravity x probability of harm[63]

Both components are relevant for analysing the precautionary elements of (a) threat and (b) uncertainty, and they are mirrored in the various formulations of the precautionary approach.

As for the gravity of harm, a substantial number of international instruments omit any specific threshold.[64] Yet, a minimum threshold may nevertheless be implied, to prevent the precautionary approach from being invoked for unavoidable, minor, or every-day impacts we humans inevitably have on our natural environment.[65] Other common formulations require *significant* or *serious or irreversible damage*.[66] The latter obviously sets the bar for triggering precaution higher. Importantly, whether a risk is classified as *significant* or *serious* depends on societal values, as discussed in Section 2.4.2, as well as on the site in question.[67] As the European Court of Justice highlighted in relation to applying precaution to cockle fishing in the Wadden Sea: 'in assessing the potential effects of a plan or project, their significance must be established in the light, inter alia, of the characteristics and specific environmental conditions of the site concerned by that plan or project.'[68]

The probability of harm is also subject to a minimum threshold, which is best explained in connection with the element of uncertainty.

2.3.2 Uncertainty

Despite the precautionary approach applying even in cases of scientific uncertainty, not all levels of uncertainty are covered. As with gravity of harm, there has to be a minimum probability of harm occurring, something more than hypothetical, as precaution would otherwise apply to every imaginary threat. In other words, there is a maximum limit on the level of uncertainty. However, as noted above, there is no minimum level of uncertainty required for precaution to apply.

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[62] Commission of the European Communities (n 57), page 12.

[63] Trouwborst (n 54), pages 26-29; Aaron Wildavsky, 'Trail and Error Versus Trial Without Error' in Julian Morris (ed), *Rethinking Risk and the Precautionary Principle* (Butterworth-Heinemann, 2000) 22-45, 25.

[64] Trouwborst (n 54), pages 45-47.

[65] Ibid, pages 47-48.

[66] Ibid, pages 44-67.

[67] Ibid, pages 133-136.

[68] *Landelijke Vereniging tot Behoud van de Waddenzee and Nederlandse Vereniging tot Bescherming van Vogels v Staatssecretaris van Landbouw, Natuurbeheer en Visserij* (C-127/02) [2004] ECR I-7405, paragraph 48.

The threshold for the probability of harm varies across international instruments, with some merely requiring the possibility that harm *might*, *may*, or *could* occur.[69] Similarly, 'a large number of definitions in the legal instruments' merely require *threats* for the precautionary approach to apply.[70] In his comprehensive analysis, Trouwborst found that under customary law there must be at least 'reasonable grounds for concern' that environmental harm may occur, that is more than a theoretical possibility but 'less than proof of probability of harm.'[71]

It should be highlighted that whilst uncertainty is subject to a maximum threshold, the precautionary principle encompasses all types of uncertainty. This includes epistemic and ontological uncertainties,[72] meaning uncertainties inherent in studying complex systems.[73] It also includes the entire spectrum of situations from quantifiable risk to ignorance, in which neither gravity nor probability are quantifiable.[74]

2.3.3 Remedial Action

The third, and most crucial, element of precaution is that of remedial action at an <u>early</u> stage. Once the thresholds for gravity and probability of an environmental threat are crossed, the precautionary approach requires 'measures to prevent environmental degradation.'[75] Without it precaution would be meaningless. Yet, this is precisely where the challenge lies. Which measures are necessary? How can the rhetoric of precaution be operationalised? Before exploring this question in detail in Section 2.4, two general criteria must be highlighted.

2.3.3.1 Effectiveness

Any precautionary measure must first and foremost be effective, meaning it has to be capable of achieving the desired level of protection.[76] Comparing measures requires examining both costs and benefits of various (in)actions and includes considering both short-term and long-term

[69] Trouwborst (n 54), pages 99-100.
[70] Ibid, pages 105-106.
[71] Ibid, pages 118-119.
[72] Chapter 2.4.4; Rosie Cooney, 'A Long and Winding Road? Precaution from Principle to Practice in Biodiversity Conservation' in in Elizabeth Fisher, Judith Jones, and René von Schomberg (eds), *Implementing the Precautionary Principle: Perspectives And Prospects* (Edward Elgar Publishing, 2006) 223-244, 229; Trouwborst (n 54), pages 72-82.
[73] W E Walker et al, 'Defining Uncertainty: A Conceptual Basis for Uncertainty Management in Model-Based Decision Support' (2003) 4 *Integrated Assessment* 5-17, pages 13-14.
[74] De Sadeleer (n 48), page 191. Trouwborst (n 54), pages 86-89;
[75] *Rio Declaration*, principle 15.
[76] Commission of the European Communities (n 57), page 17.

effects.[77] The aim is to create measures that are specific enough to be clear and meaningful, yet flexible enough to allow for changes if and when new information becomes available.[78] Additionally, consistency in precautionary measures, as promoted for example at EU level, can provide a degree of certainty and planning reliability for stakeholders.[79]

Assessing the effectiveness of a measure requires, first, the determination of the desired level of protection. This will be different in each scenario to which precaution applies. This sectoral variability is what Sage-Fuller regards as a deficiency of the precautionary principle. She argues that without normative value regarding what should be protected and the desired level of protection, the precautionary principle fails to provide guidance about the measures to be taken in applying the principle.[80] This in turn, she argues, prevents the principle from reaching customary international law status. However, Sage-Fuller recognizes that the precautionary principle can have normative value within a sectoral context, where the desired level of protection has been agreed on.[81]

Whilst it is true that the normative consideration as to what should be protected will differ in each context, this is a necessity in order for the principle to respond to the complexities of risk management.[82] This flexibility allows precaution to take into account the characteristic of different ecosystems.

Nonetheless, precaution requires active consideration of the desired level of protection in each context. For example, in some fisheries contexts the conservation benchmark, although not without criticism,[83] is to 'maintain or restore stocks at levels capable of producing maximum sustainable yield.'[84] But what is the agreed level of environmental protection with respect to deep seabed mining? As discussed in Chapters 5.4.6 and 7.2, a specific conservation benchmark

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77 Ibid, page 18; Rosie Cooney and Barney Dickson, 'Precautionary Principle, Precautionary Practice: Lessons and Insights' in Rosie Cooney and Barney Dickson (eds), *Biodiversity and the Precautionary Principle: Risk, Uncertainty and Practice in Conservation and Sustainable Use* (Earthscan, 2005) 287-298, 295; Jorge Rabinovich, 'Parrots, Precaution and Project Ele: Management in the Face of Multiple Uncertainties' in Rosie Cooney and Barney Dickson, op cit, 173-188.

78 Rosie Cooney and Barney Dickson, 'Appendix: Guidelines for Applying the Precautionary Principle to Biodiversity Conservation and Natural Resource Management' in Rosie Cooney and Barney Dickson (eds), *Biodiversity and the Precautionary Principle: Risk, Uncertainty and Practice in Conservation and Sustainable Use* (Earthscan, 2005) 299-306, 301.

79 Commission of the European Communities (n 57), page 18.

80 Sage-Fuller (n 28), page 117.

81 Ibid, pages 215-216.

82 Aline Jaeckel, 'Book Review: The Precautionary Principle in Marine Environment Law—With Special Reference to High Risk Vessels, Written by Bénédicte Sage-Fuller' (2015) 30 *The International Journal of Marine and Coastal Law* 215–219.

83 Daniel D Huppert, 'Risk Assessment, Economics, and Precautionary Fishery Management' in *Precautionary Approach to Fisheries Part 2: Scientific Papers* (FAO Fisheries Technical Paper 350/2, 1995).

84 FSA, article 5(b).

has yet to be agreed, which creates a range of challenges for the implementation of the precautionary approach.

2.3.3.2 Proportionality

The second criterion is that whilst precautionary measures have to be effective, they should not be more restrictive than necessary. In other words, the measures have to be proportional to the desired level of protection.[85] Proportionality is directly related to the gravity and probability of harm[86] and requires a case-by-case assessment.

Assessing the proportionality of measures requires considerations of both short and long-term effects, which may include taking into account any potential impacts affecting future generations, especially in relation to harm to ecosystems.[87] The European Commission further stresses that 'one should also consider replacing the product or procedure concerned by safer products or procedures.'[88] For seabed mining, such a comprehensive approach includes considering alternative means of meeting the demand for minerals, as explored in Chapter 7.2.2.

Both the proportionality and the effectiveness of precautionary measures will depend on whether the potential harm is reversible. Fisheries, for example, do not cause environmental damage per se; rather, it is the scale of modern fisheries that creates harm. The impacts of fisheries are, in most cases, reversible. As such, the precautionary approach to fisheries is about determining 'the quantities of fish that can be removed without damaging the system's productivity', which 'can be determined with some accuracy.'[89]

In line with this objective, the *Fish Stocks Agreement* sets out specific precautionary standards. For example, Article 6(3)(b) FSA requires states parties to determine 'stock-specific reference points and the action to be taken if they are exceeded.' These must include both conservation reference points, that is 'boundaries which are intended to constrain harvesting within safe

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85 Simon Marr, *The Precautionary Principle in the Law of the Sea: Modern Decision-making in International Law* (Martinus Nijhoff, 2003), pages 35-37; Ronnie Harding and Elizabeth Fisher, 'Introducing the Precautionary Principle' in Ronnie Harding and Elizabeth Fisher (eds), *Perspectives on the Precautionary Principle* (Federation Press, 1999) 2-25, at page 12.

86 See the illustrations in Trouwborst (n 54), pages 153-155.

87 Commission of the European Communities (n 57), pages 17-18.

88 Ibid.

89 Serge M Garcia, 'The Precautionary Approach to Fisheries and Its Implication for Fishery Research, Technology and Management: An Updated Review' in *Precautionary Approach to Fisheries Part 2: Scientific Papers* (FAO Fisheries Technical Paper 350/2, 1996).

biological limits within which the stocks can produce maximum sustainable yield', and target reference points, which are intended to meet management objectives.[90]

In contrast, chemical pollution, the context in which the precautionary principle was first accepted in international law,[91] differs from fisheries in that its impact may not always be reversible. As discussed in Chapter 1.2.2, seabed mining may fall into both categories. The precautionary standards to be adopted by the ISA must reflect this. The Seabed Disputes Chamber provided valuable guidance on the proportionality of environmental measures, in the context of the due diligence obligation of states sponsoring mining operations under the ISA regime:

> "Due diligence" is a variable concept. It may change over time as measures considered sufficiently diligent at a certain moment may become not diligent enough in light, for instance, of new scientific or technological knowledge. It may also change in relation to the risks involved in the activity. […] The standard of due diligence has to be more severe for the riskier activities.[92]

Similarly, which precautionary measure is proportionate depends to the situation and has to be determined on a case-by-case basis.

2.3.4 The Role of Thresholds

As this section has discussed, the precautionary principle is subject to gravity and probability thresholds, designed to prevent precaution from becoming excessively wide in scope which would render it unworkable. Moreover, these thresholds are relevant to determining the proportionality of precautionary measures. Nonetheless, understanding thresholds as an "all-or-nothing" trigger of precaution can be problematic in that it may be difficult to determine clearly the probability and gravity of harm in the face of uncertainty. Thresholds may in theory present an 'escape clause' from precautionary obligations[93] in cases where their usage may be very much warranted. Thus, it is important to examine fully any uncertainties in the decision-making process. After all, the core of the precautionary approach is to not postpone protective measures despite remaining scientific uncertainties. Rather, the criteria of effectiveness and proportionality are to guide the choice of measures. As Trouwborst reminds us: 'In case of

[90] FSA, annex II paragraph 2. For a discussion of the relevant provisions of the FSA, see David Freestone, 'Implementing Precaution Cautiously: The Precautionary Approach in the Straddling and Highly Migratory Fish Stocks Agreement' in Ellen Hey (ed), *Developments in International Fisheries Law* (Kluwer Law International, 1999) 287-325, pages 313-322.

[91] Chapter 2.2.2.

[92] *SDC Advisory Opinion*, paragraph 117.

[93] Warwick Gullett, 'The Threshold Test of the Precautionary Principle in Australian Courts and Tribunals: Lessons for Judicial Review' in Elizabeth Charlotte Fisher and others (eds), *Implementing the Precautionary Principle: Perspectives And Prospects* (Edward Elgar, 2006) 182-200; Trouwborst (n 54), page 44.

doubt as to whether particular measures are actually suitable for this purpose, it is in conformity with the precautionary principle to err on the side of caution.'[94]

2.4 Implementing the Precautionary Principle

2.4.1 The Three Dimensions of Implementing Precaution

Despite its general acceptance, confusion remains as to how to give practical effect to the precautionary principle. In the law of the sea context precaution is marked by implementation gaps.[95] Overall, the principle is often said to have had a rather modest success.[96] This may be partly due to the fact that it has caused widely different expectations, which inevitably leads to disappointments. Whilst some may view precaution as a revolutionary tool, others regard it as far more limited. This section examines the various interpretations of how precaution can be implemented and identifies three dimensions involved in its implementation: institutional and procedural dimensions, as well as the taking of protective measures.

2.4.1.1 Institutional Dimension

Implementing precaution includes an institutional dimension. This stems from the fact that the decision over which precautionary measures to take and how to arrive at that decision will be determined by existing bodies. They, in turn, require the institutional capacity and competencies to provide for precautionary decision-making, adopt protective measures, and ensure their monitoring and enforcement. As Fisher and Harding point out, 'an overwhelming influence on what is understood to be the implications of the precautionary principle for decision-making will be its institutional context', that is mainly public administration.[97] Institutional measures might include allowing 'a privileged role for scientific information, perhaps by the establishment of a scientific and technical advisory committee or the like'[98] but also the capacity to enforce protective measures and amend existing measures if new knowledge is acquired.[99]

[94] Trouwborst (n 54), page 149.

[95] BBNJ Working Group, UN Doc A/61/65 (20 March 2006), annex I paragraph 33; Kristina M Gjerde et al, 'Current Legal Developments - IUCN Workshop on High Seas Governance for the 21st Century' (2008) 23 *The International Journal of Marine and Coastal Law* 359-363, page 361.

[96] Fitzmaurice (n 3); Gullett (n 32).

[97] Elizabeth Fisher and Ronnie Harding, 'The Precautionary Principle and Administrative Constitutionalism: The Development of Frameworks for Applying the Precautionary Principle' in Elizabeth Fisher, Judith S Jones, and René von Schomberg (eds), *Implementing the Precautionary Principle: Perspectives And Prospects* (Edward Elgar Publishing, 2006) 113-136, page 116.

[98] Freestone and Hey (n 9), page 264.

[99] Chapters 7.3, 8.2.

2.4.1.2 Procedural Dimension

Several commentators focus on how precaution can be implemented through procedural means. Importantly, however, the word *procedural* is used to refer to different precautionary measures. Freestone and Hey highlight procedural measures to include reversing the burden of proof,[100] listing harmless activities,[101] or adjusting voting procedures to prevent decisions over protective measures to be slowed down unnecessarily.[102] Additionally, De Sadeleer highlights risk assessment procedures, including EIA and monitoring of activities.[103]

Peel on the other hand argues that precaution may be an exclusively procedural principle,[104] which requires three measures: (1) critically assessing uncertainties in scientific information, (2) ensuring transparency in balancing competing interests, and (3) potentially broadening participation in the decision-making process.[105] Fisher advocates a similarly narrow focus on procedure and highlights that the success or failure of the implementation of precaution 'will depend on how adequately and meaningfully scientific uncertainty is taken into account in the decision-making process and not upon whether preventive action was taken.'[106]

The precautionary approach applies to a wealth of circumstances and issues. Peel observes that what all contexts have in common is an element of uncertainty. She argues that 'an implementation approach that concentrates on how the process accommodates uncertainty will be capable of wide and flexible application in the differing factual circumstances that confront decision-makers.'[107] The advantage of such a narrow, procedural interpretation is twofold. First, it overcomes the problems associated with understanding the thresholds of harm as an all-or-nothing trigger for precautionary action[108] by diverting the focus onto procedural aspects, which by definition are more nuanced.[109] Second, it may prevent the hypothetical situation in which the need for precautionary measures to be cost-effective and proportional may render the principle ineffective.[110]

Although procedural measures are undoubtedly part and parcel of a successful implementation

[100] Ibid, page 259.
[101] Ibid, page 265.
[102] Ibid, pages 264-265.
[103] De Sadeleer (n 36), pages 202-211.
[104] Peel (n 6), pages 149, 158-159.
[105] Ibid, pages 156-157.
[106] E Fisher, 'Precaution, Law and Principles of Good Administration' (January 2005) 52 *Water Science and Technology* 19–24, 19; see also Peel (n 6), page 228.
[107] Peel (n 6), page 220.
[108] Chapter 2.3.4.
[109] Peel (n 6), page 221.
[110] Fitzmaurice (n 3), page 63.

of precaution, reducing the principle to this dimension is problematic for several reasons. First, exclusively focusing on uncertainties at the implementation stage rests on a misinterpretation of the role of uncertainty. As pointed out above, precaution applies 'in spite of uncertainty, not because of it.'[111] It would be absurd to suggest that protective measures become redundant if uncertainties are reduced and environmental harm becomes more certain. Instead, the more stable common feature across all situations where precaution will be applied is a concern over environmental or other harm.

Second, one might say that articulating and assessing uncertainties are prerequisites for applying precaution, in so much as they are necessary to identify the probability and gravity of harm, namely the triggers for the precautionary approach. Once a threat of environmental harm has been established, the question turns to which precautionary action to take. It is true that highlighting and critically examining the uncertainties at hand would, in many situations, already go a long way towards applying precaution. However, that is not to say that implementing precaution can be reduced to these exercises. Principle 15 of the *Rio Declaration* unambiguously requires 'measures to prevent environmental degradation.' Phrasing it in the negative, Judge ad hoc Charlesworth describes precaution as entailing 'the avoidance of activities that may threaten the environment even in the face of scientific uncertainty […].'[112]

This leads to the third, and most crucial reason, namely that an exclusive focus on <u>how</u> a decision is reached, and ignoring <u>which</u> decision is ultimately taken, may lead to perverse outcomes. The fundamental aim of precaution is to prevent environmental damage. As Gardiner points out, a purely procedural interpretation of the precautionary principle 'offers us no reason to believe that they will actually do anything to protect the environment.'[113] He provocatively states: 'the destruction of the earth ought not to be the necessary result of applying the precautionary principle.'[114] Yet a purely procedural reading of precaution could, in principle, allow just that.

As such, it, fourth, disregards the fundamental criterion of effectiveness. As discussed in Section 2.3.3 above, any precautionary measure must self-evidently be effective in contributing to meet the desired level of environmental protection. Fifth and finally, it disregards protective measures that have been taken specifically to give effect to the precautionary approach.

2.4.1.3 Protective Measures

[111] Trouwborst (n 8), page 191; Chapter 2.2.4.

[112] *Whaling in the Antarctic* (Australia v Japan: New Zealand intervening) (Judgment) (ICJ, 31 March 2014) (Separate Opinion of Judge *Ad Hoc* Charlesworth), paragraph 6.

[113] Gardiner (n 60), page 42.

[114] Ibid, page 43.

As has become clear, the spectrum of precautionary measures also incorporates the most obvious category of measures, those that are in themselves protecting the environment.[115] After all, it is sometimes referred to as the 'principle of precautionary action.'[116] Precaution must be translated into 'concrete policy and management measures that are readily understood, that address the conservation problem and that identify actions to be taken in specific contexts. Without these, incorporation of the Principle in law or policy may have little influence on practice.'[117] For the purpose of this thesis, these measures will be termed 'protective measures', as they directly safeguard against environmental harm.

Common examples of protective measures include banning certain activities or substances,[118] establishing safety margins,[119] and using the best available technology,[120] but also include scientific and economic research to enhance knowledge of long-term options.[121] The list is non-exhaustive since what are appropriate measures will differ in each context.[122]

It would be difficult to argue that deploying these measures is not formally part of implementing the precautionary approach, although not every measure will be appropriate in all circumstances. Determining suitable measures requires considering the situation at large including possible counter-effects that protective measures might trigger.[123] The goal, after all, is to find measures that are *effective* in reaching the conservation objective but also *proportionate* to it.

2.4.1.4 A Three-dimensional Assessment of the Implementation of Precaution

As has been shown, there remains some confusion over how to implement the precautionary approach.[124] Various measures have been identified and numerous more exist. It is helpful to recall that, by nature of being a legal principle (not a rule) covering widely different situations, the precautionary approach does not provide a mathematical formula for which measures to

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115 Commission of the European Communities (n 57), pages 15-20; Cooney (n 72), pages 232-233; Cameron and Abouchar (n 36), pages 50-51.

116 Ulrich Beyerlin and Thilo Marauhn, *International Environmental Law* (Hart Publishing, 2011), pages 47, 54; Ellen Hey, 'The Precautionary Concept in Environmental Policy and Law: Institutionalizing Caution' (1992) 4 *Georgetown International Environmental Law Review* 303–318, 304.

117 Cooney and Dickson (n 78), page 301.

118 Freestone and Hey (n 9); Trouwborst (n 54), pages 165-169; Rosie Cooney, *The Precautionary Principle in Biodiversity Conservation and Natural Resource Management: An Issue Paper for Policy-Makers, Researchers and Practitioners* (IUCN, 2004), page 30.

119 Cooney (n 118), page 30; Trouwborst (n 54), pages 169-170.

120 Trouwborst (n 54), pages 172-174.

121 Hey (n 116), page 311; Trouwborst (n 54), pages 174-177.

122 Trouwborst (n 54), pages 179-191.

123 Cooney (n 72), pages 231-233.

124 Sands and Peel (n 21), page 218; Cooney and Dickson (n 77), page 289.

deploy in order to operationalise the abstract concept. In fact, doing so would be impractical and misleading. As such, all the above measures may play a part, though they operate within different dimensions of the implementation pursuit, which can broadly be categorised as the procedural and institutional elements and protective measures. One general feature is that implementation measures are precautionary if they help to shift the focus from reactive to proactive environmental management, in line with the rationale of the principle.

The analysis in this thesis is conducted against the background of this ongoing uncertainty as to the precise meaning of implementing precaution. To account for the various interpretations, this thesis presupposes that all three dimensions play a role in implementing precaution. Therefore, the analysis in Part III of this thesis incorporates all these dimensions. This will, it is hoped, provide the most complete picture of whether, and if so in what manner, precaution is implemented in the ISA context and what lessons can be learned for the future management of commercial seabed mining in the Area.

The following sections discuss some of the key issues in relation to implementing the three dimensions of the precautionary principle for the purpose of identifying criteria to evaluate whether the precautionary principle is being implemented. Section 2.5 then compiles these criteria to establish a framework for analysing the implementation of precaution.

2.4.2 The Role of Values

'Those who demand regulatory decisions based on sound science are in fact promoting an ideology, which represents political decisions as "science".'[125]

The first issue relevant to the institutional and procedural dimension of precaution is the role of subjective values. Whilst scientific knowledge must be the basis for environmental management decisions wherever possible, its advisory function is limited.[126] Marine scientific research and EIA are crucial for minimizing uncertainties, yet some uncertainties will remain, especially when dealing with complex systems and pioneering activities.[127] The precautionary approach recognises that decisions have to be made even in the face of uncertainties. Moreover, particularly in the context of sustainable development, decisions are characterised by the

[125] Les Levidow and Susan Carr, 'Sound Science or Ideology?' (2000) 15 *Forum for Applied Research and Public Policy* 44–49, 49.

[126] Levidow and Carr (n 125); Vern R Walker, 'The Myth of Science as a Neutral Arbiter for Triggering Precautions' (2003) 26 *Boston College International and Comparative Law Review* 197–228; Mee (n 56), page 119; Steinar Andresen, Lars Wallloe, and Kristin Rosendal, 'The Precautionary Principle: Knowledge Counts but Power Decides?' in Rosie Cooney and Barney Dickson (eds), *Biodiversity and the Precautionary Principle: Risk, Uncertainty and Practice in Conservation and Sustainable Use* (Earthscan, 2005) 39-54.

[127] Chapter 2.4.4.

dynamic interdependence between nature and society.[128] As discussed in Section 2.3.3, in order to identify protective measures that are *effective*, as required by the precautionary principle, we need to first establish the desired level of protection. This, in turn, ultimately depends on the values we place on both the biological and the mineral resources. What levels of harm to our global commons do we regard as acceptable? How do we want to source minerals for our hi-technology economies? How many resources do we want to preserve for our children's children? Do we want to preserve ecosystem viability, individual species, or individual creatures?

Given this value-component, deciding on precautionary measures comprises three considerations: scientific knowledge *(what are the known facts?)*, uncertainties *(where is the limit of our knowledge, can it be extended, and which assumptions are made?)*, and value considerations *(how safe do we want to play?)*. It is important to clearly distinguish these considerations so as not to mistake value judgments for factual information. This is where Peel's focus on uncertainties, participation, and transparency, addressed individually in the following sections, becomes relevant.[129]

2.4.2.1 Making Uncertainties Explicit

Making uncertainties explicit and closely examining them enables administrative bodies to determine where objective information ends and moral or political considerations begin. Moreover, it informs value-based decisions. Quantifiable financial aspects of mineral mining can easily overshadow less direct environmental costs and benefits. Dollar bills in one's pocket may be more visible than breathing clean air and drinking fresh water. Yet, we have to take a step back and undertake a more comprehensive assessment. Critically examining uncertainties, including identifying 'areas of lack of knowledge, the unavailability of long-term data, untested methods, a one-sided presentation of evidence or a failure to highlight the limitations of studies'[130] can provide the nuanced information necessary for a more complete weighing of costs and benefits.

2.4.2.2 Participation

Establishing expert advisory bodies is an institutional tool to provide best scientific information and identify uncertainties. However, once the limitations of the relevant scientific knowledge

[128] Karin Bäckstrand, 'Civic Science for Sustainability: Reframing the Role of Experts, Policy-Makers and Citizens in Environmental Governance' (2003) 3 *Global Environmental Politics* 24-41, 36.

[129] Peel (n 6), pages 156-159; Chapter 2.4.1.

[130] Ibid, page 223.

have been established, value considerations come into play. This is where any exclusive competence of expert bodies becomes disproportionate and questions of broader participation arise.[131] As members of the public, the value-based viewpoints of experts must be taken into account, yet they are only one group within a heterogeneous society.[132] Wide participation in the decision-making process is a crucial element of implementing precaution[133] as it allows administrative bodies to capture the various concerns and viewpoints on perceptions of risk and acceptability.[134] Achieving public participation can involve the media, open discussion events, and stakeholder surveys but also institutionalized measures, such as an Ombudsperson or an advisory board representing NGOs and other stakeholders.

Public participation is all the more important for the ISA, which is obliged to act on behalf of humankind.[135] Yet, it is already a challenge to provide a platform for the voices of interested scientists and concerned NGOs. To add to the difficulty, public awareness of the debates around seabed mining and even of the existence of the ISA is currently minimal to non-existent.[136] Chapter 7.4 discusses the challenges and potential solutions presented by this situation.

2.4.2.3 Transparency

Finally, transparency in the decision-making process provides accountability over how all three considerations, scientific knowledge, uncertainties, and value judgments, are taken into account when deciding over precautionary measures. As Peel points out: '[i]nsisting upon transparency in the process by which these decisions are reached provides some safeguard against the possibility that the values of the decision-maker will have an undue influence upon the decision-making process, rather than those that have a greater measure of community support.'[137] Institutional transparency measures include publication of minutes and working documents as well as open meetings to allow NGOs and other stakeholders to observe meetings or, as in the

131 Jaye Ellis, 'Overexploitation of a Valuable Resource? New Literature on the Precautionary Principle' (2006) 17 *European Journal of International Law* 445–462, pages 450-451.

132 For detailed discussions about the role of experts, see Monika Ambrus et al (eds), *The Role of 'Experts' in International and European Decision-Making Processes: Advisors, Decision Makers or Irrelevant Actors?* (Cambridge University Press, 2014).

133 Joyeeta Gupta, 'Glocalization: The Precautionary Principle and Public Participation' in David Freestone and Ellen Hey (eds), *The Precautionary Principle and International Law: the Challenge of Implementation* (Kluwer Law International, 1996) 231-246, page 246.

134 David Vanderzwaag, 'The Precautionary Principle and Marine Environmental Protection: Slippery Shores, Rough Seas, and Rising Normative Tides' (April 2002) 33 *Ocean Development & International Law* 165–188, page 175.

135 LOSC, article 137(2).

136 Kimone Thompson, *Seabed Authority SG Laments Lack of Awareness about Entity* (Jamaica Observer, 26 July 2013) <http://www.jamaicaobserver.com/news/Seabed-Authority-SG-laments-lack-of-awareness-about-entity>.

137 Peel (n 6), page 225.

case of meetings under the *Convention on Biological Diversity*,[138] the *United Nations Framework Convention on Climate Change*,[139] and the *Desertification Convention*,[140] to address the meeting.[141] In addition, procedural measures can aid transparency, for example through the publication of assessment criteria to enable external actors to retrace decisions.[142] Similarly, 'science policies', that is 'decision rules about the way in which risk assessment scientists should proceed when they encounter specified types of uncertainties,' can aid transparency.[143] This can allow expert bodies to conduct risk assessment and make decisions over risk management in a principled way, taking into account value decisions reached by political bodies, ideally in close consultation with external stakeholders.

2.4.2.4 A Normative Framework

Administrative bodies faced with identifying value judgments can be aided by overarching normative frameworks.[144] For the ISA, the concept of common heritage of humankind is undoubtedly the most central normative framework. As discussed in detail in Chapter 3.2, the common heritage concept sets the foundation for the legal regime for seabed mining in the Area. The ISA is specifically required to regulate and control seabed mining in accordance with the principle and 'on behalf of mankind as a whole.'[145] So what general guidance can that concept provide?

One the one hand, a central aim of the common heritage concept is to ensure intra-generational equity and sharing of the benefits of seabed mining.[146] On the other hand, the concept includes what Kiss describes as the 'optimum use of resources in a spirit of conservation for future

[138] See n 17.

[139] See n 18.

[140] *United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa* (adopted 14 October 1994, entered into force 26 December 1996) 1954 UNTS 3.

[141] For a discussion on public participation rules for various multilateral environmental agreements, see Glenn M. Wiser, 'Transparency in 21st Century Fisheries Management: Options for Public Participation to Enhance Conservation and Management of International Fish Stocks' (2001) 4 *Journal of International Wildlife Law and Policy* 95–129, pages 114-118.

[142] Peel (n 6), page 225

[143] Walker (n 126), page 214.

[144] Peel (n 6), page 224.

[145] LOSC, article 153(1); see also articles 136, 137(2).

[146] LOSC, article 140; Jutta Brunnée, 'Common Areas, Common Heritage, and Common Concern' in Daniel Bodansky and others (eds), *The Oxford Handbook of International Environmental Law* (Oxford University Press, 2007) 551-573, page 561; Alexandre Kiss, 'The Common Heritage of Mankind: Utopia or Reality?' (1985) 40 *International Journal* 423–441, page 438.

generations.'[147] This conservation and inter-generational element is central to the broader ambition of sustainable development.[148]

Guidance on the interplay of both ambitions of the common heritage concept can be drawn from the Seabed Disputes Chamber's *SDC Advisory Opinion.* When addressing the question whether states that sponsor mining operators may carry different responsibilities and potential liability in case of environmental harm, the Chamber linked its response to the common heritage principle. The Chamber recognized the LOSC provisions for preferential treatment of developing states designed to give effect to the economic dimension of common heritage.[149] However, the Chamber confirmed that the paramount importance of the marine environment for humanity transcends the economic differences of states. As such, the responsibilities and liability of sponsoring states apply equally to all states, whether developing or developed.[150] To find otherwise 'would jeopardize uniform application of the highest standards of protection of the marine environment, the safe development of activities in the Area and protection of the common heritage of mankind.'[151]

The *SDC Advisory Opinion* is further discussed in Chapters 3.6.2 and 4.3.3. For present purposes, it suffices to say that the Chamber, although recognising that socio-economic considerations play a role, aimed to convey that they should not compromise environmental protection efforts. Consequently, guidance from the normative framework of the common heritage concept includes a focus on environmental protection and safety standards. Moreover, as French puts it, the Chamber has done much to present the common heritage as 'very much an active principle of international law, as well as being a fundamental, if a discrete, element of the promotion of global sustainable development',[152] which could itself be regarded as a normative

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[147] Kiss (n 146), page 438. See also C C Joyner, Legal Implications of the Concept of the Common Heritage of Mankind (1985) 35 *International and Comparative Law Quarterly* 190–199, page 195; Barbara Ellen Heim, 'Exploring the Last Frontiers for Minerals Resources: A Comparison International Law Regarding the Deep Seabed, Outer Space, and Antarctica' (1991) 23 *Vanderbilt Journal of Transnational Law* 819-849, page 827; Jennifer Frakes, 'The Common Heritage of Mankind Principle and the Deep Seabed, Outer Space, and Antarctica: Will Developed and Developing Nations Reach a Compromise?' (2003) 21 *Wisconsin International Law Journal* 409-434, page 413.

[148] Nico Schrijver, *Sovereignty over Natural Resources: Balancing Rights and Duties* (Cambridge University Press, 2008) page 254; Rüdiger Wolfrum, 'Common Heritage of Mankind' in *Max Planck Encyclopedia of Public International Law* (2009), paragraphs 22- 23; Kemal Baslar, *The Concept of the Common Heritage of Mankind in International Law* (Martinus Nijhoff, 1998), pages 103-105.

[149] *SDC Advisory Opinion,* paragraphs 151-157.

[150] Ibid, paragraph 158.

[151] Ibid, paragraph 159.

[152] Duncan French, 'From the Depths: Rich Pickings of Principles of Sustainable Development and General International Law on the Ocean Floor — the Seabed Disputes Chamber's 2011 Advisory Opinion' (2011) 26 *The International Journal of Marine and Coastal Law* 525–568, page 567.

framework.[153]

How we regulate the risks of seabed mining reveals what we value.[154] Admittedly, humans do not have the best track record in making sustainable decisions. For seabed mining, we have tasked an international organisation with reaching good decisions, based on the best scientific knowledge available. However, subjective considerations are inevitable. Thus, we need to ensure participatory and transparent decision-making and begin by determining the desired environmental conservation objective. With its attention on intergenerational equity and high environmental standards, the common heritage concept offers some normative guidance in these pursuits.

2.4.3 The Burden of Proof

A further concern affecting the procedural dimension of implementing precaution is the controversial question of whether the precautionary approach warrants a reversal of the burden of proof. The traditional rationale, of allowing commercial and industrial-scale activities unless and until they can be proven to cause environmental harm, has allowed long-term ecological degradation.[155] The precautionary approach is designed to put an end to this. It advocates against the idea of waiting for scientific proof. However, this does not always lead to a reversal of the burden of proof.[156] As Trouwborst demonstrates, under general international law such a reversal is *not* automatically part of the precautionary principle,[157] although numerous cases exist in which the burden has specifically been reversed.[158]

However, the precautionary approach does affect the *standard* of proof, regardless of who bears the *burden*. In other words, even if the burden of proof is not reversed, opponents of a potentially harmful activity no longer have to provide conclusive proof of harmfulness. Instead the precautionary thresholds of, for example, threats of serious or irreversible damage apply. Thus, 'the precautionary principle has lowered the standard of proof.'[159] Conversely, in cases where the burden of proof has been reversed, an agent of a potentially harmful activity would

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[153] UN Doc A/Res/66/288 (n 25), annex paragraph 1.

[154] The sentence is borrowed from Andre Nollkaemper, '"What you risk reveals what you value", and Other Dilemmas Encountered in the Legal Assaults on Risks' in David Freestone and Ellen Hey (eds) *The Precautionary Principle and International Law: the Challenge of Implementation* (Kluwer Law International, 1996) 73–94.

[155] Trouwborst (n 54), page 195.

[156] Alan Boyle, 'The Environmental Jurisprudence of the International Tribunal for the Law of the Sea' (2007) 22 *The International Journal of Marine and Coastal Law* 369–381, pages 374-375.

[157] Trouwborst (n 54), pages 222-227.

[158] Ibid, pages 201-219.

[159] Trouwborst (n 8), page 192; See also: Freestone and Hey (n 10); Peel (n 6), page 155.

not have to prove absolute harmlessness either.[160] After all, the presence of uncertainties prevents either side from producing conclusive evidence, be it to prove harmfulness or harmlessness.[161] The objective of the burden of proof is not to determine the dangerous or benign nature of an activity but to demonstrate whether the thresholds for the precautionary principle are met. If they are, environmental protection has to be favoured even if uncertainties remain.[162]

A clear distinction must be drawn between (1) the general burden of proof in the context of a risky activity and (2) the reversal of the burden of proof as a specific implementation measure. Each of these are discussed separately below.

2.4.3.1 Considerations for a General Allocation of the Burden of Proof

Reversing the burden of proof is not a general requirement under the precautionary principle. However, it may play a role in specific circumstances. In order to analyse why and when a reversal might be appropriate, and when it might not be, it is necessary to examine the rationale behind a reversal of the burden of proof.

Applying the traditional burden of proof can render the precautionary approach ineffective and indeed inequitable. Consider a typical case, in which a local community is protesting against a corporation's plan to build an industrial plant, which could compromise water quality in the adjacent river on which the community depends. Even when applying the precautionary approach, the community is still left to prove threats of significant environmental harm. In this scenario, a lack of resources and expertise in the local community may hinder the *effective* application of the precautionary approach, rendering it meaningless. Moreover, in contrast to the corporation, the community might not possess detailed information about the project, making it *inequitable* to place the burden of proof on the community.[163]

This is, however, a one-way logic, since strictly reversing the burden of proof can also lead to inequalities. As Cooney notes, 'asking indigenous or local communities to demonstrate that their use of non-wood forest products, sea turtle eggs or pasture was not causing any harm would be tantamount to ending the livelihood activities of substantial proportions of the world's

[160] Trouwborst (n 54), pages 225-226.

[161] Peel (n 6), page 155.

[162] Trouwborst (n 8), page 187.

[163] Cooney (n 72), page 234; *Request for an Examination of the Situation in Accordance with Paragraph 63 of the Court's Judgment of 20 December 1974 in the Nuclear Tests (New Zealand v. France) Case* [1995] ICJ Rep 1995 (Dissenting Opinion of Judge Weeramantry), page 342.

rural poor.'[164]

Consequentially, the underlying rationale of reversing the burden of proof is to ensure precaution works *effectively* and that a pinch of *equity* is added to the equation. As such, in deciding who to burden, it is important to consider who proposes an activity, who benefits from it, who bears the environmental costs, and who has access to information and resources.[165] Chapter 7.5 demonstrates that the allocation of the burden of proof does not have to be a dichotomy. Both in the ISA regime, and indeed in some fisheries regimes, the question of the burden of proof is addressed in a nuanced way.

2.4.3.2 Reversing the Burden of Proof as an Implementation Measure

Despite not being an inherent element of the precautionary approach, reversing the burden of proof is nevertheless an important implementation measure.[166] It has been applied to large-scale pelagic driftnet fishing, which is prohibited unless effective conservation and management measures can be taken to prevent 'unacceptable impact' of such fishing practices.[167] Similarly, the European Court of Justice decided that cockle fishing in the Wadden Sea must be prohibited 'if it cannot be excluded, on the basis of objective information, that [cockle fishing] will have a significant effect on [a particular] site, either individually or in combination with other plans or projects.'[168] The burden of proof was also reversed for bottom fishing in areas with seamounts, hydrothermal vents, cold water corals, and sponge fields in the area managed by the newly established *South Pacific Regional Fisheries Management Organisation.*[169] Similarly, a reversed burden of proof could be applied in marine protected areas in ABNJ.[170] As these examples show, whilst it is not an automatic element of precaution, reversing the onus of proof for selective sites or activities can be a means to implement the precautionary approach.

What has become clear is that no generic solutions exist. In some cases reversing the burden of proof may be a necessary precautionary measure, in other cases it may render the precautionary

[164] Cooney (n 72), page 234.
[165] Cooney and Dickson (n 78), page 303.
[166] Trouwborst (n 54), page 223.
[167] UNGA, UN Doc A/44/225 (22 December 1989), paragraph 4.
[168] *Landelijke Vereniging tot Behoud van de Waddenzee and Nederlandse Vereniging tot Bescherming van Vogels v Staatssecretaris van Landbouw, Natuurbeheer en Visserij* (C-127/02) [2004] ECR I-7405, paragraphs 44-45, 59, 67; See also Elen R Stokes, 'Liberalising the Threshold of Precaution - Cockle Fishing, the Habitats Directive, and Evidende of a New Understanding of "Scientific Uncertainty"' (2005) 7 *Environmental Law Review* 206-214.
[169] Interim measures adopted by participants in negotiations to establish the South Pacific Regional Fisheries Management Organisation (2007) <http://www.southpacificrfmo.org/interim-measures/>, paragraphs 3, 6 in the section on bottom fisheries.
[170] UN Doc A/61/65 (n 95), annex I paragraph 61.

approach ineffective or inequitable and alternatives are more appropriate. Either way, potential counter-effects must be considered. Again, the desired outcome should be net-environmental protection. Chapter 7.5 of this thesis assesses whether the burden of proof is or indeed could even be reversed in the specific context of the ISA, bearing in mind the overarching aims of ensuring effectiveness and equity.

2.4.4 The Nature of Uncertainties

A further aspect, affecting primarily the procedural dimension of implementing precaution, is the need to consider the type of uncertainties at hand. Explicitly examining the uncertainties involved in environmental risks is an important aspect of the precautionary approach.

Epistemic uncertainties arise due to the imperfection of our knowledge, deriving from inadequate or incomplete data, sampling errors or measurement biases, and can in principle be overcome through further rigorous research.[171] In contrast, uncertainties can also be of an ontological nature, meaning that the system being studied is intrinsically complex and variable.[172] Marine biodiversity and deep ocean ecosystems fall within this latter category.[173] These uncertainties are not temporary and go beyond strictly scientific uncertainties.[174]

When applying precaution to seabed mining, both types of uncertainties are relevant. Some of the challenges of regulating mining activities derive from the fact that the mining technology is untested and will be deployed in (quite literally) unchartered waters. The uncertainties associated with faults in pioneering technology will most likely reduce with time. However, ontological uncertainties relating to the marine environment and its biodiversity will persist. Consequently, it is all the more important for the ISA to examine fully the uncertainties and to implement the precautionary approach.

2.4.5 Dealing with Uncertainty in Complex Systems: Adaptive Management

Directly linked to the presence of uncertainties and the nature of complex systems is the option of adaptive management. Relatively strict precautionary responses, such as reversing the burden of proof, might be appropriate for particularly vulnerable ecosystems or for activities potentially causing irreversible harm. On the other end of the scale of precautionary responses, adaptive management may be an option for less serious situations.

[171] Walker et al (n 73), page 13; Cooney (n 72), page 229.
[172] Ibid, pages 13-14.
[173] Cooney (n 72), page 229.
[174] S R Dovers and J W Handmer, 'Ignorance, the Precautionary Principle, and Sustainability' (1995) 24 *Ambio* 92-97; Cooney (n 72), page 229.

Instead of being paralyzed by conservation aims, one way to address uncertainties is to design environmental management so as to be flexible and able to adapt to new findings. This so-called adaptive management deserves close attention, not least because it is a way to build precaution into the regulatory framework and can be particularly suitable for biodiversity management[175] and complex systems in general.[176]

The core idea is simply 'learning by doing'[177] as long as the doing does not cause irreversible harm. As Cooney summarises, 'adaptive management involves management actions that are designed as experiments to produce information about the resource being managed. It emphasizes making modest, reversible management interventions, careful monitoring of impacts and continual assessment and refinement of management practice as information increases.'[178] As such, adaptive management is a way to integrate ongoing scientific research with precautionary and reflective decision-making and includes four elements:[179]

(a) Monitoring the impacts of a management option based on agreed indicators;

(b) Promoting scientific research;

(c) Periodic evaluation of management options and feeding information back into the decision-making process; and

(d) Effective compliance mechanisms.

The relationship between adaptive management and the precautionary approach can be ambiguous. Some may regard it as an alternative to precaution, at least when the latter is interpreted in absolute terms as requiring widespread moratoria. Yet, in the fisheries context, adaptive management is seen as contributing to a precautionary approach, not least because the underlying aim is sustainable utilization rather than pure conservation.[180] For example, the Inter-American Tropical Tuna Association applies both a precautionary approach and adaptive

[175] CBD COP07, *Decision VII/12*, UNEP/CBD/COP/DEC/VII/12 (13 April 2004), paragraphs 10-12; Cooney (n 72), pages 238-239; Brendan Moyle, 'Making the Precautionary Principle Work for Biodiversity: Avoiding Perverse Outcomes in Decision-Making Under Uncertainty' in Rosie Cooney and Barney Dickson (eds), *Biodiversity and the Precautionary Principle: Risk, Uncertainty and Practice in Conservation and Sustainable Use* (Earthscan, 2005) 159-172, pages 170-172.

[176] David A Keith et al 'Uncertainty and Adaptive Management for Biodiversity Conservation' (2011) 144 *Biological Conservation* 1175-1178, 1178.

[177] Holly Doremus, 'Precaution, Science, and Learning While Doing in Natural Resource Management' (2007) 82 *Washington Law Review* 547–579; Cooney (n 118), page 31.

[178] Cooney (n 72), page 238.

[179] Cooney and Dickson (n 78), page 304.

[180] Cooney (n 118), page 31; Trevor Ward et al, *Policy Proposals and Operational Guidance for Ecosystem-Based Management of Marine Capture Fisheries* (WWF Australia, 2002).

management when assessing the impacts of expanded fisheries on stocks.[181]

Moreover, where despite uncertainties there are 'calls for moving in the dark, rather than sitting still,'[182] dynamic precautionary measures are beneficial. After all, any decision might later prove to be inadequate and revisiting them is an integral condition of the precautionary approach.[183] The important point is to err on the side of caution. In this context, adaptive management can be appropriate where: (a) inaction itself is risky; (b) inaction is impractical for socio-economic reasons; or (c) the main danger is the cumulative impact of small but irreversible actions.[184] In more concrete terms, the latter describes the situation that nodule mining inevitably destroys life at the mine site, yet it is the cumulative impact of numerous mine sites, and other activities, that might critically endanger deep sea biodiversity. In sum, adaptive management:

> is particularly useful in the implementation of the Precautionary Principle as it does not necessarily require having a high level of certainty about the impact of management measures before taking action, but involves taking such measures in the face of uncertainty, as part of a rigorously planned and controlled trial, with careful monitoring and periodic review to provide feedback, and amendment of decisions in the light of new information.[185]

Nonetheless, caution is warranted as adaptive management can be unsuitable in several circumstances. First, some mistakes are to be expected, making it unsuitable for activities that can quickly cause very serious or irreversible harm.[186] In preventing invasive alien species, for instance, a small quantity of creatures can cause major and irreversible environmental damage.[187] This analogy is relevant when considering management options for species at hydrothermal vents and seamounts many of which appear to be endemic and could thus be threatened by single mining operations.[188] Rabinovich suggests that adaptive management is an effective way to ensure precautionary management of wildlife, except where the species are

[181] Paul de Bruyn, Hilario Murua, and Martín Aranda, 'The Precautionary Approach to Fisheries Management: How This Is Taken into Account by Tuna Regional Fisheries Management Organisations (RFMOs)' (2012) 38 *Marine Policy* 397–406, 399.

[182] Doremus (n 177), page 554.

[183] Ibid, page 553.

[184] Ibid, pages 555-557.

[185] Cooney and Dickson (n 78), pages 304-305.

[186] R Cooney and Andrew T F Lang, 'Taking Uncertainty Seriously: Adaptive Governance and International Trade' (1 June 2007) 18 *European Journal of International Law* 523–551, pages 536-537.

[187] Cooney and Dickson (n 77), page 298; Tim Low, 'Preventing Alien Invasions: The Precautionary Principle in Practice in Weed Risk Assessment in Australia' in Rosie Cooney and Barney Dickson (eds), *Biodiversity and the Precautionary Principle: Risk, Uncertainty and Practice in Conservation and Sustainable Use* (Earthscan, 2005) 141-156.

[188] C L Van Dover et al, *Environmental Management of Deep-Sea Chemosynthetic Ecosystems: Justification of and Considerations for a Spatially-Based Approach* (ISA Technical Study: No. 9, 2011), pages 2, 45.

endangered or play a crucial role in a complex, poorly understood ecological situation.[189]

Second, adaptive management can be misused in an attempt to postpone protective measures, in effect preventing more rigorous precautionary actions. This is particularly relevant in light of the danger of a relatively speedy transition towards exploitation contracts, which would then be difficult to modify.[190] Similarly, there is a risk of a degree of complacency once exploitation has been allowed.[191] In sum, 'used indiscriminately or inappropriately, adaptive management mechanisms can operate to water down regulatory requirements, reduce public scrutiny of planning and development approval processes and accord preferential treatment to favoured industries, thus substantially detracting from any precautionary role they might serve in addressing uncertainty.'[192]

Avoiding these pitfalls requires a robust institutional design and independent decision-making bodies, able to halt or scale-down operations even against the wish of contractors, if necessary. The difficulties of such flexibility in the ISA context are discussed in Chapter 7.3. Moreover, given that adaptive management directly responds to uncertainties, it requires transparent and participatory decision-making that clearly identifies value-based elements.[193]

In sum, prior to adaptive management being considered, it must first be assessed whether more rigorous precautionary measures are necessary and whether the procedural and institutional design allows for an effective and continuous adaptation of the management of seabed mining. Only if these criteria are considered can adaptive management support the precautionary approach. Nonetheless, these words of caution should not detract from the potential of adaptive management. After all, it can be particularly useful for complex systems and it is closely linked with the ecosystems approach.[194] Both are designed to address scientific uncertainties, promote scientific research to increase understanding of ecosystems and impacts thereon, and prescribe monitoring of any potentially harmful activity.[195] Indeed, they are often regarded as elements of each other.[196]

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[189] Rabinovich (n 77), page 186.

[190] Chapter 7.3.

[191] Carl J Walters, 'Is Adaptive Management Helping to Solve Fisheries Problems?' (2007) 36 *Ambio: A Journal of the Human Environment* 304-7.

[192] Peel (n 6), page 154; see also Sidney A Shapiro and Robert L Glicksman, Risk Regulation at Risk: Restoring a Pragmatic Approach (Stanford University Press, 2003), pages 167-173.

[193] Cooney and Lang (n 186), pages 538-539.

[194] UN Doc A/Res/66/288 (n 25), annex paragraph 158.

[195] CBD COP05, *Decision V/6*, UNEP/CBD/COP/5/23 (26 May 2000); Arie Trouwborst, 'The Precautionary Principle and the Ecosystem Approach in International Law: Differences, Similarities and Linkages' (April 2009) 18 *Review of European Community & International Environmental Law* 26–37, 31.

[196] Trouwborst (n 195), page 36.

2.4.6 Examining Counter-Effects: the Aim of Net Environmental Protection

A further important consideration will affect the procedural dimension and protective measures required to implement precaution. As set out in Chapter 1, the environmental risks of seabed mining include dangers to marine biodiversity. One aspect of particular importance in the biodiversity context is the potential for unintended side- or counter-effects.

The precautionary approach was first articulated in an industrial context relating to hazardous substances. Applying precaution to the biodiversity realm is therefore a departure from its original focus and prompts an important distinction. The potential harm from a hazardous substance can be avoided by not using the substance. Damage to biodiversity levels, however, can be caused by indirect counter-effects of a number of management options.[197] The choice is often not between a clearly precautionary and a risky option but instead between 'risk and risk.'[198] For trade in endangered species, for example, the choice might be between regulating such trade and thereby accepting a certain level of killing, or banning any trade but facing the prospect of illegal hunting without quotas.[199] A similar logic can be applied to seabed mining under the ISA regime.

First, any measure to reduce and manage the effects of seabed mining on marine biodiversity may trigger unintended, and to an extent unforeseeable, ecological or other environmental counter-effects, because of the inherent complexities of species interactions and ecosystems.

Second, management decisions by the ISA may trigger counter-effects of a political nature. If, for example, the ISA was to impose restrictions that effectively prevented seabed mining, there would be a risk of mining corporations and states finding ways to circumvent the multilateral regime and proceed with mining activities with potentially far lower environmental standards.[200]

The point remains: what is considered a precautionary measure depends on the context.[201] The most restrictive measures are usually perceived to represent the highest degree of precaution. Yet, this 'equation is often made with little detailed examination of context and potential consequences.'[202] On the other hand, competing economic interests in natural resources may actually serve as an incentive to protect these resources.[203] Bioprospecting and seabed mining could be regarded as competing economic interests over resources both occurring in the deep

[197] Moyle (n 175), page 160.

[198] Cooney and Dickson (n 77), pages 294-295.

[199] Rabinovich (n 77), page 186.

[200] At present we see the opposite occurring whereby the US, not yet a party to the LOSC, is actively engaging in the ISA regime through Lockheed Martin holding two exploration contracts through its UK subsidiary, sponsored by the UK.

[201] Cooney (n 72), page 236; Moyle (n 175).

[202] Cooney (n 72), page 236.

[203] Cooney (n 118), page 32-34.

oceans. Ironically though, the economic potential of marine genetic resources may actually serve as an incentive to protect particularly sensitive ecosystems in the deep ocean from mining, if not for environmental reasons, at least for economic ones.[204]

By the same token, Moyle reminds us that precautionary measures to avoid environmental threats may actually offer conservation benefits. He argues that a focus on avoiding harm makes the precautionary principle extremely timid. 'The fear of a loss dominates the choice of strategy. While some risk aversion is warranted - and this is especially the case in the presence of irreversibility - this timidity leads to foregone opportunities to improve conservation outcomes.'[205] There is some truth in this. If the ISA strikes an adequate balance between utilisation and conservation, this could set a standard for other (future) ocean uses. The extensive competencies of the ISA, including its explicit mandate to act on behalf of humankind,[206] have triggered high hopes.

What has become clear is that applying precaution requires thinking beyond the immediate effects of any management measure. The overall aim is net environmental protection. To this aim, the ISA must decide upon specific conservation objectives. In assessing the effectiveness of seemingly precautionary measures, long-term effects (both positive and negative) as well as possible counter-effects must be considered and options compared.

2.4.7 Socio-Economic Considerations

A last aspect that affects the protective measures adopted to give effect to the precautionary principle, is socio-economic considerations.

Principle 15 of the *Rio Declaration* requires measures to be cost-effective, which includes the costs associated with the threat materialising and the costs of precautionary measures to prevent it.[207] Problematically, whilst a price tag can be put on the economic costs and profit of mineral mining, the direct benefits of intact ecosystems (let alone any intrinsic values) are difficult if not impossible to quantify. Moreover, in the context of seabed mining, current precautionary measures might not always generate actual costs, especially if the measures involve limiting or prohibiting mineral exploitation at particularly vulnerable sites before it even starts. Some costs would be foregone business opportunities rather than actual expenses. Similarly, limiting

[204] For a discussion about the need for benefit sharing arrangements to provide conservation incentives, see Nele Matz, 'Marine Biological Resources: Some Reflections on Concepts for the Protection and Sustainable Use of Biological Resources in the Deep Sea' (2002) 2 *Non-State Actors and International Law* 279–300.

[205] Moyle (n 175), page 166.

[206] LOSC, article 137(2).

[207] Trouwborst (n 54), pages 230-232.

mining at hydrothermal vents might in turn create potential future profit from commercializing research into chemosynthetic ecosystems. Additionally, the costs of repairing future environmental damage are difficult to quantify 'and the costs of irreversible harm are, by definition, inestimable.'[208] What becomes clear is that, as the European Commission notes, weighing precautionary measures 'cannot be reduced to an economic cost-benefit analysis', although such analysis may be part of the examination where appropriate.[209]

Beyond cost-benefit analyses, the question is whether the precautionary approach is interpreted as choosing the most cost-effective way towards environmental protection or whether precautionary measures are only required if they are cost-effective? The answer is self-evident. As Trouwborst stresses, the logic of the latter is flawed in the context of precaution as the very uncertainties to which precaution responds, as well as the irreversibility of some environmental harm, render a purely economic analysis impossible.[210] Instead, the implementation criteria of effectiveness and proportionality already capture the essence that is to invest what is necessary to achieve the desired level of protection but not more. This is supported by the fact that numerous international instruments define precaution without any reference to cost-effectiveness,[211] and under customary international law there does not seem to be a separate requirement of cost-effectiveness.[212] After all, the French version of the *Rio Declaration* refers to 'mesures effectives' with no separate mention of cost-effectiveness.

Additionally, socio-economic factors are inherent in any precautionary logic. The principle rests on the rationale that some restrictive measures today are cheaper than the collapse of fish stocks or the clean-up of major pollution tomorrow,[213] not to mention 'the impossibility of repairing irreparable damage.'[214] The World Health Organisation reported that the threat of ecosystem changes to human health 'indicates strongly that a precautionary approach to environmental protection is the most effective way to protect and enhance health.'[215] In sum, not being precautionary might actually lead to an inefficient allocation of financial resources, 'particularly

[208] Trouwborst (n 8), page 193.

[209] Commission of the European Communities (n 57), pages 18-19; Lucy Emerton et al 'Economics, the Precautionary Principle and Natural Resource Management: Key Issues, Tools and Practices' in Rosie Cooney and Barney Dickson (eds), *Biodiversity and the Precautionary Principle: Risk, Uncertainty and Practice in Conservation and Sustainable Use* (Earthscan, 2005) 253-274; Trouwborst (n 54), pages 249-253.

[210] Trouwborst (n 54), pages 263-264.

[211] Ibid, pages 259-261.

[212] Ibid, page 280.

[213] Ibid, page 239; Hey (n 116), page 309-310; Freestone and Hey (n 9), page 158.

[214] Trouwborst (n 54), page 280.

[215] Carlos Corvalan, Simon Hales, and Anthony McMichael, *Ecosystems and Human Well-Being: Health Synthesis. A Report of the Millenium Ecosystem Assessment* (World Health Organisation, 2005), page 10.

when alternative technologies and/or products are available.'[216] As Trouwborst summarises: proportional and effective precautionary measures are *assumed* to be cost-effective.[217]

Moreover, in the long run, a stable economy is directly dependent on a healthy environment and sustainable management of natural resources. What underpins the principle is the realization that using natural resources sustainably is not a luxurious option for the morally minded but a simple necessity if we want to maintain a world with liveable conditions and a healthy economy for generations to come.[218] As such, socio-economic sustainability is built into the precautionary principle.[219]

Lastly, one of the critiques of precaution is that it may hamper economic growth and innovation.[220] However, this ignores the fact that the demand for green technology is indeed a major driver of innovation.[221] For seabed mining this has led to the development of impact-reducing mining technology,[222] yet it could also influence innovation for using substitute metals and alternative metal supply, such as recycling electronic waste.

2.5 Framework for Analysing the Implementation of the Precaution: Assessment Criteria

The discussion on the precautionary approach has revealed a plethora of issues involved in its implementation. First, whilst the precautionary logic is anything but new, its translation into a legal principle 'has caused us to re-examine many of the most basic concepts on environmental management policy'[223] because its rationale is *proactive* environmental management. Indeed, its crucial feature is timing. It calls for early action in the face of threats of environmental harm, even when scientific uncertainties remain. To the frustration of many, the precautionary

[216] Freestone and Hey (n 10), page 12.

[217] Trouwborst (n 8), page 193.

[218] Robert T Watson and A H Zakri, *Living Beyond Our Means: Natural Assets and Human Well Being (Statement from the Board of the Directors of the Millennium Ecosystem Assessment)* (2005) <http://www.wri.org/sites/default/files/pdf/ma_board_final_statement.pdf>, page 5.

[219] Trouwborst (n 54), page 238.

[220] Handl speaks of 'no-growth strands.' Günther Handl, 'Environmental Security and Global Change: The Challenge to International Law' in Winfried Lang and others (eds), *Environmental protection and international law* (Graham & Trotman, 1991) 3-33, 80.

[221] Ram Nidumolu, C K Prahalad, and M R Rangaswami, 'Why Sustainability Is Now the Key Driver of Innovation' (2009) *Harvard Business Review* 1–10; *Fostering Innovation for Green Growth* (OECD Green Growth Studies, OECD Publishing, 2011) <http://www.oecd-ilibrary.org/science-and-technology/fostering-innovation-for-green-growth_9789264119925-en>.

[222] An example is the Joint Industry Project "Towards Zero Impact" for deep sea mining. See Stanislav Verichev, *Technologies for mining in the deep sea*, presentation given at the Workshop 'Future Ocean – Seafloor Mineral Resources' in Kiel, Germany (18-20 March 2013) <http://fileserver.futureocean.org/forschung/r3/Verichev_technologies_for_mining_deep_sea.pdf>.

[223] Freestone and Hey (n 9), page 268.

approach does not dictate specific measures. The reason is simple: '[i]t is not in the nature of any legal system to provide mathematically certain solutions to problems which may be presented to it; for so long as different factual circumstances can arise in multiple permutations, uncertainty cannot be eliminated from law.'[224]

Nonetheless, what can be developed from the rich discussions of the principle is a set of steps, an implementation cycle to operationalise the precautionary approach[225] (see Figure 2-1). Importantly, these steps are both non-exhaustive and non-linear so their order and direction is merely a broad indication. Indeed, they can be understood as a checklist of the various elements that can be involved in implementing precaution and which have to be adapted to each individual context.

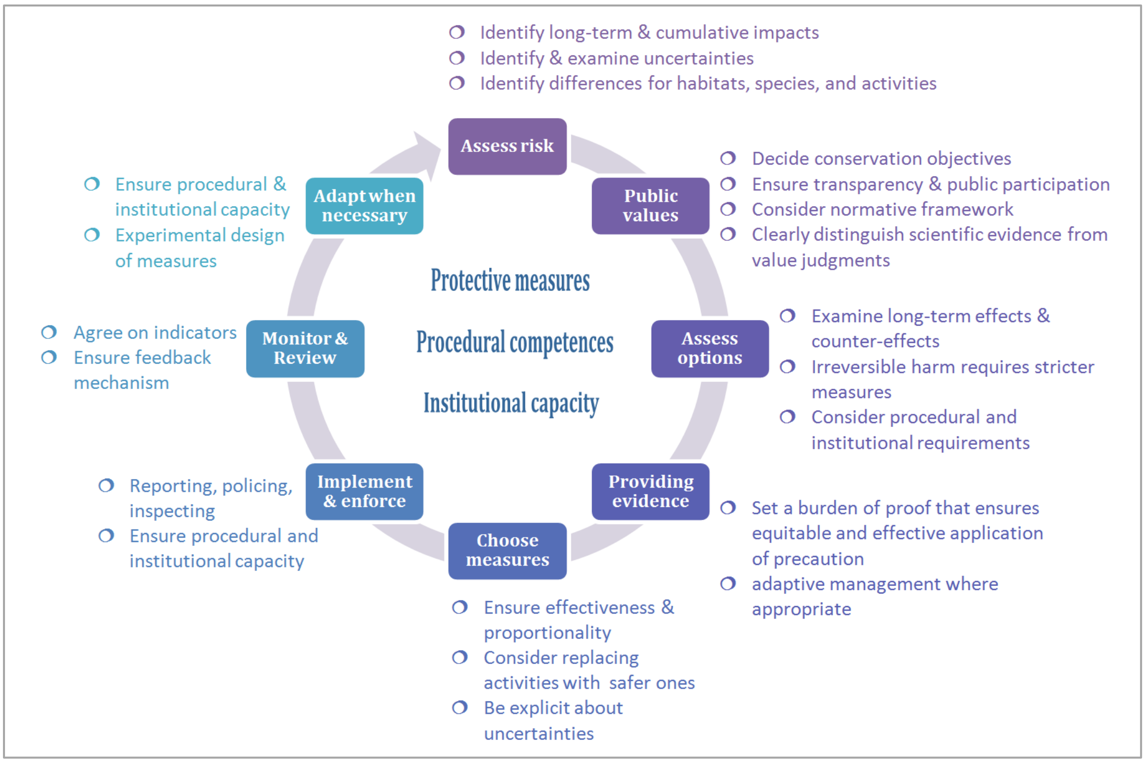

Figure 2-1: Implementation cycle of the precautionary approach.

What emerges from the analysis in this chapter is that there are three interlinked dimensions involved in implementing precaution: procedural elements, institutional elements, and the adoption of protective measures. Each of the various steps indicated in Figure 2-1 affects at least

[224] Andrew Clapham (ed), *Brierly's Law of Nations: An Introduction to the Role of International Law in International Relations* (Oxford University Press, 2012), page 84.

[225] For a list of guidelines on how to apply the precautionary approach to biodiversity conservation, see Cooney and Dickson (n 78).

two of these dimensions. For example, assessing environmental risks and identifying uncertainties is a procedural task which requires institutional capacity. Moreover, specific institutional designs, such as an expert advisory body, can facilitate this assessment. Other important procedural measures include EIA, transparency, and capturing public values and opinions. However, implementing precaution does not stop there. The criterion of effectiveness calls for protective measures that are adequate for ensuring the desired level of environmental protection. Some measures typically associated with precaution are safety margins, scientific research to limit uncertainties, moratoria, or adaptive management. However, any measure can be precautionary if it meets the criteria of effectiveness and proportionality. Assessing the various options includes considering long-term and counter-effects, and opting for stricter measures where the relevant harm could be irreversible.

Gathering evidence to assess the risks (and potential benefits) of activities can also be achieved in various ways. Examples are reversing the burden of proof, adding evidentiary presumptions to the assessment, or using adaptive management to design activities as experiments in order to collect data from them which feeds back into the risk assessment.

What has become clear is that precaution is closely linked with other principles stretching from prevention, ecosystem approach, EIA, and protection and preservation of the marine environment, to equity, public participation, transparency, sustainable development, and the common heritage of humankind. While a discussion on the nature and individual status of these concepts is beyond the scope of this thesis, it is worth highlighting, as shown in this chapter, that their implementation is interwoven with the precautionary approach. What has also become evident is that for precaution, and indeed other principles, to contribute effectively to a re-design of marine governance beyond national jurisdiction, rigorous implementation is needed.[226] This goes beyond a formal declaration of principles and requires institutional and procedural capacity.[227]

As for the precautionary principle, implementation requires a range of considerations as discussed above. Yet, the central question is when have we reached a level of measures which amounts to fulfilling the obligation to implement the precautionary approach? In other words, at what point does the sum of applied precautionary measures add up to the full principle? The answer, inconveniently, is as multifaceted as so much about the principle: it depends on the context. Even within one institution, the implementation may vary. Particularly vulnerable ecosystems require a different standard of precautionary measures than others. What is clear is that only fulfilling one aspect, such as transparent decision-making, cannot be enough. Again,

[226] David Freestone, 'Problems of High Seas Governance' [2009] *UNSW Faculty of Law Research Series*, 22.

[227] Oude Elferink (n 36), page 255.

direction is provided by the overall aim that is net environmental protection.

Against the background of this analysis, the steps identified in Figure 2-1 form the framework that is used in Part III of this thesis to evaluate whether, and if so in what manner and to what extent, the ISA is implementing the precautionary principle. In order for the ISA to successfully implement precaution, it has to put in place the institutional structures and procedural framework to both design a strategic management plan for seabed mining that is capable of meeting agreed environmental conservation objectives and to interfere if there are risks of failing to meet these objectives. Moreover, the ISA has to adopt effective and proportionate environmental protection measures and continue to implement, monitor, and adapt these measures in line with changes in scientific knowledge and the interpretation of uncertainties. In doing so, the ISA has to address the individual issues listed next to each step in Figure 2-1, as appropriate.

Before moving to this implementation analysis, however, it is necessary to understand the mandate and institutional structure of the ISA. The following chapters in Part II of this thesis, thus examine the ISA's institutional framework, its competencies and, in particular, its environmental mandate to set the scene for the core analysis in Part III.

PART II: THE INTERNATIONAL SEABED AUTHORITY

Chapter 3: The International Seabed Authority and the Seabed Mining Regime

3.1 Introduction

'The economic potential is still largely unknown. […] *How, then, can it be explained that hard-boiled and realistic national governments have lavished so much time, resources, and ingenuity on the devising of constitutional and institutional structures magnificent enough to administer the world as a whole, to cope with lands unknown quantitatively and qualitatively?'*[1]

As discussed in Chapter 1, seabed mineral mining is characterised by significant opportunities as well as numerous risks and uncertainties that require the application of the precautionary principle. Chapter 2 examined precaution as a principle of international environmental law and enumerated the many facets of its implementation. It was demonstrated that, to be meaningful, institutions implementing precaution must both integrate the principle into their decision-making procedures and have in place the institutional structures needed to assess risks, evaluate different potential responses, and implement the chosen measures. Analysing the implementation of precaution for deep seabed mining in areas beyond national jurisdiction (ABNJ), therefore, requires an in-depth examination of the institution at the heart of the regime, the International Seabed Authority.

This chapter discusses the institutional structure and competencies of the ISA, with the exception of its environmental mandate which his addressed more fully in Chapters 4 and 5. Section 3.2 begins by setting out the historical development of the seabed mining regime and the establishment of the ISA. The following sections then examine the ISA' mandate (Section 3.3), institutional structure (Section 3.4), decision-making processes (Section 3.5), and enforcement powers (Section 3.6). Sections 3.7 and 3.8 discuss the ISA's financial framework and dispute settlement mechanisms respectively. It will be concluded in Section 3.9 that the ISA, although to date largely overlooked by both international institutional law and international environmental law, is well equipped, from an institutional standpoint, to protect the marine environment from the adverse effects of the seabed mining activities it authorises. Together with the discussions in Chapters 4 and 5, this Part aims to provide a thorough foundation for the analysis in Part III of this thesis of the extent to which the ISA, in its institutional context, is implementing a precautionary approach to seabed mining activities in practice.

[1] Elisabeth Mann Borgese, 'A Constitution for the Oceans', in Elisabeth Mann Borgese and David Krieger (eds), *The Tides of Change: Peace, Pollution, and Potential of the Oceans* (Mason/Charter, 1975) 340-352, page 340.

3.2 Historical Development of the Deep Seabed Mining Regime

3.2.1 The Legal Status of the International Seabed and its Resources

Polymetallic nodules were first discovered off Siberia and expeditions with the HMS Challenger in 1872-1876 found them to occur in most oceans.[2] However, until the 1960s their exploitation in ABNJ was considered neither economically nor technologically feasible. With advances in mining technology, the idea of commercial exploitation of polymetallic nodules first began to be seriously discussed in the 1960s. At the time, disagreement existed as to the legal nature of the seabed beyond the continental shelf. One view held that the seabed and its resources were *res communis* and subject to the freedom of the high seas.[3] Its resources were thus open to all and could not be appropriated by anyone. According to an alternative view, the international seabed was *res nullius*, the effect of which was to allow claims to title over areas of the seabed based on occupation through use.[4] Indeed, concerns were expressed that the legal limits of the continental shelf could eventually be extended so far as to effectively divide up the entirety of the seafloor amongst coastal states. In particular, it was feared that the benefits of deep seabed mining would be reaped by the handful of industrialised states that possessed the capacity to make substantial investments to develop seabed mining technology.[5] Developing states would thus be effectively excluded from enjoying the economic potential of seabed minerals. In addition, developing land-based mineral exporting states could be disadvantaged by a rise in global metal supply.[6]

It was against this background[7] that the Maltese Ambassador to the United Nations, Arvid Pardo, delivered his now famous speech to the UN General Assembly on 1 November 1967. He drew attention to the impending injustice of developed state monopolisation of the potential economic benefits to be gained from seabed minerals.[8] Central to his vision was a plea for a new international treaty recognising the international seabed and ocean floor as the ‘common

[2] ISA Brochure, *Polymetallic Nodules* <https://www.isa.org.jm/documents/polymetallic-nodules>.

[3] Donald Rothwell and Tim Stephens, *The International Law of the Sea* (Hart, 2010), page 120; see also Jack N Barkenbus, *Deep Seabed Resources: Politics and Technology* (The Free Press, 1979), page 30.

[4] Barkenbus (n 3), pages 30-32; Jon Van Dyke and Christopher Yuen, '"Common Heritage" v. "Freedom Of The High Seas": Which Governs The Seabed?*' (1981) 19 *San Diego Law Review* 493–551, pages 514-519; Robin Rolf Churchill and Alan Vaughan Lowe, *The Law of The Sea* (Manchester University Press ND, 1999), page 225.

[5] Churchill and Lowe (n 4), page 224.

[6] Ibid, page 223.

[7] Barry Buzan, *Seabed Politics* (Praeger Publishers, 1976), page 67.

[8] Robert L Friedheim, *Negotiating the New Ocean Regime* (University of South Carolina Press, 1993), page 29.

heritage of mankind.'[9] According to Pardo, the requirements of this common heritage concept were that the international seabed 'should be used and exploited for peaceful purposes and for the exclusive benefit of mankind as a whole' and should not be subject to national appropriation in any manner whatsoever.[10] In order to give effect to the common heritage concept, he envisaged an 'agency with adequate powers to administer in the interests of mankind the oceans and the ocean floor beyond national jurisdiction' including 'the power effectively to regulate the commercial exploitation of the ocean floor.'[11]

Pardo's speech was momentous not only for its proposal but also for identifying the seabed beyond the continental shelf as a separate focus of concern amongst the myriad of existing ocean issues.[12] His proposal struck a chord with many delegates from developing states which, at the time, were eager to establish a more equitable international economic order.[13] This new order was to improve the terms of international trade for developing states, including addressing the inequalities of the international trade system that centred on the *General Agreement on Tariffs and Trade* (GATT).[14]

In this context, the idea of a common heritage of mankind introduced a new terminology into a politically divided environment. The concept became a tool in the ideological struggle between developing states and technologically advanced states and, because of the idea's initially socialist connotations, between East and West during the Cold War.[15] Baslar argues that some of the controversy surrounding Pardo's common heritage proposal could have been limited if it had been presented not as a divisive tool supporting particular groups of states but as a 'reiteration of a universal and inter-temporal principle derived from the nature of law.'[16]

Nevertheless, the UN General Assembly responded quickly to Pardo's speech establishing, on

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[9] For an overview of the developments towards a common heritage proposal, see Prue Taylor and Lucy Stroud, *Common Heritage of Mankind: A Bibliography of Legal Writing* (LULU Press, 2013), pages xv – xxiv.

[10] UNGA, UN Doc A/C.1./PV.1516 (1 November 1967), paragraphs 10-15.

[11] Ibid, paragraphs 8-9.

[12] Buzan (n 7), page 68.

[13] Nico Schrijver, *The Evolution of Sustainable Development in International Law: Inception, Meaning and Status* (Martinus Nijhoff Publishers, 2008); Friedheim (n 8), pages 220-221; Lawrence Juda, 'UNCLOS III and the New International Economic Order' (1979) 7 *Ocean Development & International Law* 221–255; Felipe H Paollilo, 'The Future Legal Regime of Seabed Resources and the NIEO: Some Issues' in Kamal Hossain (ed), *Legal Aspects of the New International Economic Order* (Frances Pinter, 1980) 165–170; but compare: Roderick C Ogley, 'The Law of the Sea Draft Convention and the New International Economic Order' (1981) 5 *Marine Policy* 240–251.

[14] *General Agreement on Tariffs and Trade* (adopted 30 October 1947, entered into force provisionally 1 January 1948) 55 UNTS 187.

[15] Nasila S Rembe, *Africa and the International Law of the Sea: A Study of the Contribution of the African States to the Third United Nations Conference on the Law of the Sea* (Brill, 1980), page 52; Kemal Baslar, *The Concept of the Common Heritage of Mankind in International Law* (Martinus Nijhoff Publishers, 1998), pages 31-34.

[16] Baslar (n 15), page 9.

18 December 1967, an *Ad Hoc Committee to Study the Peaceful Uses of the Sea-Bed and the Ocean Floor Beyond the Limits of National Jurisdiction*. The *Committee* was tasked with preparing a preliminary study of the legal, technical, scientific, and economic matters relating to the international seabed.[17] However, from the outset, there was a recognisable divide between industrialised states who favoured free access to ocean minerals and developing states who urged the creation of an international organisation that, as envisioned by Pardo, would regulate the seabed in the interests of all humankind.[18]

In parallel to debate on the rights over the international seabed, similar discussions were conducted for the exploration of and use of resources in Outer Space.[19] Although stopping short of mentioning the common heritage principle, the *Treaty on Principles Governing the Activities of States in the Exploitation and Use of Outer Space, including the Moon and Other Celestial Bodies*, adopted in 1967 (*Outer Space Treaty*), prohibits national appropriation of outer space and states that the exploration and use of outer space ‘shall be carried out for the benefit and in the interests of all countries’ and ‘be the province of all mankind.’[20]

In 1969, developing states, holding a majority in the General Assembly, secured a ‘Moratorium Resolution’, which passed with a narrow margin of 62 votes to 28 with 28 abstentions.[21] The Resolution declared that:

> pending the establishment of the aforementioned international régime:
>
> (a) States and persons, physical or juridical, are bound to refrain from all activities of exploitation of the resources of the area of the sea-bed and ocean floor, and the subsoil thereof, beyond the limits of national jurisdiction;
>
> (b) No claim to any part of that area or its resources shall be recognized.[22]

In 1970 the UN General Assembly adopted as Resolution 2749 its *Declaration of Principles Governing the Seabed and the Ocean Floor and the Subsoil Thereof, beyond the Limits of National jurisdiction*.[23] Widely supported, the *Resolution* was adopted by 108 votes to nil with 14 abstentions. It declared: ‘[t]he seabed and ocean floor, and the subsoil thereof, beyond the limits of national jurisdiction (hereinafter referred to as the area, as well as the resources of the

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[17] UNGA, UN Doc A/Res/2340(XXII) (18 December 1967).

[18] Churchill and Lowe (n 4), pages 226-227; Friedheim (n 8), page 30.

[19] Barbara Ellen Heim, ‘Exploring the Last Frontiers for Minerals Resources: A Comparison International Law Regarding the Deep Seabed, Outer Space, and Antarctica’ (1991) 23 *Vanderbilt Journal of Transnational Law* 819–849.

[20] *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies* (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205, articles 1, 2.

[21] UNGA, UN Doc A/RES/2574(XXIV) (15 Dec 1969), part D; Churchill and Lowe (n 4), page 227.

[22] UN Doc A/RES/2574(XXIV) (n 21), part D, paragraph 5.

[23] UNGA, UN Doc A/RES/2749(XXV) (17 December 1970).

area, are the common heritage of mankind.'[24] The *Resolution* further ruled out national sovereignty claims over 'the area' and allowed its usage for peaceful purposes only.[25] The *Resolution* also called for the establishment of an international regime for 'the area' and its resources through the conclusion of an international agreement of universal character.[26] As will be seen, the *Declaration of Principles* was significant in that it laid the foundation for what became the Part XI regime providing the opportunity to base the new regime on principle rather than state practice or, as Townsend-Gault and Smith put it, 'on an ethical foundation rather than greed.'[27]

Nevertheless, developed western states regarded the Declaration as a mere political statement of intent, rather than a binding obligation.[28] The US, for example, took the view that although no sovereign claims could be made over 'the area' as such, seabed mining was still allowed as a freedom of the high seas.[29] Writing in 1974, Luard described the disagreement over the legal status of the seabed as

> an issue of a kind that has never emerged before in man's history. It is arguable that it is the most important dispute that has ever arisen in dealings among states, for it concerns the ownership of two-thirds of the territory of the earth and a substantial proportion of its wealth.[30]

The pressing salience of the issue became clear in 1974 when it was believed that the US vessel *Hughes Glomar Explorer* was engaged in seabed mining of manganese nodules in the North Pacific Ocean. Although subsequently revealed to be a CIA led attempt to recover a sunken Soviet submarine rather than seabed mining,[31] the incident attracted the attention of the delegates who, by then, had started to formally negotiate a new legal regime for 'the area' at the *Third United Nations Law of the Sea Conference* (UNCLOS III).

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[24] Ibid, paragraph 1.

[25] Ibid, paragraphs 2, 5.

[26] Ibid, paragraph 9.

[27] Ian Townsend-Gault and Michael D Smith, 'Environmental Ethics, International Law, and Deep Seabed Mining: The Search for a New Point of Departure' in Jon M Van Dyke, Durwood Zaelke, and Grant Hewison (eds), *Freedom for the Seas in the 21st Century - Ocean Governance and Environmental Harmony* (Island Press, 1993) 392–403, 393.

[28] Churchill and Lowe (n 4), page 227-228.

[29] Dyke and Yuen (n 3), pages 497-501.

[30] Evan Luard, *The Control of the Sea-Bed: A New International Issue* (Heinemann, 1974).

[31] Norman Polmar and Michael White, *Project Azorian: The CIA and the Raising of the K-129* (Naval Institute Press, 2010), pages 1-3.

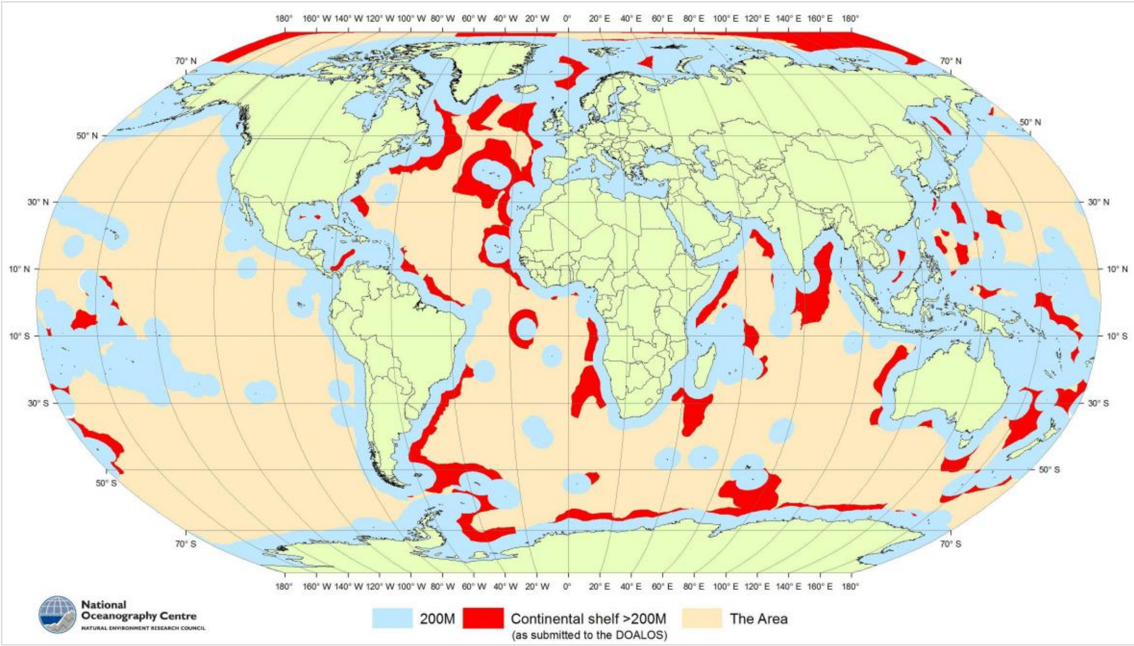

Figure 3-1: Map illustrating the approximate size of the Area.
Source: Alan Evans, Marine Geoscience Group (UNCLOS), National Oceanography Centre, Southampton, UK (July 2015).

During UNCLOS III, the divergent views as to the legal status of the Area, illustrated in Figure 3-1, and its resources continued to be evident. Developing states pushed for an organisation that would itself conduct mineral mining as well as control contractors and would distribute its direct profits and royalties amongst all states in line with the principle of the common heritage of humankind.[32] In contrast, Western states favoured a much less powerful agency that would serve as little more than a registry of national claims to mining sites.[33] This division was further complicated by the national interests of metal exporting and landlocked states who sought to be properly represented in any future institution. Over the following decade 'nothing tested so sorely the ability of diplomats from various corners of the world to reach common ground than the goal of conserving that common heritage and profiting from it at the same time.'[34] Interestingly, several decades later the debate around equity remains, although it now also encompasses considerations relating to environmental protection and mining monopolies by private multinational corporations.

In parallel to UNCLOS III, the need for regulation of future mineral exploration in outer space

[32] Churchill and Lowe (n 4), page 228.

[33] Ibid.

[34] UN Division for Ocean Affairs and the Law of the Sea, *The United Nations Convention on the Law of the Sea - A historical perspective* (1998) <http://www.un.org/Depts/los/convention_agreements/convention_historical_perspective.htm>.

was being discussed.[35] The *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Treaty)* was adopted in 1979, to regulate, amongst other things, mineral exploration on the Moon.[36] The divergent positions with respect to ownership and benefit sharing of natural resources, evident at UNCLOS III, were similarly relevant for the *Moon Treaty*,[37] where these differences were not reconciled. With fewer than 20 states parties, the *Moon Treaty* was not widely accepted, inter alia because it incorporated the common heritage principle.[38] However, the *Moon Treaty* 'is important because it delegitimizes any unilateral action by interested states.'[39] Furthermore, the common heritage principle was successfully integrated in the *Barcelona Convention*, a regional agreement over the protection of the Mediterranean marine environment[40] as well as the *African Charter on Human and Peoples' Rights*,[41] which specifically links the common heritage principle with the right to development.[42]

UNCLOS III lasted from 1973 to 1982 during which developing states were able to gain support both for inclusion of the common heritage principle in the LOSC and for an entity with comprehensive powers to manage the Area in the interests of mankind as a whole. However, as examined in Section 3.4 below, extensive efforts at UNCLOS III to ensure representation in the ISA of the various interest groups, resulted in complicated rules to determine membership in its decision-making organs.

3.2.2 The LOSC and Continuing Uncertainty as to the Legal Status of the Seabed and its Resources

The legal framework for the deep seabed was incorporated into Part XI and Annex III and IV of the LOSC, which established the ISA as an autonomous organisation with exclusive competencies over mineral resources in the international seabed Area. Article 136, described as

[35] For a detailed discussion, see Ricky Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space* (Springer, 2012).

[36] *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies* (adopted 5 December 1979, entered into force 11 July 1984) 1363 UNTS 3.

[37] Heim (n 19), pages 833-836.

[38] Moon Treaty, article 11; Anthony R Filiato, 'The Commercial Space Launch Act: America's Response to the Moon Treaty?' (1986) 10 *Fordham International Law Journal* 763–781, pages 766-771.

[39] Nico Schrijver, *Development without Destruction: The UN and Global Resource Management* (Indiana University Press, 2010), page 90.

[40] *Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean* (adopted 16 February 1976, amended 10 June 1995, entered into force 9 Jule 2004) 1102 UNTS 27, preamble.

[41] *African Charter on Human and Peoples' Rights* (adopted 27 June 1981, entered into force 21 October 1986), 21 ILM 58 (1982), article 22(1).

[42] Schrijver (n 13), pages 167-171.

‘one of the most contentious yet also one of the most symbolic provisions of the Convention,’[43] confirmed the legal status of the Area and its resources as the common heritage of mankind.[44] This characterisation informs every aspect of the seabed mining regime and establishes a legal difference between the water column (still governed by the Grotian notion of the freedom of the high seas) and the seabed in ABNJ.

To give effect to the common heritage principle, Part XI included several controversial provisions. Among them were Articles 158 and 170, which established ‘the Enterprise’ as the commercial arm of the ISA.[45] The Enterprise was intended to become the physical manifestation of the common heritage principle in that an organ of the ISA would itself conduct seabed mining operations with some of the profits being distributed amongst member states, particularly developing states.[46] To become operational, the Enterprise was to receive significant financial assistance from states parties.[47] Article 144 provided for the transfer of technology relating to seabed mining activities to both developing states and the Enterprise. In addition, Article 151(10) provided for ‘a system of compensation’ or other economic adjustment assistance to aid developing states whose economies suffer serious adverse effects from the changes in export and price of a particular mineral, as a result of mining in the Area.[48] Article 151(4) and (5) also set out annual production limits for seabed mining and required a percentage of production to be reserved for the Enterprise. Lastly, Article 155 subjected Part XI to a review conference 15 years after the commencement of commercial mining production, which would have allowed three-fourth of the state parties to adopt universally binding amendments to the LOSC.

Although the LOSC was adopted in 1982, the aforementioned differences between industrialised and developing states had not been fully resolved. Several industrialised states remained dissatisfied with the negotiated regime for deep seabed mining and refrained from signing the LOSC in 1982.[49] Indeed, the vast majority of industrialised states did not ratify the *Convention* for another decade. Their concerns, amongst other points, pertained to the operational aspects of the common heritage principle. Thus, in the early 1980s, a number of

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43 Donald R Rothwell, ‘Building on the Strengths and Addressing the Challenges: The Role of Law of the Sea Institutions’ (2004) 35(2) *Ocean Development & International Law* 131-156, page 132.

44 See also LOSC, preamble.

45 Chapter 3.4.7.

46 LOSC, articles 140(2), 160(2)(g) 173, annex IV article 10.

47 LOSC, article 170(4), 173(2), annex IV article 11(3).

48 See also LOSC, 164(2)(d).

49 'Table recapitulating the status of the Convention and of the related Agreements, as at 7 January 2015' <http://www.un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm#The%20United%20Nations%20Convention%20on%20the%20Law%20of%20the%20Sea>; Satya N Nandan, Michael W Lodge and Shabtai Rosenne, The Development of the Regime for Deep Seabed Mining (Kluwer Law International, 2002), page 2.

industrialised states developed what became known as the Reciprocating States Regime (RSR), an alternative framework for seabed mining in the Area entirely divorced from the LOSC.[50] This regime was based on national laws under which states agreed to recognise the exploration and exploitation licenses for seabed mining sites granted by other participating states. Such laws were originally enacted by France, Germany, Italy, Japan, UK, and the US.[51] Moreover, several multilateral agreements were concluded with the aim of coordinating national legislation, preventing overlapping claims, and resolving any disputes arising from such overlaps.[52] The framework was to be less onerous than Part XI in order to protect the investments in seabed mining those states had already made.[53]

The RSR proved to be problematic for the Preparatory Commission for the ISA in 1984 and 1985, when the US, UK, and Germany granted licenses in the Area to seabed mining consortia under domestic laws.[54] The sites partially overlapped with claims under the 'pioneer investor scheme', a scheme agreed at UNCLOS III to protect substantial investments already made in seabed mining.[55] Thus, much of the work of the Preparatory Commission turned to finding a *modus vivendi* between the two parallel regimes that would provide for mutual recognition of sites claimed under domestic legislation and the pioneer investor scheme.[56]

The reciprocating states maintained that they were not legally bound by UN General Assembly resolutions, specifically Resolution 2749, and that mining was allowed as a high seas freedom. In line with this concept, the states did not seek to advance claims of sovereignty over the Area. Moreover, 'all of the Governments concerned insisted that their legislation was interim in nature.'[57]

However, the Group of 77 and Eastern European states did not support this view. They

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[50] For a detailed discussion of the Reciprocating States Regime, see Edward Duncan Brown, *Sea-Bed Energy and Minerals: The International Legal Regime, Volume 2: Sea-Bed Mining* (Martinus Nijhoff Publishers, 2001), chapter 7.

[51] Nandan, Lodge and Rosenne (n 49), page 54; Brown (n 50), pages 244-245.

[52] E.g. *Agreement Concerning Interim Arrangements Relating to Polymetallic Nodules on the Deep Sea Bed between France, the Federal Republic of Germany, the United Kingdom and the United States* (adopted 2 September 1982, entered into force 2 September 1982) 1871 UNTS 276; *Provisional Understanding Regarding Deep Sea-bed Matters among Belgium, France, Germany, Italy, Japan, Netherlands, United Kingdom and United States* (adopted 3 August 1984, entered into force 2 September 1984) XXIII ILM 1354.

[53] Nandan, Lodge and Rosenne (n 49), page 54.

[54] Brown (n 50), page 281.

[55] For an analysis of the pioneer investor scheme see Brown (n 50), chapters 6 and 7; the pioneer investor scheme lapsed on 16 November 1994, when the LOSC entered into force. See Resolution II, A/CONF.62/121* (27 October 1982), paragraph 14.

[56] Brown (n 50), pages 278-289; Nandan, Lodge and Rosenne (n 49), pages 55-56.

[57] Satya Nandan, Lodge and Rosenne (n 49), page 54; Rothwell and Stephens (n 3), page 132; A V Lowe, 'The international seabed: a legacy of mistrust' (1981) 5(3) *Marine Policy* 205–216, 213; Brown (n 50), page 245.

criticised the RSR as conflicting with the spirit of the LOSC[58] and with UNGA Resolution 2749. They regarded the latter as customary international law confirming that the Area is not subject to high seas freedoms and that its resources may only be exploited under the Part XI regime.[59] The Preparatory Commission supported this view and in 1985 declared unambiguously that:

> (a) the <u>only</u> regime for exploration and exploitation of the Area and its resources is that established by the United Nations Convention on the Law of the Sea and related resolutions adopted by the Third United Nations Conference on the Law of the Sea,
>
> (b) Any claim, agreement or action regarding the Area and its resources undertaken outside the Preparatory Commission which is incompatible with the [LOSC] and its related resolutions <u>shall not be recognized</u>.[60]

The Preparatory Commission made clear that it 'rejects such claim, agreement or action as a basis for creating legal rights and regards it as wholly illegal.'[61]

By 1990, this controversy and efforts to harmonise both parallel regimes took another turn as states indicated their willingness to renegotiate Part XI in order to achieve universal support for a multilateral legal regime for seabed mining and the LOSC. These renegotiations, the last chapter of the lengthy history of the establishment of the ISA, form the focus of the next section.

3.2.3 The 1994 Implementing Agreement and the Revision of the Common Heritage Concept

Simultaneous to the development of the Reciprocating States Regime, the rate of ratifications of the LOSC by developing states slowly grew throughout the 1980s. By 1990 the number of ratifications approached 60, creating a real prospect that the LOSC could enter into force without participation from those industrialised states most involved in seabed research. The adverse consequences were apparent; not only would it have limited any practical effect of the common heritage idea but it would have also burdened the relatively few, mainly developing states parties, with the costs for establishing the three institutions foreseen in the *Convention*: the ISA, the International Tribunal for the Law of the Sea, and the Commission on the Limits of

[58] Rothwell and Stephens (n 3), page 133.

[59] For a discussion on the potential customary nature, see Churchill and Lowe (n 4), pages 234-235.

[60] *Declaration adopted by the Preparatory Commission on 30 August 1985*, LOSC/PCN/72 (2 September 1985), paragraph 1 (emphasis added).

[61] Ibid, paragraph 2.

the Continental Shelf.[62]

Against this background, combined with a decline of momentum behind the New International Economic Order and a 'discernible shift towards a more market-oriented economy,'[63] members of the Preparatory Commission expressed 'their readiness to hold a dialogue with all interested parties concerning outstanding issues and the need for universal participation' in the LOSC.[64] Building on this momentum, in 1990 the UN Secretary General sponsored the first of a number of 'informal consultations'. These intense efforts to achieve universal participation in the LOSC culminated in the adoption by the General Assembly of the *Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea* (IA) on 28 July 1994. Although a separate instrument, the IA 'shall be interpreted and applied together with Part XI as a single instrument',[65] with the IA prevailing in case of inconsistencies.[66] Article 4(1) of the IA ensured that any subsequent ratification of or accession to the LOSC 'shall also represent consent to be bound by this Agreement.'

As discussed extensively in the literature,[67] the IA introduced a number of changes to address the controversial provisions of Part XI set out in Section 3.2.3. These include reducing operating costs of the ISA, basing seabed mining on a commercial footing, eliminating obligatory technology transfers, and changing voting procedures within the ISA Council. Section five of the IA alters the controversial provisions on technology transfer, by providing for such transfer on a commercial basis consistent with the protection of intellectual property rights.[68] Section six largely abolishes subsidies for mining activities,[69] bases the production policy on 'sound commercial principles'[70] and subjects it to the GATT and its successor or superseding agreements.[71] Additionally, the IA provides that the Enterprise will no longer be funded by the

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[62] Rothwell and Stephens (n 3), page 133.

[63] UNGA, UN Doc A/48/950 (9 June 1994), paragraph 2.

[64] 'Information about the Preparatory Commission: Statements Made by Delegations at the Conclusion of the 1989 Summer Meeting' (1990) 15 *Law of the Sea Bulletin* 54-63, 54.

[65] UNGA, UN Doc A/RES/48/263 (28 July 1994), paragraph 4.

[66] IA, article 2(1).

[67] David Anderson, *Modern Law of the Sea* (Martinus Nijhoff Publishers, 2008), pages 301-378; ED Brown, 'The 1994 Agreement on the Implementation of Part XI of the UN Convention on the Law of the Sea: breakthrough to universality?' (1995) 19(1) *Marine Policy* 5–20; Myron H Nordquist and John Norton Moore (eds), *Entry Into Force of the Law of the Sea Convention* (Martinus Nijhoff Publishers, 1995); Bernard H Oxman, 'The 1994 Agreement and the Convention' (1994) 88(4) *The American Journal of International Law* 687–696; Nandan, Lodge and Rosenne (n 49), pages 56-66; Vaughan Lowe, 'Was it Worth the Effort?' (2012) 27 *The International Journal of Marine and Coastal Law* 1–7.

[68] IA, annex section 5(1)(b). The original obligation for transferring technology was laid out in LOSC, annex III article 5.

[69] IA, annex section 6(1)(c).

[70] IA, annex section 6(1)(a)

[71] IA, annex section 6(1)(b)

member states.[72] Similarly, the provisions of Article 155 LOSC, allowing for review of Part XI, have largely been dis-applied. However, amendments to Part XI can still be adopted by the ISA.[73] The IA also gives concrete meaning to the economic assistance for developing states foreseen in Article 151(10). It provides an economic assistance fund, which will, however, be solely financed through payments from contractors and voluntary contributions.[74] Consequently, the IA discards any direct obligation on member states to compensate developing land-based mineral producers.

Through these changes, the meaning of the common heritage principle in the seabed mining context has been reinterpreted to substantially reduce the benefit-sharing elements. Nonetheless, it continues to be a revolutionary concept and the basic principle underlying the ISA regime. Although the principle is not defined in the LOSC, its scope is captured in Part XI. First and foremost, Article 137 prohibits appropriation of the Area or its resources and states that '[a]ll rights in the resources of the Area are vested in mankind as a whole, on whose behalf the Authority shall act.' Article 140 confirms that mineral exploration and exploitation in the Area 'must be carried out for the benefit of mankind as a whole', with particular regard for developing states, and that financial and other economic benefits derived from mining activities must be shared equitably. Other relevant provisions include Article 139 (state responsibility), Article 141 (use of the Area exclusively for peaceful purposes), Article 143 (marine scientific research for the benefit of mankind), Article 145 (protection of the marine environment), Article 148 (promotion of effective participation of developing states), and Articles 156-185 (international management of the Area through the ISA, including the Enterprise). Additionally, although with limited ramifications, the general aim to cooperate in promoting the transfer of technology and scientific knowledge, in Article 144, remains.

Lastly, the so-called parallel system, specifically designed to give effect to the common heritage principle, was largely maintained in the IA. Under the parallel system, when applying for an exploration or exploitation contract, applicants are required to submit a plan of work, mineral data, and environmental information for two sites of equal economic value capable of allowing two mining operations.[75] If successful, the applicant receives a contract covering one of the sites, whilst the second site is reserved for 15 years for mining activities to be conducted by the Enterprise or a developing state.[76] The aim of this parallel system is to ensure access to and benefit sharing of this global commons for developing states, by lowering the costs and efforts

[72] IA, annex section 2(3).
[73] LOSC, articles 314, 136.
[74] IA, annex section 7.
[75] LOSC, annex III article 8; IA, annex section 1(10).
[76] LOSC, annex III articles 8, 9; IA, annex sections 2(2), 2(5).

associated with locating a potential mining site.[77] In sum, the common heritage principle still inspires several exceptional elements in the Part XI regime.

Summing up, it was the legal framework for the implementation of the common heritage principle that substantially delayed the entry into force of the entire LOSC. However, the LOSC offered a package deal of which Part XI was only one segment. The renegotiation of the controversial aspects of Part XI, which resulted in the adoption of the IA, ultimately secured widespread support for the LOSC. As a result of this renegotiation, the common heritage regime in its original form has never come into effect. When the LOSC entered into force on 16 November 1994, Part XI applied as modified by the IA.

These changes also had profound implications for the ISA whose structure and functioning were altered, turning the ISA into what Treves describes as ‘a much more "normal" organization in comparison with the Authority described in the Convention.’[78] Nevertheless, as the following sections detail, the powers of the ISA to shape the seabed mining regime and to set general environmental standards for deep seabed mining remain substantial. Moreover, the ISA remains the only organisation specifically required to give effect to the common heritage principle. As such, it is a testing ground for the practical scope and implications of this philosophical notion that remains both controversial and holds potential.[79] In fact, in the context of moving towards mineral exploitation, one of the current challenges is to define the terms of future exploitation activities, particularly financial terms, in accordance with the common heritage principle.[80] It remains to be seen to what extent the principle will be furnished with practical meaning.

3.3 Mandate of the ISA

As Pardo discerned in his 1967 speech, declaring the international seabed and its resources the heritage of humankind would have little practical consequence without simultaneously establishing an international agency to give effect to this idea. That agency is the ISA. At its core, the ISA may be regarded as the institutional element of the common heritage principle. In

[77] In 2010, the ISA introduced an alternative to the parallel systems. When applying for a contract to explore for sulphides or crusts, applicants can opt to either contribute a reserved area or offer an equity interest to the Enterprise of at least 20 percent from the contractor’s future exploitation work. See *Sulphides* and *Crusts Exploration Regulations*, regulation 19(2).

[78] Tullio Treves, ‘The Law of the Sea “System” of Institutions’ (1994) 2(1) *Max Planck Yearbook of United Nations Law Online* 325 – 340, 335.

[79] For a discussion about the viability of the common heritage notion for marine genetic resources, see Nele Matz-Lueck, ‘The Concept of Common Heritage of Mankind: Its Viability as a Management Tool for Deep-Sea Genetic Resources’ in Alex G Oude Elferink and Erik Jaap Molenaar (eds), *The International Legal Regime of Areas beyond National Jurisdiction: Current and Future Developments* (Martinus Nijhoff Publishers, 2010) 61-75.

[80] ISA, ISBA/Cons/2015/2 (March 2015).

more practical terms, the ISA has been established to implement the international seabed mining regime described in the previous sections.

The central function of the ISA is to organise, control, and carry out activities in the Area, particularly with a view to administering the resources of the Area.[81] The resources in question are defined in accordance with the focus on minerals at the time of UNCLOS III. Thus, 'resources' are specifically defined as comprising 'all solid, liquid or gaseous mineral resources *in situ* in the Area at or beneath the seabed, including polymetallic nodules.'[82] 'Resources', when recovered from the Area, are referred to as 'minerals.'[83]

The ISA's work affects all actors involved in the seabed mining regime. As illustrated in Figure 3-2, mining operations are carried out either by states parties, state enterprises, or natural or juridical persons which possess the nationality of states parties or are effectively controlled by them or their nationals.[84] Thus, both public and private actors can be involved in mining operations although they have to be sponsored by a state party.[85] Additionally, if established in the future, the Enterprise, which is discussed in Section 3.4.7 below, will also be able to conduct mining operations.[86] To ensure legal certainty, a contract system has been developed whereby exploration and exploitation work in the Area can only be carried out under a contract issued by the ISA, which grants exclusive but temporary rights to the contractor.[87]

[81] LOSC, articles 153(1), 157(1).
[82] LOSC, article 133(a).
[83] LOSC, article 133(b).
[84] LOSC, article 153(2)(b).
[85] LOSC, article 153(2)(b), annex III article 4.
[86] LOSC, article 153(2)(a).
[87] LOSC, annex III articles 3, 16.

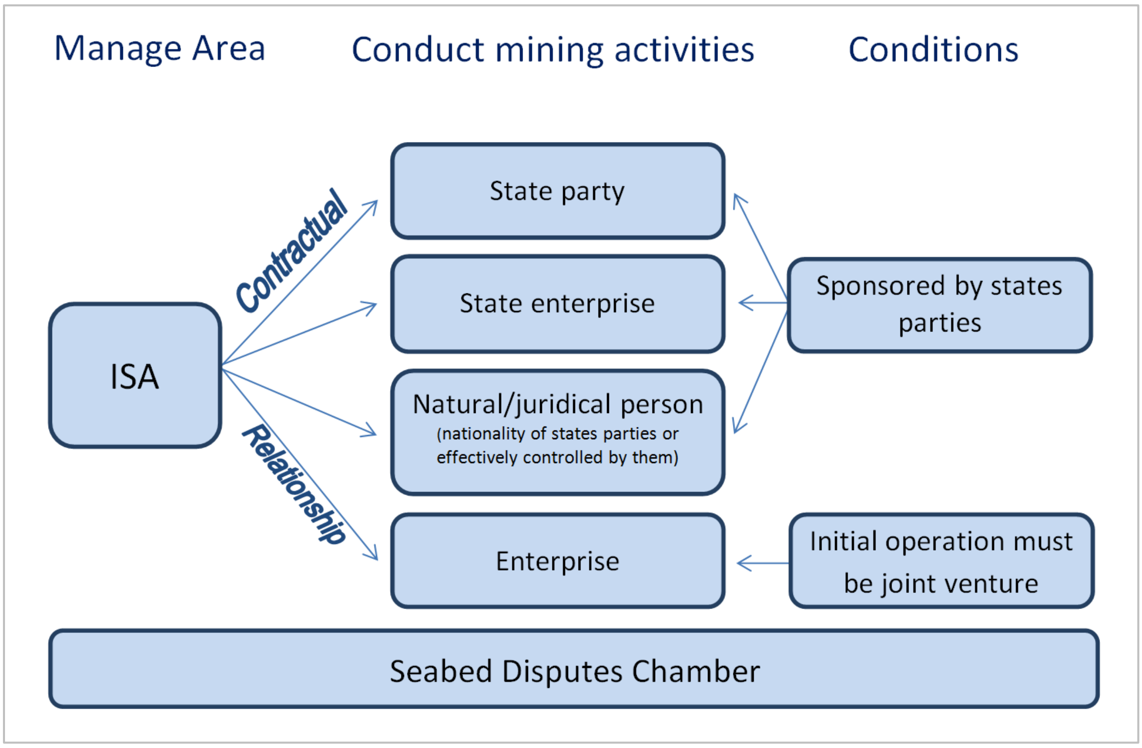

Figure 3-2: The structure of the seabed mining system.

The ISA is assigned three crucial tasks: First, to develop the Area regime through adopting the Mining Code; second, to control access to minerals in the Area through the aforementioned contractual system; and third to ensure compliance with the regulatory framework. The second and third tasks are examined in Chapters 3.5.2 and 3.6 respectively. The first task, adopting the Mining Code, is the primary manner in which the ISA develops the seabed mining regime. These law-making powers and the Mining Code warrant detailed analysis, which is provided in Chapters 5.2 and 5.3. However, some reference is made throughout the present chapter to the *Exploration Regulations*, as these provide details relevant to the discussions in this chapter.

Given the focus on minerals, seabed activities that are unrelated to mineral resources, such as deep sea fishing[88] or laying submarine cables and pipelines,[89] fall outside of the ISA's competencies. Moreover, the ISA's jurisdiction is spatially limited to the international seabed, ocean floor, and subsoil thereof and does not include the waters superjacent to the Area.[90]

The ISA came into existence on 16 November 1994 upon the entry into force of the LOSC and has been fully operational at its headquarters in Kingston, Jamaica, since June 1996. As of July 2015 the ISA comprises 167 member states plus the European Union. As a state involved in cutting edge ocean research and technology, the US is a notable non-member.

[88] LOSC, articles 87(1), 116.
[89] LOSC, article 112.
[90] LOSC, article 135.

The magnitude of the ISA's task should not to be underestimated. The ISA manages mining in the Area, which covers approximately half of the surface of the Earth,[91] with less than 40 permanent staff. The ISA's task is complicated by the fact that seabed mining is a novel activity to be undertaken at great depths and with as yet largely untested technology. As discussed in Chapter 1, the risks involved are serious, particularly because of possible harm to the sensitive marine ecosystems in which mineral deposits are located. The fact that our knowledge of these ecosystems, their interactions, and recovery rates are rudimentary does not simplify the task. In short, the ISA is mandated to administer and regulate an activity, the precise effects of which remain uncertain but are potentially serious, on behalf of mankind as a whole. In recognition of these factors, the mandate of the ISA is broad and extensive, requiring the protection of the marine environment as well as the coordination of further marine scientific research. These two aspects of the ISA's work are discussed in detail in Chapter 4. The following sections introduce the ISA's institutional structure, its decision-making processes, and its core powers.

3.4 Institutional Organisation of the ISA

Whilst the core institutional structure of the ISA is similar to that of most international organisations (IOs),[92] the power dynamics between the organs are rather unusual and attest to the many compromises achieved over the years of negotiating the ISA regime. A further particularity, which only becomes apparent upon closer inspection, is the significant power granted to one of the small expert bodies of the ISA, the Legal and Technical Commission, whose competencies exceed that of an ordinary advisory body. However, what most distinguishes the ISA from other IOs is the unique idea of establishing a commercial entity to mine seabed minerals as an organ of the ISA.

Before introducing the individual organs of the ISA, it should be noted that in renegotiating Part XI during the early 1990s, industrialised states placed importance on minimising the costs of operating the ISA.[93] Accordingly it was decided not to establish all of the ISA organs from its inception, particularly given, that the economic situation prevailing at the time was such that seabed mining ventures were thought not likely to become a reality for another decade.[94] Consequently, the IA provides that 'the setting up and the functioning of the organs and

[91] Michael Lodge, 'Current Legal Developments: International Seabed Authority - Endowment Fund for Marine Scientific Research' (2009) 24 *The International Journal of Marine and Coastal Law* 185–193, pages 185-186.

[92] Henry G Schermers and Niels M Blokker, *International Institutional Law* (vol 5, Martinus Nijhoff Publishers, 2011), pages 292-293; Jan Klabbers, *An Introduction to International Institutional Law* (Cambridge University Press, 2009), pages 155-160.

[93] IA, annex section 1(2).

[94] Oxman (n 67), page 696.

subsidiary bodies of the Authority shall be based on an evolutionary approach.'[95] As a result, the functions of each organ of the ISA, and indeed the number of organs and subsidiary bodies, will increase in line with the gradual development of seabed mining activities.[96] As of June 2015, the core institutional structure of the ISA consists of three principal organs: (1) the Assembly; (2) the Council; and (3) the Secretariat.[97]

As is commonly the case for IOs,[98] both the ISA Assembly[99] and the Council have the competence to establish subsidiary organs having 'due regard to economy and efficiency.'[100] Two such subsidiary organs have been established: (4) the Legal and Technical Commission (LTC) and (5) the Finance Committee. The establishment of (6) an Economic and Planning Commission and (7) the Enterprise are foreseen in the LOSC. However, as discussed below, these bodies are not yet operational.

3.4.1 The Assembly

The Assembly is the plenary body of the ISA in which each member state is represented.[101] The Assembly follows a one state, one vote structure and has the power to establish, in collaboration with the Council, general policies on all matters within the competence of the ISA.[102]

In many IOs, the plenary body, as the most democratic organ, sets standards and has the final say on decisions. However, the ISA Assembly shows certain similarities with the UN General Assembly in that it may be regarded as a "toothless tiger". In many ways, it is effectively subordinate to the Council. The IA significantly limits the powers of the Assembly by subjecting its decisions, on any matter over which the Council also has competence, to the decision recommended by the Council.[103] Thus, while the Assembly remains the forum in which many decisions are formally adopted, most of these decisions must have first been

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[95] IA, annex section 1(3).

[96] Rüdiger Wolfrum, 'Legitimacy of International Law and the Exercise of Administrative Functions: The Example of the International Seabed Authority, the International Maritime Organization (IMO) and International Fisheries Organizations' (2008) 9(11) *German Law Journal* 2039–2060, 2046

[97] For a detailed overview of the institutional framework of the ISA, see Brown (n 50), chapter 8.

[98] See for example: *Charter of the United Nations*, (adopted 26 June 1945, entered into force 24 October 1945) [1945] ATS 1, article 7(2) (*UN Charter*).

[99] LOSC, article 160(2)(d).

[100] LOSC, article 162(2)(d); see also article 158(3).

[101] LOSC, article 159(1).

[102] LOSC, articles 159(6), 160; IA, annex section 3(1); *Rules of Procedure of the Assembly of the International Seabed Authority*, rule 60.

[103] IA, annex section 3(4); For a summary of the negotiation regarding the balance of power between the Assembly and the Council, see Satya N Nandan, Micheal W Lodge and Shabtai Rosenne, *United Nations Convention on the Law of the Sea, 1982: A Commentary, Volume VI* (Martinus Nijhoff Publishers, 2002), pages 371-373.

recommended by the Council.[104] This dynamic is further explored in Section 3.5 on decision-making procedures.

Although the LOSC states that the Assembly 'shall be considered the supreme organ of the Authority,'[105] this label is largely symbolic. This formulation is based on a political compromise between developing states that favoured a powerful democratic organ and industrialised states, which feared being outnumbered if the plenary body could decide on sensitive questions such as production policies.[106] This bifurcation of interests is familiar from the UN context where the Security Council, a small body in which the five dominant Powers maintain veto rights, has primary competence over sensitive decisions relating to international peace and security. This concern was addressed in the renegotiation of Part XI, which limited the power of the Assembly while retaining the supremacy label.[107] As a result, as is the case with plenary bodies in many IOs,[108] the Assembly's ability to provide checks and balances as a democratically legitimised body is undermined.

3.4.2 The Council

The Council is the central, executive organ of the ISA. The Council consists of representatives of 36 member states that are elected by the Assembly.

In many IOs, a relatively small council or board supports the work of the plenary body. However, according to Schermers and Blokker those councils with governing responsibilities ordinarily have a narrow task.[109] The ISA Council is an exception. It can exercise law-making, policy-making, and supervisory competencies, including the power to establish specific policies on *any matter* within the competencies of the ISA.[110] In particular, the Council decides over the approval of plans of work,[111] elaborates and adopts the Mining Code,[112] and 'exercises control over the activities in the Area.'[113] The LOSC also confers competencies on the Council to

[104] LOSC, article 160(2);

[105] LOSC article 160 (emphasis added).

[106] Erik Franckx, 'The International Seabed Authority and the Common Heritage of Mankind: The Need for States to Establish the Outer Limits of their Continental Shelf' (2010) 25(4) *The International Journal of Marine and Coastal Law* 543–567, 550; Chapter 3.2.

[107] Felipe H Paolillo, 'Institutional Arrangements' in René-Jean Dupuy and Daniel Vignes (eds), *A Handbook on the Law of the Sea, Volume 1* (Martinus Nijhoff Publishers, 1991) 689-819, pages 749-750.

[108] Schermers and Blokker (n 92), page 298.

[109] Ibid, page 310.

[110] LOSC, article 162.

[111] IA, annex section 3(11).

[112] LOSC, article 162(2)(o); IA, annex section 1(15)-(16); Chapter 3.5.1.

[113] LOSC, articles 153(4), 162(2)(l); Chapter 3.6.

ensure environmental protection, including the power to issue emergency orders,[114] on the basis of recommendations received from the LTC.[115] In sum, the Council enjoys more competencies than the Assembly and can be regarded as the main decision-making organ.

Given such broad powers, the question of how to determine which states would be represented on the Council was naturally a contentious one.[116] The complicated formula of determining membership is based on a chamber system to ensure representation of all major interest groups as well as equitable geographic distribution. A similar system of categorising member states into interest groups is applied by other IOs. A point in case is the International Monetary Fund (IMF), whose executive board consists of the five largest investor states in the IMF,[117] with all other member states being represented through a total of 19 additional directors.[118] Membership in the UN Security Council is based on political power and equitable geographic representation. While the five permanent seats are reserved for the major Powers after WWII, the remaining seats are allocated based on contribution to the maintenance of international peace and security and equitable geographical distribution.[119] The ISA Council deploys a combination of these systems. It is composed of:[120]

a. Four members from amongst the major consumers and importers of the relevant minerals, including one member with the largest economy of the Eastern European region and one member with the largest economy overall on the date of entry into force of the *Convention*. In effect this means that both Russia and Japan have held a seat on the Council since its inception[121] and they are currently joined in this group by China and Italy. If the US accedes to the LOSC it will be guaranteed a seat on the Council since the size of its economy exceeded that of Japan in 1994;

b. Four members from amongst the eight largest investors in seabed activities, currently France, Germany, India, and South Korea;

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[114] LOSC, article 162(2)(w).

[115] LOSC, article 165(2)(k); Chapter 5.4.4.

[116] See 'Information Note concerning the Secretary-General's informal consultation on outstanding issues relating to the deep seabed mining provisions of the UN Convention on the Law of the Sea, New York, 14-15 October 1991,' paragraphs 9-20, reprinted in 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* (ISA, 2002), pages 35-46.

[117] The current Executive Directors are listed online <http://www.imf.org/external/np/sec/memdir/eds.aspx>.

[118] *Articles of Agreement of the International Monetary Fund* (adopted on 22 July 1944, entered into force 27 December 1945) (as amended) 2 UNTS 39, article XII section 3.

[119] *UN Charter*, article 23(1).

[120] IA, annex section 3(15); for a table of the current membership of the Council see <https://www.isa.org.jm/authority/council-members >.

[121] See 'Composition of the Council of the International Seabed Authority 1996-2016' <http://www.isa.org.jm/files/documents/EN/18Sess/Council/Council96-2016.pdf>.

c. Four members from amongst the major net exporters of the relevant minerals including at least two developing states, currently Australia, Canada, Chile, and South Africa;

d. Six members from amongst developing states representing special interests such as large populations, land-locked states, and island states, currently Bangladesh, Brazil, Fiji, Jamaica, Lesotho, and Uganda;

e. An additional 18 members are elected according to the principle of equitable geographic distribution.

Besides these interest groups, in practice, significant importance is given to the principle of geographical representation. In 1996 an agreement was reached that each of the five regions used to determine geographical representation at the UN would receive an agreed number of seats, which totalled 37.[122] Because the Council only comprises 36 seats, four of the regional groups, namely Africa, Asia, Latin America and the Caribbean, and Western Europe and others, with the exception of the Eastern European group, relinquish a seat in rotation, whilst maintaining the right to have an extra member participating in the Council without voting rights.[123] In fact, any member of the ISA may participate in Council meetings without vote[124] and, given its central role within the ISA, Council sessions are ordinarily attended by more than the 36 members, as well as observers.[125]

For voting purposes, the members of the Council are divided into four chambers. Each group of states referred to in (a) to (c) above constitutes a chamber and the developing states elected as part of the groups referred to in (d) and (e) constitute the fourth chamber.[126]

3.4.3 The Secretariat

The Secretariat is responsible for the administration of the ISA.[127] It comprises the Secretary-General and approximately 35 staff[128] and is organised into four sub-units, the Office of the Secretary-General, the Office of Resources and Environmental Monitoring, the Office of Legal Affairs, and the Office of Administration and Management. The Secretariat administers the exploration and exploitation contracts, provides general administrative support, and organises the annual sessions as well as workshops and technical meetings. Moreover, the Secretariat

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[122] ISA, ISBA/A/L.8 (21 March 1996).
[123] Ibid.
[124] *Rules of Procedures of the Council of the International Seabed Authority*, rule 74.
[125] Ibid, rule 75.
[126] IA, annex section 3(9).
[127] LOSC, articles 166-169.
[128] See <https://www.isa.org.jm/secretariat>.

provides background papers and research and also commissions expert studies for the consideration of the ISA organs.[129] Through these functions, the Secretariat can, as secretariats of most IOs,[130] influence the work of the other ISA organs.

3.4.4 The Legal and Technical Commission

The LTC, although a technical advisory organ, occupies a central role in the ISA's decision-making. Established under Article 163 LOSC, the LTC is subsidiary to the Council and currently comprises 24 individual experts.[131] These experts have qualifications relevant to mineral mining, oceanography, protection of the marine environment, and relevant economic or legal matters.[132] The 24 members are elected by the Council from among the candidates nominated by the member states.[133]

The LOSC is neutral with respect to the question whether LTC members should be independent or represent their government.[134] However, in practice the nationality of LTC members is not insignificant. Some of the LTC members are affiliated with a government institution or the entity that holds an exploration contract with the ISA.[135] Although these may be highly regarded experts in the field, it could provide some member states with a privileged position to exert influence. As of 2014, almost half of the 24 experts are from developed states.[136]

The LTC was designed as an advisory body to the Council. Indeed, to fulfil its advisory role, LTC meetings precede the annual sessions of the Council and Assembly. This is consistent with the practice in many IOs, which use advisory bodies for the preparation of recommendations and decisions for subsequent approval by the relevant bodies.[137] However, in practice the work of the LTC exceeds an advisory mandate. As set out in Article 165, the LTC is responsible for preparing the first drafts of the Mining Code and assessing new applications for exploration and exploitation contracts, two of the most important functions of the ISA. Moreover, the LTC is

[129] Satya Nandan, 'Administering the Mineral Resources of the Deep Seabed' in David Freestone, Richard Barnes, and David Ong (eds) *The Law of the Sea: Progress and Prospects* (Oxford University Press, 2006) 75-92, 81.

[130] Schermers and Blokker (n 92), page 338.

[131] The LTC was originally established with only 15 members, yet in accordance with Article 163(2) LOSC the Council has gradually increased the size of the LTC.

[132] LOSC, article 165(1).

[133] LOSC, article 163.

[134] LOSC, article 163(3). In contrast, article 2(1) of Annex II to the LOSC requires that members of the Commission on the Limits of the Continental Shelf (CLCS) 'shall serve in their personal capacities.'

[135] A de facto lack of independence of experts is listed as a common criticism of expert bodies in international organisations. See Schermers and Blokker (n 92), page 218.

[136] For information on the current members of the LTC, see <https://www.isa.org.jm/authority/legal-and-technical-commission>.

[137] Schermers and Blokker (n 92), page 308.

equipped with broad powers to make recommendations to the Council on environmental protection.[138] Importantly, the LTC is required to prepare assessments of the environmental implications of activities in the Area,[139] and, upon request from the Council, to supervise such activities.[140] Thus, most of the technical, detailed work of the ISA is undertaken by the LTC, with the Council subsequently adopting decisions based on the recommendations of the LTC. Although the LTC has no formal decision-making powers, as further explored in Section 3.5, when its draft documents and recommendations are adopted by the Council and become effective, the work of the 24 individuals can, in practice, be definitive.

Delegating significant powers to an expert body can commonly be observed in international institutional law. In fact, Schermer and Blokker have found that many commissions dealing with technical issues enjoy relative independence in practice.[141] Examples include the UN Commissions on Statistics or Narcotic Drugs, which officially operate under the supervision of the UN Economic and Social Council (ECOSOC). 'In practice, however, they are so technical in character that the ECOSOC has little control over them.'[142]

Deep seabed mining is certainly a highly technical undertaking. Given that scientific knowledge of the deep sea, although evolving, is in its infancy, the LTC can provide the Council with technical and scientific information and ensure that decisions by the Authority are based on expert advice.[143] However, as highlighted in Chapter 2.4.2, as soon as the decision-making involves value-judgments complete reliance on expert advisers may distort the picture.

Indeed, as observed throughout this thesis, while the integration of scientific advice into the ISA's institutional framework is crucial, a concentration of significant powers in a small expert body can also present challenges, particularly if decisions by that body are reached behind closed doors. As a general rule, LTC meetings are held in private session without the participation of observers or member states.[144] Open meetings are only held occasionally, to discuss matters of general interest to the ISA.[145] As discussed in Chapter 7.4 this closed door policy has proven problematic in the context of managing the common heritage of mankind.

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138 LOSC, article 165(2)(e), (h).

139 LOSC, article 165(2)(d).

140 LOSC, article 165(2)(c).

141 Schermers and Blokker (n 92), page 315.

142 Ibid.

143 James Harrison, *Making the Law of the Sea: A Study in the Development of International Law* (Cambridge University Press, 2011), page 120.

144 *Rules of Procedures of the Legal and Technical Commission*, rule 6.

145 Ibid.

3.4.5 The Finance Committee

The Finance Committee is a subsidiary organ of the Assembly that was added to the institutional framework by section 9 of the annex to the IA. It was established in light of the concern to ensure the cost-effective functioning of the ISA until it becomes financially self-sufficient, and in response to the requirement set out in Article 162(2)(y) LOSC to 'establish a subsidiary organ for the elaboration of draft financial rules, regulations and procedures […].'

The Finance Committee comprises 15 members with 'appropriate qualifications relevant to financial matters.'[146] The members are elected by the Assembly for a 5 year, renewable term,[147] and include at least one member from the above mentioned Council groups a, b, c, and d.[148] Until the Authority can meet its own administrative costs, the five largest financial contributors to the ISA are also guaranteed a seat on the Finance Committee. Thus, they are afforded greater say in the financial decisions of the Authority.

The role of the Finance Committee is to oversee the financial management of the Authority[149] and to make recommendations on financial decisions to the Council and Assembly.[150] The effect of its recommendations is significant. Decisions by the Assembly and the Council on specific issues listed in section 9(7) of the IA, such as draft financial rules, regulations, and procedures, or the administrative budget, have to 'take into account' recommendations of the Finance Committee'[151] Additionally, other decisions by the Assembly or Council with financial or budgetary implications have to be 'based on the recommendations of the Finance Committee.'[152]

3.4.6 The Economic Planning Commission

Article 163 of the LOSC envisages a further advisory body to the Council, namely the Economic Planning Commission. In accordance with the evolutionary approach to establishing the organs of the ISA, this Commission is not yet operational. The IA assigns the functions of the Economic Planning Commission to the LTC until the Council decides otherwise or until the exploitation phase commences.[153]

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[146] IA, annex section 9(1).
[147] IA, annex sections 9(3), 9(4).
[148] IA, annex section 9(3).
[149] IA, annex section 9.
[150] IA, annex section 9(7).
[151] IA, annex section 9(7).
[152] IA, annex section 3(7); Brown (n 50), pages 315-316.
[153] IA, annex section 1(4).

Once established, the Commission will comprise 15 experts[154] with qualifications in mining, managing mineral resources, and international trade and economics.[155] This will include at least two members from developing states 'whose exports of the categories of minerals to be derived from the Area have a substantial bearing upon their economies.'[156] Similarly to the LTC, members of the Economic Planning Commission will be elected by the Council for a 5 year, renewable term.[157]

The functions of the Economic Planning Commission are set out in Article 164 of the LOSC and include reviewing economic trends with regard to seabed minerals and assisting developing states that are producers of minerals and that are seriously affected by the production of minerals from the Area.[158] The Commission will make recommendations to the Council with respect to these issues. Moreover, it will recommend to the Council the amount to be set aside for the above mentioned[159] economic assistance fund.[160]

3.4.7 The Enterprise

The most innovative institution provided for in the LOSC is the Enterprise, the commercial arm of the ISA. It was envisaged to carry out exploration for and exploitation of seabed minerals directly as well as transporting, processing, and marketing of minerals.[161] Establishment of the Enterprise is provided for in Article 158(2) LOSC and its statute is set out in Annex IV LOSC. However, in accordance with the above-mentioned evolutionary approach to setting up the organs of the ISA,[162] the Enterprise is not yet operational.

Instead, an interim Director-General has been appointed from within the Secretariat staff to oversee the Enterprise's rather modest initial functions, including monitoring trends in seabed mining activities, assessing relevant technological developments, and assessing results of marine scientific research particularly on environmental impacts of seabed mining.[163] If and when the Enterprise becomes fully operational, it will become an organ of the ISA[164] albeit

[154] LOSC, article 163(2).
[155] LOSC, article 164(1).
[156] LOSC, article 164(1).
[157] LOSC, article 163(2)-(6).
[158] LOSC, article 164(2).
[159] Chapter 3.2.3.
[160] IA, annex section 7.
[161] LOSC, article 170(1), annex IV article 1.
[162] IA, annex section 1(3).
[163] IA, annex section 2(1).
[164] LOSC, article 170(1)

enjoying 'autonomy in the conduct of its operations.'[165] It will have a Director-General, who will be appointed by the Assembly and be directly responsible to a Governing Board,[166] which, in turn, will comprise 15 members also elected by the Assembly.[167]

The IA makes the transition for the Enterprise to an independently functioning organ contingent upon approval by the Council and adherence to commercial principles.[168] The Council is required to 'take up the issue of the [independent] functioning of the Enterprise' once the first exploitation plan is approved or an application for a joint-venture operation is received.[169] In fact, the IA stipulates that the Enterprise's initial deep seabed mining operations must be through joint-ventures.[170] However, the Council only has to establish an independently functioning Enterprise, 'if joint-venture operations with the Enterprise accord with sound commercial principles.'[171] What is more, the IA removes any obligation of states parties to finance the operations of the Enterprise,[172] leaving the idea of a commercial arm of the ISA to potentially fail on the basis of insufficient funds. In short, the IA drastically modifies the legal framework for the Enterprise and it remains unknown if and how the Enterprise will function.

3.5 Decision-making Processes in the ISA

As shown in the previous section, the roles of and power dynamics between the Assembly, the Council, and the LTC are noteworthy peculiarities of the ISA regime. This section examines the decision-making processes of the Authority to further illustrate these dynamics as well as highlight the strengths and limitations of the ISA's competencies.

Decision-making within the ISA is a complex process,[173] reflecting its negotiation history, which saw states bargain for influence in the decisions that the ISA would take.[174] Of particular importance are the processes for (1) adopting new regulations and (2) deciding over new applications for exploration or exploitation contracts. Each of these processes is examined in detail below.

165 LOSC, annex IV article 2.
166 LOSC, annex IV article 7.
167 LOSC, annex IV articles 4-6.
168 IA, annex section 2(2).
169 IA, annex section 2(2).
170 IA, annex section 2.
171 IA, annex section 2(2) (emphasis added).
172 IA, annex section 2(3).
173 IA, annex section 3.
174 Section 3.2.

3.5.1 Adopting Mining Regulations

As further explored in Chapter 5.2, the ISA is tasked to adopt legally binding regulations setting out detailed requirements for the exploration and exploitation of seabed minerals.[175] The main work of developing and drafting the regulations is performed by the LTC, 'taking into account all relevant factors including assessments of the environmental implications of activities in the Area.'[176] During this multi-year process,[177] the LTC may be supported by notes and reports from the Secretariat. Similarly, government representatives, external scientists, and contractors may indirectly contribute to developing draft regulations through participating in annual workshops on scientific and technical issues organised by the ISA.

Once the LTC has completed its work, it adopts the draft regulations by consensus where possible, or by majority vote if necessary.[178] In practice, the LTC has only had to resort to voting once, in February 2015, when adopting the draft procedures and criteria for the extension of an exploration contract.[179] The draft regulations are then considered, potentially amended, and adopted by the Council, 'taking into account the recommendations of the Legal and Technical Commission.'[180] It is at this stage that member states can scrutinize the draft, something they have done extensively in the past. The genesis of the *Exploration Regulations* for polymetallic sulphides and cobalt-rich ferromanganese crusts serves as an illustration. After a formal request by Russia in 1998 to develop drafts for these regulations,[181] the LTC submitted its first draft to the Council in 2004.[182] However, it took several more years of discussions, workshops, and information gathering, and a further draft version by the LTC before the Council was satisfied with the regulations which were ultimately adopted in 2010 and 2012 respectively.[183]

The Council must adopt any new regulations by consensus; that is, with an absence of formal objections by any of the 36 Council members.[184] The LOSC even provides for a conciliation committee to reach consensus when formal objections have been raised.[185] No alternatives are

175 LOSC, articles 160(2)(f)-(g), 162(2)(o), 165(2)(f)-(g); IA, annex section 1(15)-(16).
176 LOSC, article 165(2)(f)-(g).
177 For a detailed analysis of the decision-making process over rules, regulations and procedures, see Harrison (n 143), pages 127-131.
178 IA, annex sections 3(2), 3(13); *Rules of Procedure of the Legal and Technical Commission*, rule 44.
179 ISA, ISBA/21/C/3 (31 March 2015), paragraph 2.
180 LOSC, article 162(2)(o)(ii).
181 ISA, ISBA/4/A/18 (31 August 1998), paragraph 14.
182 ISA, ISBA/16/C/5 (25 February 2010).
183 Ibid.
184 IA, annex sections 3(2), 3(6); LOSC, article 161(8)(d), (e).
185 In the case of a formal objection to a substantive proposal to the Council, the President of the Council must establish a conciliation committee, of no more than nine members of the Council, to reach a compromise, within 14 days, which can be adopted by consensus. LOSC, article 161(8)(e); IA, annex

provided for, in cases consensus cannot be reached. In practice, this effectively allows members of the Council to veto the adoption of new regulations. This is undoubtedly one reason behind the intricate compromise in determining membership of the Council, as examined in Section 3.4.2.

Even though the Assembly has give final approval of any regulations,[186] once adopted by the Council regulations apply provisionally.[187] If the Assembly requires changes to the provisions, 'it shall return the matter to the Council for further consideration.'[188] This requirement applies not only to new regulations but to every decision of the Assembly on any matter over which the Council also has competence, 'or on any administrative, budgetary or financial matter.'[189] Consequently, as Harrison highlights, even if the Assembly rejects the regulations recommended by the Council, they remain provisionally valid without the consent of the democratic, plenary organ.[190] Since there is no time limit by which the Council has to reconsider the regulations, they can, at least in theory, remain provisionally valid indefinitely.[191] In practice, however, the Assembly has approved all existing sets of regulations and amendments thereof within a week.[192]

When approving new regulations, the Assembly must seek to establish consensus, similar to the Council and the LTC.[193] A decision may be deferred for up to five days to reach consensus.[194] However, contrary to the practice in the Council, where consensus cannot be reached, the Assembly ultimately has the ability to adopt regulations by a two-thirds majority.[195] In sum, the decision-making process clearly focuses on the LTC and the Council whilst granting very limited powers to the Assembly.

3.5.2 Assessing Applications for Plans of Work

The second decision-making process of particular interest is the method for granting exploration, and in the future exploitation, contracts. Formal written applications for so-called

section 3(6).

186 LOSC, article 160(2)(f)(ii)

187 LOSC article 162(2)(o)(ii).

188 IA, annex section 3(4).

189 IA, annex section 3(4).

190 Harrison (n 143), page 126.

191 Ibid, page 126.

192 See for example ISA, ISBA/20/A/10 (24 July 2014).

193 IA, annex sections 3(2), 3(3).

194 LOSC, article 159(9), (10).

195 LOSC, article 159(8); IA, annex section 3(3).

plans of work are first assessed by the LTC in closed session.[196] If questions or concerns are raised, the LTC may pose written questions to the applicant and consider the written responses to them.[197]

The LTC must make a range of determinations in relation to each application.[198] These include determinations as to whether the applicant possesses the financial and technical capabilities to carry out the proposed work and whether the plan of work provides for effective protection of human health and safety as well as effective protection and preservation of the marine environment including its biodiversity. The LTC must also determine whether the application complies with the anti-monopoly provisions contained in article 6(3) of annex III LOSC as well as the ISA regulations.[199]

Although these assessments might appear to be of a technical nature, they inevitably involve discretionary judgments. This is particularly the case where the human health and environmental consequences of such a novel activity are involved, where the LTC has no means of independently verifying the data contained in the application. The significance of this issue is further investigated in Chapters 7.2.3 and 8.3.1.

If the LTC finds that these criteria have been met, it must recommend to the Council that it approve the application.[200] If, however, the LTC finds that an application does not comply with the criteria, it is required to notify the applicant who then has 45 days to amend the application.[201] If, after further consideration of the amended application, the LTC would still not recommend approval for the plan of work, the applicant must be given a further 30 days to make representations.[202] The LTC then issues publicly available recommendations to the Council regarding each application.

Where possible, the LTC is required to adopt its recommendations by consensus. Majority voting is available as a last resort;[203] however, in practice the LTC has never resorted to it, preferring instead to defer difficult decisions in a continuing quest for consensus.[204]

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[196] LOSC, articles 153(3), 165(2)(b).

[197] ISA, ISBA/19/C/14 (9 July 2013), paragraph 27.

[198] LOSC, annex III articles 4(6), 6; *Nodules Exploration Regulations*, regulation 21; *Sulphides* and *Crusts Exploration Regulations,* regulation 23.

[199] *Nodules Exploration Regulations,* regulation 21(6)(d).

[200] *Nodules Exploration Regulations*, regulation 21(5); *Sulphides* and *Crusts Exploration Regulations,* regulation 23(5); LOSC, annex III article 6(3).

[201] *Nodules Exploration Regulations,* regulation 21(8); *Sulphides* and *Crusts Exploration Regulations*, regulation 23(9).

[202] Ibid.

[203] IA, annex section 3(2), (13); *Rules of Procedure for the Legal and Technical Commission*, rule 44.

[204] See for example the deferral of the decision over Russia's application: ISA, ISBA/19/C/14 (9 July 2013), paragraphs 27-29.

The final decision on an application is then taken by the Council based on the LTC's recommendations. Interestingly, the Council has limited competence to overrule recommendations by the LTC. If the LTC recommends approval of a plan of work, the Council is essentially required to approve it.[205] Again utilising the chamber system outlined in Chamber 3.4.2, disapproval is only possible by a two-thirds majority 'including a majority of members present and voting in each of the chambers of the Council.'[206] What is more, if the Council does not take a decision on the application within 60 days, unless the Council decides on a longer period, the recommendation 'shall be deemed to have been approved by the Council at the end of that period.'[207]

In case the LTC makes no recommendation or recommends disapproval, the Council may nevertheless approve the plan of work by a two-thirds majority 'provided that such decisions are not opposed by a majority in any one of the chambers' of the Council.[208] This procedure clearly assists the approval of new applications. Additionally, it provides a *de facto* veto power for each chamber, which ensures that no major interest group can be disregarded, thereby clearly demonstrating the reasoning behind the complex chamber system that determines the Council's composition.[209] The Assembly has even less power than the Council in this regard given that it has no competence whatsoever in respect of the granting of mining contracts.

One of the reasons for the limited competence of the Council to overrule LTC recommendations can be found in the history of the negotiations of the LOSC and the IA. A concern of industrialised states was that access to seabed minerals could be restricted by the ISA, including on political grounds.[210] Thus, Article 4 of Annex III to the LOSC requires that applications must be accepted if they meet the 'objective and non-discriminatory criteria' set out above.[211] As the UN Secretary General summarised in 1992: 'This procedure should ensure that access would not be denied to applicants who are found by the Legal and Technical Commission to be qualified under the rules and regulations of the Authority.'[212]

Importantly, the Council has no access to the full application documents. Because applications contain some confidential and proprietary information, including on the applicants' financial assets, technological equipment to be used, and mineral data obtained during prospecting

[205] IA, annex section 3(11).
[206] IA, annex section 3(5), (11).
[207] IA, annex section 3(11).
[208] IA, annex section 3(5), 3(11).
[209] Chapter 3.4.2.
[210] Nandan, Lodge and Rosenne (n 49), page 40; Brown (n 50), pages 113-116.
[211] 'Information Note concerning the Secretary-General's informal consultation on outstanding issues relating to the deep sea-bed mining provisions of the UN Convention on the Law of the Sea, New York, 16 and 17 June 1992', reprinted in ISA (n 116), pages 79-84 paragraph 18.
[212] Ibid.

work,[213] access to these documents is strictly limited to the LTC and the Secretariat.[214] This presents challenges with regard to investigating the basis upon which the LTC makes its recommendations, as discussed in Chapter 7.4.1.

This decision-making procedure clearly illustrates the fundamental role of the LTC. First, the LTC is the organ mandated to carry out the important task of considering whether the applicant has met all legal obligations.[215] Second, whilst the LTC itself has no formal decision-making competencies but merely makes recommendations to the Council, these recommendations do, in practice, carry significant weight. Indeed, the legal framework makes it difficult for the Council to reject a recommendation and, as of June 2015, the Council has indeed never done so. In this respect, some similarities can be drawn with the Commission on the Limits of the Continental Shelf (CLCS). Although a technical body working in private, determinations by the CLCS in relation to the limits of the continental shelf of coastal states give rise to legal consequences.[216] The challenges associated with significant power resting with a small expert body are examined in Chapters 8.2 and 8.3.

In summary, both the decision-making processes for the adoption of regulations and the assessment of new applications for mining contracts exemplify the dynamics between the small yet powerful expert body, the LTC, and the Council as the formal decision-making organ. In comparison, the role of the Assembly is, in practice, marginal.

3.6 Enforcement Powers

Having examined the general mandate of the ISA and the decision-making processes with respect to two core competencies of the ISA, namely the adoption of the Mining Code and the issuing of exploration and exploitation contracts, it is necessary to complete the picture by examining a further, namely enforcement powers. As so often in international law, the practical effect of rules or competencies can be limited by a lack of effective enforcement mechanisms. With this in mind, it is notable that the ISA has been equipped with powers to monitor compliance, and to respond to instances of non-compliance. Moreover, the legal framework provides for a system of state responsibility.

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213 *Exploration Regulations*, annex II.

214 *Nodules Exploration Regulations*, regulation 36(3); *Sulphides Exploration Regulations*, regulation 38(2); *Crusts Exploration Regulations*, regulation 38(3); LOSC, article 163(8).

215 LOSC, annex III article 6; IA, annex section 1(6);

216 Anna Cavnar, 'Accountability and the Commission on the Limits of the Continental Shelf: Deciding Who Owns the Ocean Floor' (2009) 42 *Cornell International Law Journal* 387–440; But compare: Ted L McDorman, 'The Role of the Commission on the Limits of the Continental Shelf: A Technical Body in a Political World' (2002) 17 *International Journal of Marine and Coastal Law* 301–324.

3.6.1 Monitoring Compliance

Article 153(4) unambiguously states that the Authority 'shall exercise such control over activities in the Area as is necessary for the purpose of securing compliance' with the LOSC, the rules, regulations and procedures of the ISA, and approved plans of work. Moreover, article 153(5) grants the ISA 'the right to take at any time any measures provided for under [Part XI] to ensure compliance with its provisions and the exercise of the functions of control and regulation assigned to it thereunder or under any contract.'

These provisions confer broad competencies on the ISA to decide for itself upon the measures that are necessary to ensure compliance. In order to guarantee inspections will form part of the compliance mechanism, the LOSC specifically mandates the ISA to inspect all installations in the Area used in connection with activities in the Area.[217] The Council is tasked to 'exercise control over activities in the Area',[218] including directing and supervising inspections.[219] The LTC has the corresponding mandate to make recommendations to the Council regarding such inspections and may carry out inspections itself.[220]

However, no inspections have been carried out at present. Indeed, how a system of inspections will be translated into practice remains unclear but will likely require changes to the ISA's institutional structure, as discussed in Chapter 8.2.2 and 8.4.2.

The only method currently used to monitor compliance by contractors with their obligations is annual reporting by the contractors about their activities.[221] These annual reports are reviewed by the LTC. Overseeing compliance, thus, lies primarily in the hands of the Council and the LTC, whilst the Assembly is merely informed in case of non-compliance,[222] except in case of a decision on the suspension of a member state as described in the following paragraph. The LTC can be requested by the Council to supervise activities in the Area.[223] Yet, again, it remains unclear how the LTC is to conduct such supervision. Consequently, there is significant scope, and indeed necessity, to enlarge the ISA's enforcement capacity and to develop rules, regulations, and procedures to that extent.[224]

In cases of non-compliance, the Seabed Disputes Chamber[225] (SDC) as the central judicial entity dealing with disputes arising under the ISA regime, becomes relevant. The specific role and

[217] LOSC, article 153(5).
[218] LOSC, article 162(2)(l).
[219] LOSC, article 162(2)(z).
[220] LOSC, article 165(2)(m), 165(3).
[221] *Exploration Regulations*, annex IV section 10.
[222] LOSC, article 162(2)(a).
[223] LOSC, article 165(2)(c).
[224] Chapter 8.2.2.
[225] LOSC, article 162(2)(u).

function of the SDC are examined in Section 3.8. For present purposes, it can be noted that the ISA can take a range of measures in case of non-compliance, which depend on who is being non-compliant but always include instituting proceedings before the SDC.[226] First, *states parties* can, in serious cases, be subjected to sanctions; if the SDC finds a state party to have 'grossly and persistently violated' Part XI, the Assembly may, upon recommendation of the Council, suspend that state from membership in the Authority.[227] Second, non-compliance by *contractors* can, in serious cases, trigger sanctions by the ISA, such as suspension or termination of the contractor's rights or monetary penalties.[228] However, in practice these powers to impose penalties are strictly limited as they are effectively subject to judicial approval.[229] Except for in cases of emergency orders, no penalties may be applied 'until the contractor has been accorded a reasonable opportunity to exhaust the judicial remedies available to him under Part XI, section 5.'[230]

3.6.2 Responsibilities and Liability

The ISA's enforcement powers, including efforts to ensure compliance, are complemented by the fact that the LOSC establishes the legal responsibility of states parties to ensure that activities in the Area comply with Part XI, regardless of whether they are carried out by the state itself, state enterprises, or private corporations sponsored by the state.[231] In its 'historic'[232] *Advisory Opinion*, the SDC clarified that article 139 and article 4 of Annex III to the LOSC entail two types of obligations. First, the obligation of due diligence to ensure compliance by the contractor with his contractual obligations and those set out in the legal framework. Second, states parties have direct obligations, such as assisting the ISA and applying a precautionary approach, which are independent of sponsoring mining operators.[233]

Breach of these obligations entails liability, provided that damage has occurred. Liability for breaching the due diligence obligation also requires a causal link between the breach and damage. States parties can prevent liability for the obligation of due diligence by taking 'all necessary and appropriate measures to secure effective compliance' by the sponsored contractor

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226 Ibid.
227 LOSC, articles 162(2)(t), 185.
228 LOSC, annex III article 18.
229 Ibid.
230 Ibid; Nandan, Lodge and Rosenne (n 103), page 312.
231 LOSC, article 139(1), annex III article 4(4).
232 David Freestone, 'Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area' (2011) 105(4) *The American Journal of International Law* 755–760, page 755.
233 *SDC Advisory Opinion*, paragraphs 99-140.

with its obligations.[234] These include adopting domestic laws and regulations and taking administrative measures.[235] These measures, with respect to the prevention, reduction, and control of pollution from mining activities, 'shall be no less effective than the international rules, regulations and procedures' adopted by the ISA.[236] This liability framework strengthens the Part XI regime further and seeks to ensure that sponsoring states must have in place a comprehensive domestic regulatory framework when they sponsor activities in the Area.

Importantly, the SDC highlighted that the sponsoring state's responsibilities and liability 'apply equally to all sponsoring states, whether developing or developed.'[237] In its reasoning, the SDC recognised the importance of preventing 'sponsoring states "of convenience",' a reference to the challenge in the law of the sea that has been highly problematic in enforcing flag state responsibilities. The SDC observed that differential treatment would 'jeopardize uniform application of the highest standards of protection of the marine environment, the safe development of activities in the Area and protection of the common heritage of mankind.'[238] Nonetheless, as further discussed in Chapter 5.4.6, the Chamber acknowledged that some differences might apply with respect to states' direct obligations.

In order for this liability regime to be effective, an important question is who has standing to bring a case against a non-compliant sponsoring state. The SDC speculated that the ISA might be entitled to bring a case, a competence that could be implicit in the ISA's obligation to act on behalf of mankind.[239] As further discussed in Chapter 4.3.3, SDC also notes that 'each State Party may […] be entitled to claim compensation in light of the erga omnes character of the obligations relating to preservation of the environment of the high seas and in the Area.'[240] These 'remarkable' findings[241] pave the way for an extensive liability regime, although they also raise numerous questions with respect to the respect to the relationship between sponsoring states and the ISA, which are beyond the scope of this thesis. In any event, the SDC's findings demonstrate the repercussion of the common heritage principle, affecting even the enforceability of the seabed mining regime. Further implications of the *SDC Advisory Opinion* on the ISA's environmental mandate are examined in Chapters 5.4.6.

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[234] Ibid, paragraphs 170-211; LOSC, article 139(2), annex III article 4(4).
[235] *SDC Advisory Opinion*, paragraphs 213-241.
[236] Ibid; LOSC, articles 209(2), 215.
[237] *SDC Advisory Opinion*, paragraph 158.
[238] Ibid, paragraph 159.
[239] Ibid, paragraphs 179-180; LOSC, article 137(2).
[240] *SDC Advisory Opinion*, paragraph 180. An 'erga omnes obligation' is an obligation is owed to the international community as a whole.
[241] Duncan French, 'From the Depths: Rich Pickings of Principles of Sustainable Development and General International Law on the Ocean Floor — the Seabed Disputes Chamber' S 2011 Advisory Opinion' (2011) 26 *The International Journal of Marine and Coastal Law* 525–568, page 545.

In summary, the competencies of the ISA, as the central administrative agency for seabed mining in the Area, are supplemented with comprehensive enforcement powers and a system of state responsibility and liabilities in case of non-compliance. Thus, in theory, the ISA regime has been equipped with a comprehensive enforcement mechanism. This is particularly relevant in the context of preventing environmental harm from mining activities. In other words, the ISA has been equipped with teeth, a rarity in international environmental law. Indeed, liability for environmental damage was the concern that led to the request of the *SDC Advisory Opinion*. Nevertheless, it remains to be seen how these enforcement powers will be translated into practice.

3.7 Financing the ISA

Closely related to the question of how the ISA's enforcement powers can be translated into practice is that of financing the Authority. A system to inspect mining operations will inevitably generate costs in addition to the ordinary expenses incurred in the administration and operation of the ISA. In this context, a brief note on the financial arrangements of the ISA is required.[242]

Cost-effectiveness was a central concern during the renegotiations of Part XI, prompting the decision to establish ISA organs in an evolutionary manner.[243] The ISA is primarily funded through assessed contributions of its members[244] 'until the Authority has sufficient funds from other sources to meet those expenses.'[245] The intention is thus that the ISA will eventually become a financially self-sufficient international organisation, funded by royalties or other profit sharing mechanisms from contractors, including the Enterprise.[246] The LOSC foresees that a portion of the income will then be distributed equitably to members of the ISA, taking into account the interests and needs of developing states.[247]

A first step towards reducing the financial burden on ISA members was taken in 2013. With the rise in the number of applications for exploration contracts, since 2011, the costs for administering and supervising the contracts as well as reviewing annual reports submitted by the contractors have increased. This led to an undesirable situation in which the member states of the ISA, through their contributions, collectively financially supported the administration costs generated by contractors, many of whom are sponsored by industrialised states or are private

[242] For a detailed discussion of the financial arrangements of the ISA, see Brown (n 50), pages 335-339.
[243] IA, annex section 1(2).
[244] LOSC, article 171; IA, annex section 1(14).
[245] IA, annex section 1(14).
[246] LOSC, article 171, annex III article 13, annex IV article 10; IA, annex section 8(1); *Developing a Regulatory Framework for Mineral Exploitation in the Area* (n 80).
[247] LOSC, articles 82(4), 140(2), 151(10), 160(2)g), 173(2); IA, annex section 7.

mining corporations. Thus, in 2013, the ISA decided to impose an annual overhead charge of USD 47.000, to be reviewed every two years, on each contractor to meet the costs for administering the contracts.[248] For IOs to receive part of their income from charges for services they provide, as done by the World Bank group, is no exception in international institutional law.[249] However, very few IOs can generate substantial proportions of their income independently.[250] It remains to be seen whether the ISA will be able to achieve a substantial income once commercial-scale mining commences.

3.8 Dispute Settlement in the ISA Regime: The Seabed Disputes Chamber

The seabed mining regime is completed by a compulsory dispute settlement mechanism, established under Part XI and Annex VI LOSC, and centred on the Seabed Disputes Chamber (SDC).[251] Originally intended to be an organ of the ISA,[252] the SDC is an independent legal body based within the International Tribunal for the Law of the Sea (ITLOS) in Hamburg; in other words a 'tribunal within a tribunal.[253]

The Chamber has compulsory jurisdiction in respect of disputes concerning activities in the Area[254] as well as jurisdiction to give advisory opinions at the request of the ISA Assembly or Council.[255] Whilst it has not yet decided any contentious cases, as noted above, the Chamber delivered its first Advisory Opinion in 2011.

The LOSC grants standing before the SDC not only to states parties and the ISA, but also to the Enterprise, as well as contractors, including private entities.[256] Although this is not unique, most international dispute settlement bodies that grant standing to non-state actors concentrate

[248] ISA, ISBA/19/A/12 (25 July 2013).

[249] Schermers and Blokker (n 92), pages 678-670.

[250] Ibid.

[251] LOSC, articles 186-191, annex VI articles 35-40; For a detailed discussion of the dispute settlement mechanism, see Tullio Treves, 'Judicial Action for the Common Heritage' in Holger Hestermeyer, Nele Matz-Lück, Anja Seibert-Fohr, and Silja Vöneky (eds), *Law of the Sea in Dialogue* (Springer, 2010) 113–133; Louis B. Sohn, 'Peaceful Settlement of Disputes in Ocean Conflicts: Does UNCLOS III Point the Way' (1983) 46 *Law & Contemporary Problems* 195–200.

[252] Judge Dolliver Nelson, 'The International Tribunal for the Law of the Sea', Presentation given at the Sensitization Seminar on the Work of the International Seabed Authority (28-30 March 2011) <www.isa.org.jm/files/documents/EN/Seminars/2011/ITLOS-DNelson.pdf>.

[253] Helmut Tuerk, 'The Contribution of the International Tribunal for the Law of the Sea to International Law' in Alex G Oude Elferink and Erik Jaap Molenaar (eds) *The International Legal Regime of Areas beyond National Jurisdiction: Current and Future Developments* (Martinus Nijhoff Publishers, 2010) 217–230, 221.

[254] LOSC, article 187

[255] LOSC, article 191.

[256] LOSC, article 187, annex VI article 37.

primarily on investment law and human rights proceedings.[257]

In reaching its decisions, the SDC is empowered to apply the LOSC as well as the rules, regulations, and procedures adopted by the ISA, the mining contracts, and other rules of international law.[258] Through interpreting these instruments, the SDC can contribute to the development of the seabed mining regime. However, pursuant to Article 189 LOSC, the Chamber has no jurisdiction to directly review the discretionary powers of the ISA. Thus, the SDC cannot 'pronounce itself on the question of whether any rules, regulations and procedures of the Authority are in conformity with this Convention, nor declare invalid any such rules, regulations and procedures.'[259] In other words, the Chamber is not able to control the law-making functions of the ISA through judicial review. Rather, its jurisdiction is confined to deciding individual cases.[260] This provision has not escaped criticism.[261] In the words of Caflisch, it is difficult to see 'how the Chamber could conceivably "decide" any such claim without "pronouncing itself", at least incidentally, on the legality of the rules, regulations and procedures which may be involved.'[262]

Nevertheless, the SDC may be able to comment on the compatibility of ISA regulations with the LOSC and the IA in the context of giving an advisory opinion. However, owing to the non-binding effect of advisory opinions, any decision regarding potential amendments to the regulations remains with the ISA. As Harrison summarises, this leaves no doubt that the dispute settlement procedure 'was not intended to provide a check on the law-making activities of the Authority.'[263] Given such limited option to challenge the validity of ISA regulations, the procedure of adopting them becomes all the more important.[264]

It should be noted that the jurisdiction of the SDC, although extensive, is not exclusive. Disputes between two states parties concerning the interpretation or application of Part XI and related annexes can also, upon agreement, be submitted to a special chamber of ITLOS, or to an ad hoc chamber of the SDC upon the request of one of the parties.[265] A further exception is

[257] Eric de Brabandere, 'Non-State Actors in International Dispute Settlement – Pragmatism in International Law' in *Participants in the International Legal System: Multiple Perspectives on Non-State Actors in International Law* (Taylor & Francis, 2011) 342–359, pages 342-343.

[258] LOSC, article 293, annex VI article 38.

[259] LOSC, article 189.

[260] LOSC, article 189.

[261] Judge Dolliver Nelson, 'The International Tribunal for the Law of the Sea', Presentation given at the Sensitization Seminar on the Work of the International Seabed Authority (28-30 March 2011) <http://www.isa.org.jm/en/scientific/seminars/Jamaica#speakers>.

[262] Lucius C Caflisch, 'The Settlement of Disputes Relating to Activities in the International Seabed Area',' in Christos L Rozakis and Constantine A Stephanou (eds) *The New Law of the Sea* (Elsevier Science Publishers, 1983) 303–344, page 313.

[263] Harrison (n 143), page 151.

[264] Ibid, page 153.

[265] LOSC, article 188(1).

provided for disputes between the ISA and a contractor concerning the interpretation or application of their contract. Given the commercial nature of the contract, such disputes are submitted to binding commercial arbitration, unless the parties agree otherwise.[266] However, the arbitration tribunal has no jurisdiction to interpret the LOSC and must refer any such question to the SDC.[267] Consequently, the SDC enjoys 'the exclusive function of interpreting Part XI of the Convention and the relevant annexes and regulations that are the legal basis for the organization and management of activities in the Area.'[268]

3.9 Conclusion

The ISA forms the institutional centre of what started as a bold, and not uncontroversial, approach to managing natural resources in ABNJ. The economic potential of deep seabed mining and the opportunity to develop a new legal construct with an embedded degree of equity as between states, engaged states in lengthy negotiations. The history of the development of the seabed mining regime attests to the struggle to agree on an ideological underpinning for the new regime. The result is a compromise that classifies the Area and its resources as the common heritage of humankind whilst incorporating both communitarian features and market-oriented policies.

This struggle for influence and ideology is visible throughout the ISA regime and has contributed to its complex structure. The seabed mining regime involves a multitude of public and private actors. The legal framework, comprising the LOSC, the IA, the exploration contracts, and the ISA's Mining Code, determine the complex relationships between all actors. Moreover, the ISA itself has been created with a number of organs and subsidiary organs with further organs to be added as the regime progresses towards the mineral exploitation phase. Most noteworthy, the LOSC provides for the possibilities of a future commercial mining entity, the Enterprise, within the ISA. However, given the gradual decay of communitarian ambitions it is uncertain whether the Enterprise will ever rise to the expectations of developing states and provide for benefit sharing from this common heritage.

Against the background of diverging national interests, the mechanisms to determine membership in the main decision-making organs have naturally been contested. What is more, as this chapter has explored, some of the power dynamics between the organs, particularly when implementing the decision-making processes for adopting new regulations or assessing new applications, are rather unusual. Largely neglecting the plenary organ, the Assembly, the main

[266] LOSC, article 188(2)(a).
[267] LOSC, article 188(2)(b).
[268] *SDC Advisory Opinion*, paragraph 25.

decision-making powers rest with the Council which is supported by the LTC, an authoritative small expert advisory body with extensive competencies.

This chapter has highlighted three core competencies of the ISA, namely developing legally binding regulations, deciding whether to issue new exploration and exploitation contracts, and enforcing the laws and obligations. It has become clear that the LTC plays a central role in implementing the first two competencies. At the same time, the legal framework aims to ensure an objective assessment of new applications and limits the opportunity for political considerations. The challenges associated with these institutional dynamics are further analysed in part III of this thesis in the context of the role of the LTC in implementing the precautionary approach.

In addition, the ISA's mandate is completed by surprisingly extensive enforcement powers, which are strengthened by the LOSC provision that establish the responsibility of states parties to ensure compliance by sponsored entities with their obligations under the legal framework. However, at present, these powers are largely theoretical in nature and it remains to be seen whether they will be effectively translated into practice or whether, for instance, a lack of funding will act as an impediment.

In conclusion, the ISA is equipped with significant institutional competencies, which are relevant to its ability to protect the marine environment from the adverse effects of seabed mining. This chapter has sought to shed some light on the institutional and procedural dynamics of the ISA and to highlight current challenges for the regime. In addition, the ISA is also equipped with an environmental mandate. The challenge lies in utilising these competencies to implement the precautionary approach in line with that environmental mandate. The following two chapters analyse the environmental mandate of the ISA to complete the basis for the analysis in Part III of this thesis as to whether, and if so in what manner, the ISA is implementing the precautionary principle.

Chapter 4: The Environmental Mandate of the ISA

4.1 Introduction

> '*Of all issue areas in the law of the sea, none enjoyed greater international agreement than the need to preserve and protect ocean space from man-made degradation*.'[1]

The previous chapter set out the ISA's general mandate, institutional structure, and decision-making processes. Against this background, this chapter explores the environmental mandate of the ISA under the LOSC and the IA to provide an overview of the overarching obligations of the ISA in relation to the protection of the marine environment and their historical context. Building on this analysis, Chapter 5 then examines how the ISA has developed its specific environmental obligations further, through its law-making powers and the adoption of the Mining Code.

From the outset of the negotiations of the LOSC it was recognized as inevitable that deep seabed mining would have environmental consequences. In order to effectively implement the objectives of the LOSC, including those on the protection and preservation of the marine environment set out in Part XII,[2] it was accepted that the ISA would require a comprehensive environmental mandate. Consequently, the ISA is required not only to administer and regulate seabed mining activities in the Area on behalf of humankind, but it is also obligated, under the LOSC, to ensure effective protection for the marine environment from the potentially harmful effects of such mining activities. Both aims are two sides of the same coin, and it is left for the ISA to strike the appropriate balance between these competing demands.

This dynamic between management of seabed mining and marine environmental protection is what makes the ISA both an interesting and an important case-study. It also raises the question of whether the ISA's competencies might enable it to play an important role in the wider quest for sustainable ocean governance in areas beyond national jurisdiction (ABNJ).[3] With this in mind, the present chapter provides an analysis of the ISA's environmental competencies and responsibilities. In doing so, the chapter situates the ISA's competencies in the context of general developments with regard to improving regulation and governance of marine biodiversity in ABNJ.

The chapter begins with a discussion in Section 4.2 of the historical context in which the ISA's

[1] Christopher C Joyner, 'The Antarctic Treaty System and the Law of the Sea-Competing Regimes in the Southern Ocean' (1995) 10(2) *The International Journal of Marine and Coastal Law* 301–331, page 311.

[2] See also LOSC, preamble paragraph 4.

[3] Chapters 4.5, 5.4.2.1.

environmental mandate was established. Subsequently, Section 4.3 provides an analysis of the specific LOSC and IA provisions that form the ISA's environmental mandate as well as the core environmental obligations of the ISA member states. Section 4.4 explores the extent to which the obligation to apply the precautionary principle has been gradually integrated into the LOSC. Lastly, Section 4.5 discusses the ISA's mandate over marine scientific research in the context of the debate around bioprospecting.

4.2 Environmental Considerations During the Negotiations of Part XI and the IA

The problem of marine pollution was appreciated as early as the 1920s, when the first efforts were made to regulate vessel-source pollution.[4] By the 1960s awareness of the serious and growing impact of marine pollution had become widespread.[5] When deep ocean mineral mining became a serious topic of conversation in the 1960s, it was clear that this new activity would contribute to existing challenges with respect to the protection of the marine environment.

These early concerns were given voice in the 1970 *Declaration of Principles Governing the Seabed and the Ocean Floor, and the Subsoil Thereof, beyond the Limits of National Jurisdiction* in which states agreed that:

> With respect to activities in the area and acting in conformity with the international régime to be established, States shall <u>take appropriate measures</u> for and shall <u>co-operate in the adoption and implementation of international rules, standards and procedures</u> for, inter alia:
>
> (a) The prevention of pollution and contamination, and other hazards to the marine environment, including the coastline, and of <u>interference with the ecological balance of the marine environment</u>;
>
> (b) The protection and conservation of the natural resources of the area and the <u>prevention of damage to the flora and fauna of the marine environment</u>.[6]

This provision captures wide-ranging environmental protection concerns that appear to support protective measures 'in the most comprehensive and all-embracing manner.'[7] Interestingly, when referring to activities in the Area, the Declaration is not limited to mineral activities but

[4] Alan Khee-Jin Tan, *Vessel-Source Marine Pollution: The Law and Politics of International Regulation* (Cambridge University Press, 2005), pages 107-109; Patricia Birnie, Alan Boyle and Catherine Redgwell, International Law and the Environment (3rd ed, Oxford University Press, 2009), page 379.

[5] Evan Luard, *The Control of the Sea-Bed: A New International Issue* (Heinemann, 1974), page 76; Birnie, Boyle, and Redgwell (n 4), page 380; Gwénaëlle Le Gurun, 'Environmental Impact Assessment and the International Seabed Authority' in Timo Koivurova and C J Bastmeijer (eds) *Theory and Practice of Transboundary Environmental Impact Assessment* (Brill, 2007) 221 –264, pages 225-226.

[6] UNGA, UN Doc A/RES/2749(XXV) (17 December 1970), paragraph 11 (emphasis added).

[7] Myron H Nordquist et al, *United Nations Convention on the Law of the Sea, 1982: A Commentary, Volume IV* (Martinus Nijhoff Publishers, 1991), page 10.

encompassed any activity that can conceivably take place in the Area.[8] Paragraphs 12 and 14 of the Declaration highlight this wide scope by noting that ‘activities in the area, including those relating to its resources,’ must conform to specific standards.

This provision built the basis for subsequent negotiations of the provisions of the LOSC that set out the ISA’s environmental mandate. However, during the UNCLOS III negotiations, the Declaration’s broad scope was narrowed to define ‘activities in the Area’ restrictively, by reference only to mineral exploration and exploitation activities.[9] Thus, the LOSC departed from the comprehensive focus of protecting the Area from all potentially harmful interferences and instead confirmed a single-sector mandate for the ISA.[10] This can be explained by the concern of industrialised states, outlined in Chapter 3.2, which wanted to see ‘the Authority possess as little discretionary powers as possible.’[11] Nevertheless, the Preamble to the LOSC expressly references the Declaration and calls for the further development of the principles enshrined therein.[12]

Overall, environmental concerns continued to play an important role during the negotiations of the LOSC, not least because UNCLOS III commenced in 1972, the same year the United Nations Conference on the Human Environment was held in Stockholm. The conference not only ‘stimulated the widespread attention to the global environment that has continued to the present’[13] but also influenced negotiations at UNCLOS III.[14] Indeed, as discussed in Section 4.3.3, Principle 7 of the *Stockholm Declaration on the Human Environment*, calling on states to prevent marine pollution,[15] found detailed application in the LOSC.

As will be recalled from Chapter 3.2, Part XI of the LOSC remained controversial even after the adoption of the LOSC. The informal consultations from 1990 to 1994, aimed at its amendment, addressed the concerns of industrialised states with respect to the future seabed mining regime for the Area. At the outset of the informal consultations, environmental considerations were identified as a point of concern.[16] However, by 1992 it had become apparent that there were no

[8] Peter B Payoyo, *Cries of the Sea: World Inequality, Sustainable Development and the Common Heritage of Humanity* (Martinus Nijhoff Publishers, 1997), pages 334-337.

[9] LOSC, article 1(1)(3); Satya N Nandan, Michael W Lodge, and Shabtai Rosenne, *United Nations Convention on the Law of the Sea, 1982: A Commentary, Volume VI* (Martinus Nijhoff Publishers, 2002), pages 192-194.

[10] Payoyo (n 8), pages 336-337.

[11] Ibid.

[12] LOSC, preamble, para 6.

[13] Jonathan I Charney, ‘The Marine Environment and the 1982 United Nations Convention on the Law of the Sea’ (1994) 28 *The International Lawyer* 879–901, 883.

[14] David Anderson, *Modern Law of the Sea* (Martinus Nijhoff Publishers, 2008), page 13.

[15] *Report of the United Nations Conference on the Human Environment*, Stockholm, 5-16 June 1972, A/Conf.48/14/Corr. 1, 11 ILM 1416 (1972).

[16] ‘Information Note Concerning the Secretary-General’s Informal Consultation on Outstanding Issues Relating to the Deep Seabed Mining Provisions of the UN Convention on the Law of the Sea, New

areas of disagreement that would require modification of the environmental obligations the LOSC places on both states parties and the ISA.[17] Indeed, the Preparatory Commission for the ISA had simultaneously been developing a set of draft environmental rules for the seabed mining regime without encountering any 'insurmountable obstacles' in the progress.[18] As a result, it was agreed that 'this was not a controversial issue' and that environmental concerns were therefore 'qualitatively different' from the disputed aspects surrounding Part XI.[19] Therefore, environmental considerations were removed from the list of obstacles,[20] without in any way reducing their importance.[21] In Anderson's words, 'there was general agreement that environmental considerations were of utmost importance and that the Convention already imposed high standards which would be further elaborated by the Authority. This question was not seen to be one which represented an obstacle in the way of ensuring universal participation.'[22]

The 12 years between the conclusions of the LOSC in 1982 and the adoption of the IA in 1994, were characterised by a growing awareness of the urgency of environmental protection.[23] Several significant multilateral environmental agreements were adopted, including the *Convention on Biological Diversity*,[24] and the *Convention for the Protection of the Marine Environment of the North-East Atlantic*.[25] Moreover, advances in research into the deep sea environment uncovered new knowledge about the scientific and economic potential of deep ocean ecosystems and living organisms.[26] It is hardly surprising then that the IA addressed such growing environmental consciousness. Its preamble specifically highlights 'the importance of the Convention for the protection and preservation of the marine environment and of the

York, 25 March 1991', reprinted in 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* (ISA, 2002), 13-20, 13.

[17] 'Summary of Informal Consultations Conducted by the Secretary-General on the Law of the Sea During 1990 and 1991 (31 January 1992)', reprinted in ISA (n 16) 65-78, paragraph 45; Nandan, Lodge, and Rosenne (n 9), page 197.

[18] Summary of Informal Consultations Conducted by the Secretary-General (n 17), paragraph 46.

[19] Ibid.

[20] UNGA, UN Doc A/48/950 (9 June 1994), paragraph 9.

[21] See for example Nandan, Lodge, and Rosenne (n 9), pages 197-199.

[22] Anderson (n 14), page 310.

[23] Bernard H Oxman, 'The 1994 Agreement and the Convention' (1994) 88(4) *The American Journal of International Law* 687–696, 688.

[24] *Convention on Biological Diversity* (adopted 5 June 1992, entered into force 29 December 1993) 1760 UNTS 79.

[25] *Convention for the Protection of the Marine Environment of the North-East Atlantic* (adopted 22 September 1992, entered into force 25 March 1998) 2354 UNTS 67.

[26] See for example Maria C Baker et al, 'Biogeography, Ecology, and Vulnerability of Chemosynthetic Ecosystems in the Deep Sea' in Alasdair McIntyre (ed), *Life in the World's Oceans: Diversity, Distribution, and Abundance* (Wiley-Blackwell, 2010) 161-182.

growing concern for the global environment.'[27] What is more, states agreed that the protection of the deep sea environment must not only be part of the ISA's mandate but in fact a priority area on which the ISA should concentrate before approving the first exploitation contract.[28] This was intended to include the adoption of binding rules, regulations and procedures setting applicable environmental protection standards[29] as well as the 'timely elaboration of rules, regulations and procedures for exploitation, including those relating to the protection and preservation of the marine environment.'[30]

In sum, the need to address the environmental risks of seabed mining was recognized from the very start of developing the regime. Thus, the LOSC incorporates extensive environmental obligations, which are discussed in this chapter. Furthermore, despite the powers and functions of the ISA having been at the core of the controversy around Part XI in the early 1990s, the ISA's mandate to ensure effective protection of the marine environment was not challenged. On the contrary, the IA strengthened the importance of the Authority's environmental obligations by identifying them as a priority task.

4.3 The General Obligation under the LOSC and the IA to Protect and Preserve the Marine Environment

4.3.1 The Obligation to Protect and Preserve the Marine Environment

The adoption of the LOSC presented a major step for international law relating to the marine environment.[31] Part XII of the LOSC is dedicated to the broad objective captured in Article 192 of protecting and preserving the marine environment. As an umbrella convention, Part XII of the LOSC addresses the growing problem of marine pollution and environmental degradation in a comprehensive, global manner rather than a regional or sector-based approach.[32] Part XI of the LOSC complements this global focus with a sector-specific allocation of competencies to the ISA.

The scope of Part XII encompasses not only marine pollution but affects any human activity

[27] IA, preamble paragraph 3.
[28] IA, annex section 1(5).
[29] IA, annex section 1(5)(g).
[30] IA, annex section 1(5)(k).
[31] Charney (n 13).
[32] David M Ong, 'The 1982 UN Convention on the Law of the Sea and Marine Environmental Protection' in Malgosia Fitzmaurice, David M Ong, and Panos Merkouris, *Research Handbook on International Environmental Law* (Edward Elgar Publishing, 2010) 567-585, pages 568-569; Moira L McConnell and Edgar Gold, 'Modern Law of the Sea: Framework for the Protection and Preservation of the Marine Environment?' (1991) 23 *Case Western Reserve Journal of International Law* 83-105, 85.

that impacts on marine environmental protection and preservation.[33] Whilst not setting specific protection standards, Part XII comprises general environmental protection principles[34] and 'lays down the broad legal framework within which all law-making on the marine environment must now take place.'[35] These general rules, rights, and obligations are then refined by the rules applying to an individual regime or activity.

The broad and all-encompassing aim to protect and preserve the marine environment also underpins the ISA's mandate which is discussed in the following sections in two parts. The first part examines the obligation incumbent on the ISA to protect the marine environment from damage caused by seabed mining, whilst the second part concentrates on the corresponding obligations of states. Both are separate obligations although they naturally overlap, as the ISA consists of member states and the European Union. Any failure on the part of the ISA to meet its environmental obligations will therefore also affect the assessment of whether or not the member states have met their corresponding environmental obligations and *vice versa*.

Moreover, whilst the rules on the ISA regime are set out primarily in Part XI of the LOSC, other parts of the *Convention* are also relevant. In addition, as confirmed by Article 31(3)(c) of the *Vienna Convention on the Law of Treaties*,[36] in interpreting a treaty both the context and 'any relevant rules of international law applicable in the relations between the parties' can be taken into account. These include rules contained in the LOSC outside of Part XI.[37] After all, as an international organisation the ISA operates within the broader context of international law and is bound by general rules of international law[38] and customary international law.[39] This affects the environmental mandate of the ISA, which, as the present chapter will demonstrate, reflects international environmental legal principles, such as the obligation to apply the precautionary approach.

[33] McConnell and Gold (n 32), page 86.

[34] Nordquist et al (n 7), page 21.

[35] Ong (n 32), page 570.

[36] *Vienna Convention on the Law of Treaties* (adopted 23 May 1969, entered into force 27 January 1980) 1155 UNTS 331 (VCLT).

[37] WTO, *Canada - Measures Affecting the Export of Civilian Aircrafts*, WT/DS70/AB/R (2 August 1999), paragraphs 155-156; Richard Gardiner, *Treaty Interpretation* (Oxford University Press, 2008), pages 177-178, 182-186, 260.

[38] *Interpretation of the Agreement of 25 March 1951 Between the WHO and Egypt* (Advisory Opinion of 20 December 1980) [1980] ICJ Rep 73, pages 89-90; Henry G Schermers and Niels M Blokker, *International Institutional Law* (vol 5, Martinus Nijhoff Publishers, 2011), pages 833-835 and 995-998.

[39] Schermers and Blokker (n 38), page 835.

4.3.2 The Environmental Mandate of the ISA

When delivering his speech in 1967,[40] Ambassador Pardo envisaged the future international agency 'as the body with over-all responsibility for keeping the problem of ocean pollution under control.'[41] Although the LOSC limited the ISA's mandate to seabed mining, it nonetheless imposed a comprehensive obligation on the ISA to ensure seabed mining in the Area would not undermine the overall aim of protecting the marine environment. Under Article 145, the ISA is required to take:

> necessary measures […] in accordance with this Convention with respect to activities in the Area to ensure effective protection for the marine environment from harmful effects which may arise from [activities in the Area].

This provision assigns the primary responsibility for preventing environmental harm resulting from mining activities in the Area to the ISA.[42] At the same time it grants the ISA a broad capacity to enact protective measures as it deems necessary. Article 145 continues specifically to require the ISA to adopt appropriate rules, regulations and procedures, including for:

> the prevention, reduction and control of <u>pollution and other hazards</u> to the marine environment, including the coastline, and of <u>interference with the ecological balance of the marine environment</u>, particular attention being paid to the need for protection from harmful effects of such activities as drilling, dredging, excavation, disposal of waste, construction and operation or maintenance of installations, pipelines and other devices related to such activities; [and]
>
> the <u>protection and conservation of the natural resources</u> of the Area and the <u>prevention of damage to the flora and fauna</u> of the marine environment.[43]

Article 145 sets the framework for environmental protection from seabed mining in the Area and it provides some guidance as to the subjective environmental conservation objectives the ISA must adopt. Nevertheless, the list of activities named in Article 145 that require protective measures is non-exhaustive. Indeed, Article 17(2)(f) of Annex III to the LOSC lists further activities:

> Rules, regulations and procedures shall be drawn up in order to secure effective protection of the marine environment from harmful effects directly resulting from activities in the Area or from shipboard processing immediately above a mine site of minerals derived from that mine site, taking into account the extent to which such harmful effects may directly result from drilling, dredging,

[40] Chapter 3.2.

[41] UNGA, UN Doc A/C.1./PV.1516 (1 November 1967), paragraph 10.

[42] Nandan, Lodge, and Rosenne (n 9), page 194.

[43] LOSC, article 145 (emphasis added); see also LOSC, annex III article 17(1)(b)(xii); IA, annex section 1(5)(g).

coring and excavation and from disposal, dumping and discharge into the marine environment of sediment, wastes or other effluents.

In the context of this broad obligation to protect the environment, it should be recalled that whilst the Council has the competence to adopt new regulations,[44] the Legal and Technical Commission is required to formulate and submit to the Council environmental rules, regulations, and procedures and keep them under review.[45] Moreover, the LTC has to make recommendations to the Council on 'the protection of the marine environment, taking into account the views of recognized experts in that field.'[46] Here, it should be noted that the ISA also has the competence to issue emergency orders to prevent serious environmental harm in critical situations. Such orders may include suspension or adjustment of operations.[47] Furthermore, the general and specific competencies of the ISA are supplemented by incidental powers under article 157 of the LOSC and section 1(1) of the annex to the 1994 Agreement.

These provisions grant the ISA a general and far-reaching environmental mandate, which was given additional emphasis under the IA. Section 1(5)(g) of the Annex to the IA requires the ISA to give priority to the adoption of rules, regulations, and procedures that incorporate applicable standards for the protection and preservation of the marine environment. Several points may be observed in relation to the ISA's general environmental mandate.

First, Article 145 elaborates upon the principle in Article 209,[48] which generically enunciates that 'international rules, regulations and procedures shall be established in accordance with Part XI to prevent, reduce and control pollution of the marine environment from activities in the Area.'[49] The obligation to establish such international rules is clearly assigned to the ISA under Article 145. However, Article 209(2) also requires states to adopt corresponding laws and regulations to prevent pollution from any activities in the Area involving vessels flying their flag or other structures or installations operating under their authority. Importantly though, 'such laws and regulations shall be no less effective than the international rules, regulations and procedures'[50] adopted by the ISA. As such, Article 209 grants a preferential role to the regime created by the ISA in accordance with Part XI as regards the protection of the environment from pollution in the Area.[51]

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[44] LOSC, article 162(2)(o)(ii); Chapter 3.5.1.

[45] LOSC, article 165(2)(f)-(g).

[46] LOSC, article 165(2)(e).

[47] LOSC, articles 162(2)(w), 165(2)(k); Chapters 5.4.4, 6.6.

[48] Nandan, Lodge, and Rosenne (n 9), pages 195-196.

[49] Article 209 is complemented by article 215 which provides that enforcement of these international rules is to be governed by Part XI.

[50] LOSC, article 209(2), annex III article 21(3).

[51] Tullio Scovazzi, 'Mining, Protection of the Environment, Scientific Research and Bioprospecting:

Similarly, states who engage in seabed mining in areas within their national jurisdiction are required to adopt pollution prevention laws, regulations, and measures under Article 208, which must be no less stringent than international rules. Consequently, the effects of the ISA's environmental mandate extend beyond the Area regime and directly set a benchmark for pollution standards adopted under domestic legislation.

Second, in setting environmental standards, the ISA must be guided by Part XII of the LOSC. In fact, a previous draft of Article 145 referred specifically to the need to take protective measures 'in accordance with Part XII' of the LOSC.[52] The wording was ultimately replaced by the requirement to act 'in accordance with this Convention.'[53]

Of particular relevance is Article 197 in Part XII which sets out the need to take into account 'characteristic regional features' of marine environments. In the deep ocean context, this requires particular attention to be given to unique and largely unchartered ecosystems and organisms.

Lastly, and indeed importantly, Article 145 provides for the protection of the marine environment as a whole, including flora and fauna. Although the ISA's mandate is limited to seabed mining activities, as discussed in Section 4.2 above, it is not spatially restricted. Indeed, the requirement to prevent 'interference with the ecological balance of the marine environment' recognises the integrated nature of marine ecosystems and includes in that obligation not only the seabed but also the water column, coastal areas, as well as 'other parts of the environmental continuum of the oceans.'[54]

Moreover, the ISA's environmental mandate comprises the protection of marine flora and fauna regardless of whether or not they form part of the Area. This becomes especially relevant in light of the ongoing debate over marine genetic resources.[55] The realisation that living organisms in the deep ocean hold commercially promising genetic information has sparked a debate over who should have access to these so called 'marine genetic resources' and how the benefits might be shared.[56] Part of the debate focuses on whether or not those marine genetic resources that are sedentary species, living on the ocean floor, should be regarded as forming

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Some Considerations on the Role of the International Sea-Bed Authority' (2004) 19(4) *The International Journal of Marine and Coastal Law* 383–410, 394.

[52] Nandan, Lodge, and Rosenne (n 9), page 195.

[53] LOSC, article 145.

[54] Nandan, Lodge, and Rosenne (n 9), page 196.

[55] See also Section 4.5.

[56] For a detailed discussion of the debate, see Robin Warner, *Protecting the Oceans Beyond National Jurisdiction: Strengthening the International Law Framework* (Martinus Nijhoff Publishers, 2009), chapter 7; Nele Matz, 'Marine Biological Resources: Some Reflections on Concepts for the Protection and Sustainable Use of Biological Resources in the Deep Sea' (2002) 2 *Non-State Actors and International Law* 279–300.

part of the Area and thus the common heritage of humankind.[57]

In brief, some states and scholars argue that if the economic potential of marine genetic resources had been known at the time of UNCLOS III, marine genetic resources would have been included in the definition of 'resources' in Part XI.[58] Moreover, the Part VI continental shelf regime applies to non-living, natural resources of the seabed and subsoil as well as to living organisms belonging to sedentary species,[59] which are defined as those species 'which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil.'[60] If the same distinction was to be applied to sedentary species beyond the continental shelf these resources would form part of the Area, and thus part of the common heritage of mankind[61] possibly leading to their inclusion within the mandate of the ISA. Opposing views have been expressed by delegations, who interpret the seabed regime narrowly as only covering mineral resources in accordance with Article 133(a) of the LOSC. These delegations argue that all other resources are subject to the high seas regime.[62]

In light of this debate, it must be noted that Article 145 already provides for the protection of all flora and fauna at least from adverse effects of seabed mining. Corresponding to Article 192, this obligation is not restricted to flora and fauna that were known at the time of negotiating the *Convention*. As a result, the existing environmental mandate of the Authority is independent of the ongoing debate over the status of marine genetic resources.[63]

It becomes clear that whilst the LOSC and the IA provide the broad environmental mandate of the ISA, significant gaps remain. The agreements include few specific environmental measures and fail to provide guidance on how to implement them. For example, although emergency orders are required, the LOSC does not specify how these orders by the ISA could be financed and implemented in practice.[64] Similarly, Article 165(2)(d) requires the LTC to 'prepare

[57] BBNJ Working Group, UN Doc A/67/95 (13 June 2012), paragraph 15-19.

[58] See for example Frida Armas-Pfirter, 'How Can Life in the Deep Sea Be Protected?' (2009) 24(2) *The International Journal of Marine and Coastal Law* 281–307; Louise Angélique de La Fayette, 'Institutional Arrangements for the Legal Regime Governing Areas Beyond National Jurisdiction - Commentary on Tullio Scovazzi' in Alex G Oude Elferink and Erik Jaap Molenaar (eds) *The International Legal Regime of Areas beyond National Jurisdiction: Current and Future Developments* (Martinus Nijhoff Publishers, 2010) 77–79; Fernanda Millicay, 'A Legal Regime for the Biodiversity of the Area' in Myron H Nordquist et al (eds) *Law, Science and Ocean Management* (Martinus Nijhoff Publishers, 2007) 739–850; BBNJ Working Group, UN Doc A/61/65 (20 March 2006), paragraph 71.

[59] LOSC, articles 77(4), 68.

[60] LOSC, article 77(4).

[61] Armas-Pfirter (n 58), page 303.

[62] UN Doc A/61/65 (n 58), paragraph 72; UN Doc A/67/95 (n 57), paragraph 15.

[63] Chapter 4.5.

[64] Chapters 5.4.4, 6.6.

assessments of the environmental implications of activities in the Area.' Yet, beyond this provision, the *Convention* does not specify the role and scope of such an environmental impact assessment (EIA) in the decision-making process of the ISA. Such specific considerations were reserved for a later stage, partly because during the negotiations for the LOSC and the IA, understanding of the deep oceans was rudimentary and seabed mining remained a challenging future activity for which the required technology only existed in sketchbooks. Instead, the ISA's environmental obligations are developed further through the Mining Code, which sets out specific environmental standards and requirements. These complement the general obligations listed above and are best discussed in the context of the ISA's development of its environmental obligations mandate through the Mining Code, in Chapter 5.

4.3.3 General Environmental Obligations of States

Whilst the ISA has a clear environmental protection mandate with respect to seabed mining activities in the Area, states have a corresponding obligation covering *all* human activities that impact the seas and oceans. This section offers a brief discussion of several components of this obligation that in turn inform the ISA's environmental mandate.

As clearly and unambiguously stated in Article 192 of the LOSC, states have an unequivocal 'obligation to protect and preserve the marine environment.' This is complemented by the more specific obligation in Article 194(5) to 'protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life.' The latter, Warner notes, presents 'an early recognition of the need for ecosystem based management of the Oceans.'[65] It can be seen as especially relevant for deep oceans with their exotic and fragile life forms, such as chemosynthetic ecosystems and cold-water corals.[66]

The significance of the prevalent obligation in Article 192 is further confirmed in Article 193, which reiterates the traditional sovereign right of states to exploit their natural resources yet expressly subjects it to the obligation to protect and preserve the marine environment.

What is noteworthy is that Article 192 refers generically to states rather than states parties, which allows for the interpretation that the obligation is a general principle of international law binding on all states.[67] Since Part XII was developed following the adoption of numerous treaties on aspects of marine environmental protection,[68] Article 192 'is the culmination of a process of adopting increasingly broad measures in different types of international instruments

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[65] Warner (n 56), page 49.
[66] Scovazzi (n 51), page 396.
[67] See Nordquist et al (n 7), pages 39-40.
[68] Chapter 4.3.

relating to marine environmental issues.'[69] It is this context that allows for the conclusion that the LOSC's provisions on marine environmental protection, including Article 192, form part of customary international law.[70] In the ISA context, this means that non-member states are equally required to protect the marine environment from any potential seabed mining operations.

The concise formulation of Article 192 reflects the obligation to prevent marine pollution. In fact, Article 194 requires states to take '<u>all</u> <u>measures</u> consistent with this Convention that are <u>necessary</u> to prevent, reduce and control pollution of the marine environment from any source'[71] including from seabed mining operations[72] but also from vessels, dumping, land-based activities, and atmospheric pollution.[73] This obligation applies to all maritime areas, including the international seabed.[74] Thus, one of the fundamental changes brought about by Part XII is that 'pollution can no longer be regarded as an implicit freedom of the seas.'[75] Importantly, however, this duty to prevent pollution is a due diligence obligation on states to take all necessary measures, yet 'using for this purpose the best practicable means at their disposal and in accordance with their capabilities.'[76] This addition reduces the force of the provision and implies a degree of flexibility, particularly for developing states.[77] Interestingly, however, in the specific articles dealing with pollution from seabed activities such discretion is absent. On the contrary, in controlling pollution from seabed activities, as well as pollution from vessels and dumping,[78] states have to adopt measures that are no less effective than international rules and standards.[79]

As part of the duty to control pollution, states are required, under Articles 204 and 206 LOSC, to monitor the risks or effects of pollution and to assess potential environmental impacts of activities planned to be carried out within their jurisdiction or under their control. Pollution is defined broadly as:

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[69] Nordquist et al (n 7), page 36.

[70] Philomène Verlaan, 'Marine Scientific Research: Its Potential Contribution to Achieving Responsible High Seas Governance' (2012) 27 *The International Journal of Marine and Coastal Law* 805–812, pages 810-811; Alan E Boyle, 'Protecting the Marine Environment: Some Problems and Developments in the Law of the Sea' (1992) 16 *Marine Policy*, 79-85, 80; Birnie, Boyle, and Redgwell (n 4), pages 387-390.

[71] LOSC, article 194(1). (emphasis added)

[72] LOSC, articles 194(3)(c), 196, 208, 209.

[73] LOSC, articles 194(3), 207, 210-212.

[74] Nandan, Lodge, and Rosenne (n 9), page 197.

[75] Birnie, Boyle, and Redgwell (n 4), pages 383, 390.

[76] LOSC, article 194(1).

[77] See also LOSC, article 207(4); Jan Albers, *Responsibility and Liability in the Context of Transboundary Movements of Hazardous Wastes by Sea: Existing Rules and the 1999 Liability Protocol to the Basel Convention* (Springer, 2014), page 124-125.

[78] LOSC, articles 210(6), 211(2).

[79] LOSC, articles 208(3), 209(2).

> the introduction by man, directly or indirectly, of substances or energy into the marine environment […] which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities.[80]

This definition captures a wide range of interferences and could arguably allow noise, light, and heat pollution from exploration and exploitation activities to be included as forms of energy.[81]

In addition to outlawing marine pollution, Part XII also places the duty to control marine pollution into the wider context of the *preservation* of the marine environment.[82] As such, the obligation goes beyond avoiding harm and includes the requirement to take active measures to enhance the state of the marine environment.[83] As stated in the commentary to Part XII, this

> goes much further than merely combating pollution after it has already taken place. It entails the active taking of legal and administrative measures, and the application of scientific methods and procedures which are all designed not simply to check or abate the deterioration of marine ecosystems, but also to provide the means for protecting and preserving the marine environment from the harmful effects of pollution and other hazards.[84]

Thus, Part XII introduces a proactive element requiring both states and international organisations to regulate and manage human activities before serious harm occurs. [85]

A further important point is that the obligation to protect and preserve the marine environment covers all marine spaces and affects the international community as a whole. Verlaan observes that it 'could even be argued that this obligation is on the verge of acquiring an *erga omnes* nature.'[86] Indeed, the Seabed Disputes Chamber confirmed this assumption in relation to ABNJ in its *SDC Advisory Opinion*. The Chamber was confronted with the question of who would be entitled to claim compensation from a state that sponsored activities in the Area following a breach of obligations and the occurrence of environmental harm. Referencing Article 48 of the

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[80] LOSC, article 1(1)(4).

[81] Harm M Dotinga and Alex G Oude Elferink, 'Acoustic Pollution in the Oceans: The Search for Legal Standards' (2000) 31(1-2) *Ocean Development & International Law* 151–182, 158; David Kenneth Leary, *International Law and the Genetic Resources of the Deep Sea* (Martinus Nijhoff Publishers, 2007), page 40-41.

[82] Nordquist et al (n 7), pages 10-11; David Freestone, 'Problems of High Seas Governance' [2009] *UNSW Faculty of Law Research Series*, 23.

[83] Nordquist et al (n 7), pages 40-41.

[84] Nordquist et al (n 7), page 11.

[85] Birnie, Boyle, and Redgwell (n 4), pages 383-384.

[86] Verlaan (n 70), page 811; see also Albers (n 77), pages 124-126. *Erga omnes* obligations are owed to the international community as a whole, enabling any state to invoke the responsibility of another state for a breach of this obligation, regardless of direct injury, see *Barcelona Traction Case* (Belgium v Spain) (Second Phase) [1970] ICJ Rep 3, paragraphs 33-34.

ILC *Articles on State Responsibility*,[87] the Chamber concluded that 'each State Party may [...] be entitled to claim compensation in light of the *erga omnes* character of the obligations relating to preservation of the environment of the high seas and in the Area.'[88] The importance of this statement should not be lost. The Chamber offered 'the first indication of the existence of a right of *actio popularis* arising under an international environmental treaty outside the context of non-compliance procedures.'[89] Nonetheless, it should be noted that much of the stringency of the *SDC Advisory Opinion* was informed by the common heritage nature of the Area and its resources.[90] Thus, the findings of the SDC must be understood within the context of the ISA regime and might not be generalizable per se.

In summary, the LOSC imposes a far-reaching general obligation on states to protect and preserve the marine environment, including from pollution. This not only complements the ISA's environmental mandate but may also affect its enforceability in so far as the *erga omnes* nature of the obligation to protect the marine environment in ABNJ may allow any state to commence proceedings against a non-complying state.

4.4 Gradual Integration of Precaution into the LOSC

Despite the LOSC conferring a far-reaching environmental mandate onto the ISA and states parties, an important provision is missing in the *Convention* and the IA: the express obligation to apply precaution. It is submitted, however, that this obligation can be read as being implicit in the LOSC.

The LOSC does not mention the precautionary principle per se. However, it does require both states parties and the ISA to take actions associated with precaution, such as conducting scientific research, EIAs, and declaring protected areas from seabed mining.[91] Moreover, the LOSC allows for provisional measures 'to prevent serious harm to the marine environment.'[92] As Judge Treves stated in the *Southern Bluefin Tuna* cases, 'a precautionary approach seems to

[87] International Law Commission, *Articles on Responsibility of States for Internationally Wrongful Acts*, reprinted in 'Report of the International Law Commission on its Fifty-third session', UN Doc A/56/10 (2001).

[88] *SDC Advisory Opinion*, paragraph 180.

[89] Philippe Sands and Jacqueline Peel, *Principles of International Environmental Law* (3rd edn, Cambridge University Press, 2012), page 732; see also Duncan French, 'From the Depths: Rich Pickings of Principles of Sustainable Development and General International Law on the Ocean Floor — the Seabed Disputes Chamber's 2011 Advisory Opinion' (2011) 26 *The International Journal of Marine and Coastal Law* 525–568, pages 545-546.

[90] French (n 89), page 544.

[91] LOSC, articles 143, 162(2)(x), 165(2)(d), (l), 256, 206.

[92] LOSC, article 290(1).

me inherent in the very notion of provisional measures.'[93] Similarly, the late Judge Laing observed that given the numerous environmental protection provisions of the LOSC, 'it cannot be denied that [the *Convention*] adopts a precautionary approach.'[94]

The negotiations for the LOSC predate the rise of the precautionary approach in international law. However, with the mainstreaming of environmental awareness, the concept - even if not the precise language - of precaution has well and truly arrived in the law of the sea.[95] As discussed in Chapter 2.2.3, there is mounting evidence of the precautionary principle having become binding as a rule of customary international law.[96] As a living instrument, the LOSC must be interpreted in light of more recent developments in international law,[97] including the widespread acceptance of the precautionary principle as evidenced by its incorporation in numerous treaties and other international instruments since the early 1990s.[98]

Indeed, eminent support for this evolutionary approach has been provided by the International Court of Justice (ICJ) in the recent *Whaling in the Antarctic* case. In following the judgments in both the *Gabčíkovo-Nagymaros* case[99] and the *Pulp Mills* case,[100] Judge ad hoc Charlesworth noted in her separate opinion that 'treaties dealing with the environment should be interpreted wherever possible in light of the precautionary approach, regardless of the date of their adoption.'[101] Similarly, Judge Cançado Trindade reiterated that 'international treaties and conventions are products of their time, and their interpretation and application in time, with a temporal dimension, bears witness that they are indeed living instruments.'[102] Highlighting the

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[93] *Southern Bluefin Tuna Cases (New Zealand v Japan, Australia v Japan)* (Provisional Measures) (ITLOS Cases No 3 & 4, 27 August 1999) (Separate Opinion of Judge Treves), paragraph 9; see also *M/V 'Louisa' Case (Saint Vincent and the Grenadines v. Kingdom of Spain)* (Provisional Measures) (ITLOS Case No 18, 23 December 2010) (Dissenting Opinion of Judge Wolfrum), paragraph 4.

[94] *Southern Bluefin Tuna Cases* (n 93), paragraph 17; see also the argument by Malaysia in *Case concerning Land Reclamation by Singapore in and around the Straits of Johor (Malaysia v. Singapore)* (Provisional Measures), verbatim record of 25 September 2003, ITLOS/PV.03/02/Corr.1, pages 17-20.

[95] Rosemary Rayfuse, 'Precaution and the Protection of Marine Biodiversity in Areas beyond National Jurisdiction' (2012) 27 *The International Journal of Marine and Coastal Law* 773–781.

[96] *SDC Advisory Opinion*, paragraph 135; Arie Trouwborst, *Evolution and Status of the Precautionary Principle in International Law* (Kluwer Law International, 2002).

[97] VCLT, article 31(3); see also LOSC, article 138; Alan Boyle, 'Further Development of the Law of the Sea Convention: Mechanisms for Change' (2005) 54 *International & Comparative Law Quarterly* 563-584; Birnie, Boyle, and Redgwell (n 4), page 388.

[98] Chapter 2.2.2.

[99] *Gabčíkovo-Nagymaros Project (Hungary v Slovakia)* (Judgment) [1997] ICJ Rep 78, paragraph 140.

[100] *Pulp Mills on the River Uruguay (Argentina v. Uruguay)* (Judgment) [2010] ICJ Rep 71, paragraph 164.

[101] *Whaling in the Antarctic* (Australia v Japan: New Zealand intervening) (Judgment) (ICJ, 31 March 2014) (Separate Opinion of Judge *Ad Hoc* Charlesworth), paragraph 9; see also *Legal Consequences for States of the Continued Presence of South Africa in Namibia (South West Africa) notwithstanding Security Council Resolution 276 (1970)* (Advisory Opinion) [1971] ICJ Rep 31, paragraph 53.

[102] *Whaling in the Antarctic* (n 101) (Separate Opinion of Judge Cançado Trindade), paragraph 34.

importance of interpreting the *International Convention for the Regulation of Whaling* (ICRW) in light of precaution, Judge Cançado Trindade observed:

> It has been made clear, in recent decades, that the international community has adopted a conservation-oriented approach in treaty regimes, including treaties covering marine mammals. The ICRW Convention is to be properly interpreted in this context; it does not stand alone as a single international Convention aimed at conservation and management of marine mammals. The ICRW Convention is part of a plethora of international instruments adopted in recent years, aiming at conservation with a precautionary approach.[103]

This approach mirrors that articulated fifteen years earlier in the *Southern Bluefin Tuna* cases by Judges Treves and Laing, who noted in their separate opinions that the LOSC should be interpreted in accordance with the precautionary approach.[104]

Importantly, the clearest judicial endorsement to date of the precautionary principle by an international tribunal dealt specifically with the Part XI regime. In its 2011 *SDC Advisory Opinion*, the Seabed Disputes Chamber clearly demonstrated its willingness to take an evolutionary approach to interpreting the Part XI regime in light of current environmental concerns, particularly with regard to the applicability of the precautionary approach.[105] The Chamber found an obligation on sponsoring states to apply precaution both as a direct obligation under the ISA *Exploration Regulations*[106] and as an element of their general obligation of due diligence.[107] While the former are discussed in detail in Chapter 5.3, the latter deserves close attention here.

Article 139(1), similar to Article 4(4) of Annex III to the LOSC, establishes a general responsibility of states to ensure that any entity they sponsor to carry out activities in the Area does so 'in conformity with this Part.'[108] The Chamber linked this obligation of due diligence with the environmental obligations under the ISA regime, including the ISA Regulations. Thus, the Chamber noted that:

> [I]t is appropriate to point out that the precautionary approach is also an integral part of the general obligation of due diligence of sponsoring States, which is applicable even outside the scope of the Regulations. The due diligence obligation of the sponsoring States requires them to take all appropriate

[103] Ibid, paragraph 57.

[104] *Southern Bluefin Tuna Cases* (n 93) Separate Opinion of Judge Treves, paragraph 9 and Separate Opinion of Judge Laing, paragraphs 12-21; see also Alan Boyle, 'The Environmental Jurisprudence of the International Tribunal for the Law of the Sea' (2007) 22(3) *The International Journal of Marine and Coastal Law* 369-381, pages 373-374.

[105] *SDC Advisory Opinion*, paragraph 135.

[106] Ibid, paragraph 127.

[107] Ibid, paragraphs 131-132.

[108] Ibid, paragraphs 107-116; see also LOSC, article 153(4).

measures to prevent damage that might result from the activities of contractors that they sponsor.[109]

In finding this connection, the Chamber relied on an 'implicit' link between an obligation of due diligence and the precautionary approach in the *Southern Bluefin Tuna* cases.[110] Moreover, the Chamber noted that under the ISA standard clauses for exploration contracts 'the precautionary approach is a contractual obligation of the sponsored contractors whose compliance the sponsoring State has the responsibility to ensure.'[111] What is important to note for present purposes is that the Chamber demonstrated a willingness to interpret the responsibility of sponsoring states under the LOSC in line with the more recent obligation to apply a precautionary approach. What is more, by viewing the precautionary approach as part of the due diligence obligation, the Chamber extended its application even to activities outside the ISA mining Regulations.[112] As French notes, 'through this, the Chamber has refashioned States' general obligations to take into account more recent legal developments.'[113] In line with the precautionary principle, the Chamber highlighted that the standard of due diligence may change with new scientific or technological knowledge and that 'the standard of due diligence has to be more severe for the riskier activities.'[114]

Such prominent support from international courts and tribunals for an evolutionary approach leaves no doubt that the LOSC must now be interpreted in light of the precautionary approach. This assertion is supported by Boyle's analysis of the environmental jurisprudence of the International Tribunal for the Law of the Sea in its first decade of existence, in which he found that the Tribunal had demonstrated a 'willingness to interpret and apply Part XII of the *Convention* consistently with the contemporary state of international environmental law.'[115] Scholars have also argued that the LOSC must be applied in accordance with the precautionary approach.[116] Moreover, adding political support for a progressive interpretation of the LOSC,

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[109] Ibid, paragraph 131.
[110] Ibid, paragraph 132; *Southern Bluefin Tuna Cases* (n 93), paragraphs 77, 79, 80.
[111] *SDC Advisory Opinion*, paragraph 133.
[112] Ibid, paragraph 131.
[113] French (n 89), page 547.
[114] *SDC Advisory Opinion*, paragraph 117.
[115] Boyle (n 104), page 380.
[116] Myron H Nordquist et al (eds), *United Nations Convention on the Law of the Sea, 1982: A Commentary, Volume III* (Martinus Nijhoff Publishers, 1995), page 288; Nico Schrijver, *The Evolution of Sustainable Development in International Law: Inception, Meaning and Status* (Martinus Nijhoff Publishers, 2008), page 185; Alex G Oude Elferink, 'Governance Principles for Areas beyond National Jurisdiction' (2012) 27 *The International Journal of Marine and Coastal Law* 205–259, pages 225-227; Boyle (n 97), pages 573-574; Bénédicte Sage-Fuller, *The Precautionary Principle in Marine Environmental Law: With Special Reference to High Risk Vessels* (Routledge, 2013), pages 68-70; Birnie, Boyle, and Redgwell (n 4), pages 388-389;; David Freestone, 'International Fisheries Law Since Rio: The Continued Rise of the Precautionary Principle' in Alan Boyle and David Freestone (eds), *International Law and Sustainable Development: Past Achievements and Future Challenges* (Oxford University Press, 2001) 135–164, pages 135–164.

the UN General Assembly invited:

> the relevant global and regional bodies, in accordance with their mandates, to investigate urgently how to better address, on a scientific basis, including the application of precaution, the threats and risks to vulnerable and threatened marine ecosystems and biodiversity in areas beyond national jurisdiction; how existing treaties and other relevant instruments can be used in this process consistent with international law, in particular with the Convention [on the Law of the Sea], and with the principles of an integrated ecosystem-based approach to management […].[117]

This call, together with the endorsement by judicial bodies and supportive arguments by numerous scholars, leaves no doubt that the law of the sea has moved on. The precautionary approach can be interpreted into the LOSC. The next chapter examines the manner in which the ISA itself has confirmed the applicability of the precautionary approach in the seabed mining context. Before turning to that discussion, however, the next section offers a brief overview of the current limits of the ISA's mandate with particular reference to the issue of bioprospecting.

4.5 The Debate About Bioprospecting and Marine Scientific Research in the Context of the ISA's Mandate

A discussion about the ISA's environmental mandate would not be complete without a brief look at the current debate around bioprospecting, which also affects the ISA's mandate. As noted in Section 4.3.2 above, the economic potential of marine genetic resources has sparked a fierce debate over who should have access to these resources and how the benefits might be shared. Although a detailed analysis of the debate is beyond the scope of this thesis, this section outlines how bioprospecting is linked with the ISA's environmental obligations as well as its mandate to conduct marine scientific research. It should be noted that there is no agreed definition of bioprospecting but it broadly involves the search for and usage of genetic material for commercial purposes.[118]

The LOSC does not specifically regulate bioprospecting as it predates the discovery of the economic potential of marine genetic resources.[119] Nonetheless, there is, as Scovazzi formulates it, 'an inextricable factual link between the protection of the deep sea-bed environment (including its biodiversity), marine scientific research and bioprospecting.'[120] The ISA has established competencies with respect to the first two activities. Its environmental protection mandate is discussed in Section 4.3.2 above. Its competencies with respect to marine scientific

[117] UNGA, UN Doc A/RES/58/240 (5 March 2004), paragraph 52 (emphasis added).

[118] David Leary et al, 'Marine Genetic Resources: A Review of Scientific and Commercial Interest' (2009) 33 *Marine Policy* 183-194.

[119] Armas-Pfirter (n 58), pages 303-304.

[120] Scovazzi (n 51), page 384.

research are summarised here.

Pursuant to Article 143(2) LOSC, the Authority is obliged to promote and encourage the conduct of marine scientific research in the Area, and coordinate and disseminate the results. As such, the ISA serves as a focal point for deep sea research.[121] The IA classifies this obligation as a priority focus to be pursued before the start of the exploitation phase and highlights the need to place 'particular emphasis on research related to the environmental impact of activities in the Area.'[122] A further priority task for the ISA is to acquire scientific knowledge and monitor the developments in marine technology 'in particular technology relating to the protection and preservation of the marine environment.'[123] Additionally, the ISA is mandated to carry out marine scientific research itself 'concerning the Area and its resources' and may enter into contracts for that purpose.[124]

In addition to the ISA's mandate, all states parties also have a right to conduct marine scientific research[125] in ABNJ,[126] including the Area.[127] States are to promote international cooperation in such research, which may include participating in international programmes.[128] In particular, they are required to cooperate in and promote research about pollution of the marine environment.[129] In fact, the UN General Assembly has recently called upon

> States, individually or in collaboration with each other or with competent international organizations and bodies, to continue to strive to improve understanding and knowledge of the oceans and the deep sea, including, <u>in particular, the extent and vulnerability of deep sea biodiversity and ecosystems</u>, by increasing their marine scientific research activities in accordance with the Convention.[130]

Against the background of the ISA's mandate over environmental protection and marine scientific research, the question is whether the ISA has any competencies with respect to bioprospecting?[131]

Here, the starting point must be whether bioprospecting might be regarded as marine scientific

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[121] Satya Nandan, 'Administering the Mineral Resources of the Deep Seabed' in David Freestone, Richard Barnes, and David Ong (eds) *The Law of the Sea: Progress and Prospects* (Oxford University Press, 2006) 75-92, page 82.

[122] IA, annex section 1(5)(h)

[123] IA, annex section 1(5)(i).

[124] LOSC, article 143(2).

[125] For a discussion on the interplay between marine scientific research and the obligation to protect the marine environment see Verlaan (n 70).

[126] LOSC, articles 87(1)(f), 238, 257

[127] LOSC, article 143(3), 256.

[128] LOSC, articles 143(3), 242.

[129] LOSC, article 200.

[130] UNGA, UN Doc A/RES/68/70 (9 December 2013), paragraph 222 (emphasis added).

[131] See for example Lyle Glowka, 'Putting marine scientific research on a sustainable footing at hydrothermal vents' (2003) 27(4) *Marine Policy* 303–312; Armas-Pfirter (n 58); Scovazzi (n 51).

research in the Area. Whilst research in the high seas can be carried out freely, research in the Area, pursuant to Article 143(1) must be ‘carried out exclusively for peaceful purposes and for the benefit of mankind as a whole, in accordance with Part XIII.’[132] The question then is whether bioprospecting, given that many marine genetic resources occur around the international seabed, that is the Area, falls under Article 143(1). This raises two questions. The first links back to the aforementioned debate in Section 4.3.2 around whether or not marine genetic resources are part of the Area or the water column. The reality likely lies somewhere in between, since several of these species, many of which remain unknown at present, will impudently ignore imaginary delineations drawn by lawyers and politicians.

Second, it would appear from the non-restrictive wording of Article 143(1) that research in the Area is not limited to mineral resources. Instead, as Armas-Pfirter highlights, it refers to research in the entire geographical space of the Area[133] including its living resources. Thus, bioprospecting could in principle be subject to Article 143(1) provided that marine genetic resources are understood as forming part of the Area. However, the mandate of the ISA has been defined narrowly with a focus on mineral resources.[134] Its current mandate extends to the protection of the entire marine environment, including marine genetic resources and their habitat, yet only from the harmful effect of seabed mineral mining activities.[135]

Nonetheless, the ISA’s work is relevant for bioprospecting activities. Research carried out in the context of prospecting or exploration for minerals can also provide valuable scientific knowledge or result in the discovery of new genetic resources. Indeed, in order to establish environmental baselines to assess the impact of mining activities, the flora and fauna present at a potential mining site need to be catalogued and studied. The unresolved question is whether any conditions apply with respect to contractors commercialising any genetic information they discover during mineral exploration work. Thus, whilst the competencies of the ISA do not, at present, extend to all aspects of bioprospecting, in particular the questions of sharing economic benefits derived from bioprospecting, the ISA’s work inevitably affects both research into marine genetic resources around mineral deposits and the conservation of these living organisms from seabed mining, for example around hydrothermal vents.

In theory, the ISA’s mandate could be expanded in the future to specifically include bioprospecting. In this context, a number of states and non-governmental organisations have been lobbying for a new international agreement, possibly an implementing agreement to the

[132] LOSC, article 143(1) (emphasis added).
[133] Armas-Pfirter (n 58), page 299.
[134] Chapter 3.3.
[135] LOSC, article 145; Section 4.3.2.

LOSC, to regulate the protection of marine biodiversity in ABNJ,[136] including marine genetic resources.[137] Such an agreement could potentially establish a system of access to and benefit sharing of marine genetic resources and define the role of the ISA in this system.[138]

However, opinions over the desirability of such an agreement diverge.[139] Momentum was gained in 2011, when for the first time the EU and the G77[140] plus China and Mexico agreed on a common position favouring a 'package deal' addressing issues concerning marine scientific research, marine protected areas, environmental impact assessments, capacity-building and the transfer of marine technology.[141] The UN-based *BBNJ Working Group*[142] recommended the initiation of a process to establish a legal framework for marine biodiversity. After lengthy negotiations, in January 2015, the *BBNJ Working Group* adopted a formal recommendation to develop a legally binding agreement,[143] which was adopted by the UN General Assembly in June 2015.[144] A preparatory committee will work from 2016 to 2017 to '*make substantive recommendations to the General* Assembly on the elements of a draft text of an international legally binding instrument under the [LOSC].'[145] Subsequently, the UN General Assembly will 'decide on the convening and on the starting date of an intergovernmental conference, under the auspices of the United Nations, to consider the recommendations of the preparatory committee on the elements and to elaborate the text of an international legally-binding instrument under the Convention.'[146] A new agreement, if and when it will be adopted, could affect the ISA's mandate with respect to the protection of the marine environment in ABNJ but also bioprospecting. However, it will likely take several years until an agreement is reached.[147]

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136 BBNJ Working Group, UN Doc A/69/780* (13 February 2015); BBNJ Working Group, UN Doc A/66/119 (30 June 2011), paragraph 42.

137 For a discussion of the current framework for marine biodiversity in ABNJ, see Robin M Warner, 'Conserving Marine Biodiversity in Areas beyond National Jurisdiction: Co-Evolution and Interaction with the Law of the Sea' (2014) 1 *Frontiers in Marine Science* 1–11; Jeff Ardron et al, 'The Sustainable Use and Conservation of Biodiversity in ABNJ: What Can Be Achieved Using Existing International Agreements?' (2014) 49 *Marine Policy* 98–108.

138 For a detailed discussion on the various options, see Elisabeth Druel and Kristina M Gjerde, 'Sustaining Marine Life beyond Boundaries' (2014) 49 *Marine Policy* 90–97, 93; David Leary, 'Moving the Marine Genetic Resources Debate Forward: Some Reflections' (2012) 27 *The International Journal of Marine and Coastal Law* 435–448.

139 See for example UN Doc A/67/95 (n 57), paragraph 41-47; Elisabeth Druel et al, *A Long and Winding Road - International Discussions on the Governance of Marine Biodiversity in Areas beyond National Jurisdiction* (Studies No 07/13, IDDRI, 2013), page 23-33.

140 The Group of 77 is a group of states that cooperate at UN level <www.g77.org>.

141 UN Doc A/66/119 (n 136), paragraphs 17, 42; Druel et al (n 139), page 23.

142 Chapter 1.2.3.

143 UN Doc A/69/780* (n 136).

144 UNGA, UN Doc A/RES/69/292 (19 June 2015).

145 UN Doc A/69/780* (n 136), paragraph 1(e).

146 Ibid.

147 For a discussion of the recent developments, see Julien Rochette et al, 'A New Chapter for the High Seas?' [2015] *IDDRI Issue Brief No 02/15.*

Importantly, the current environmental mandate of the ISA exists independently of these ongoing discussions for a potential new implementing agreement. Regardless of any future developments, the ISA is already under an obligation to ensure that seabed mining, as a new human activity with the potential to have serious impacts on marine biodiversity, does not become another item on the list of perils to the marine environment.

4.6 Conclusion

During early discussions for a potential international regime for seabed mining, it was already recognised that environmental damage from seabed mining will have to be regulated and minimised. Throughout the negotiations for the LOSC and the IA widespread awareness of the urgent need to address environmental concerns increased. To address this concern, the LOSC incorporated a broad obligation on states to protect and preserve the marine environment. In order to integrate Part XI with the *Convention's* environmental conservation objective, the LOSC confers upon the ISA a far-reaching environmental mandate to take such measures as the ISA considers 'necessary' to protect the marine environment, as a broad ecological space, from harm caused by seabed mining. The IA further strengthens this mandate by identifying environmental protection as a priority issue. Although the LOSC does not explicitly require the ISA to apply the precautionary approach, it is clear that such obligation can now be interpreted into the Convention.

Consequently, the ISA is equipped with both a mandate to organize, carry out, and control seabed activities in the Area on behalf of humankind as a whole and to protect the marine environment, through a precautionary approach. It is the ISA's responsibility to balance both interests and to fill the legal gaps left by the LOSC and the IA with respect to specific environmental measures and ways to implement these. The mandate to take 'necessary measures' enables the ISA to think outside the box and proactively develop environmental management standards for seabed mining to fulfil the broad objectives of the LOSC and the IA. As the next chapter discusses, the first step in implementing its broad environmental mandate is for the ISA to adopt specific rules, regulations, and procedures forming part of the Mining Code.

Chapter 5: Developing the ISA's Environmental Mandate Through the Mining Code

5.1 Introduction

'An excellent example of the way in which the Regulations significantly develop the legal regime for the Area is the section on the protection of the marine environment.'[1]

The core question of this thesis is: whether, and in what manner and to what extent, is the ISA implementing the precautionary principle? The previous chapters provide the background analysis to this question. Chapters 1 and 2 discuss the context for this thesis regarding the environmental risks of seabed mining and the precautionary principle respectively. Chapter 3 introduces the ISA's institutional competences and decision-making processes and Chapter 4 discusses the environmental mandate of the ISA.

This chapter begins to formulate the answer to this core research question through an analysis of the manner in which the ISA has developed the legal framework of its environmental obligations. As Chapter 4 demonstrated, the precise content of the legal framework for seabed mining, including the framework for the protection of the marine environment from the adverse consequences of seabed mining, was left to be developed by the ISA. In order to do so, the ISA was equipped with law-making powers.

Utilising these powers, the ISA is continuously developing the Mining Code, a collective term for the regulations and recommendations that sets out the detailed rules, regulations, and procedures for prospecting, exploration, and exploitation of deep seabed minerals in the Area. The Mining Code thus represents the manifestation of the ISA's interpretation of its environmental mandate under the LOSC and the IA in line with developments in international law, including the need to apply the precautionary principle. In adopting the Mining Code, the ISA develops its obligations further and adds specific environmental measures and standards that can integrate findings from scientific research. Thus, adoption of the Mining Code represents the first step in the ISA's implementation of its environmental mandate. However, implementation does not stop there. As discussed in Chapter 2.1, implementation of the precautionary principle requires more than its mere inclusion into policy or legislative schemes.[2] Effective implementation of the precautionary principle also requires its application in practice

[1] James Harrison, *Making the Law of the Sea: A Study in the Development of International Law* (Cambridge University Press, 2011), page 137.

[2] Elizabeth Fisher, Judith S Jones, and René von Schomberg, 'Implementing the Precautionary Principle: Perspectives And Prospects' in Elizabeth Fisher, Judith S Jones, and René von Schomberg (eds), *Implementing the Precautionary Principle: Perspectives And Prospects* (Edward Elgar Publishing, 2006) 1–16, page 1.

through procedural, institutional and protective measures. Part III of this thesis analyses, in detail, the manner in which the ISA is implementing precaution in practice. By way of precursor, this chapter focuses on the prior issue which is an examination of the manner in which the ISA is developing the 'legislative aspects' of its environmental mandate through the exercise of its law-making powers.

The chapter begins with a discussion of the ISA's law-making powers in Section 5.2. Section 5.3 then introduces the Mining Code including the future exploitation regulations currently being developed. The core analysis, in Section 5.4, examines the extent to which the ISA has developed its environmental obligations through the Mining Code by analysing the specific environmental measures integrated into the Mining Code. The analysis finishes by demonstrating how the precautionary approach has been specifically incorporated into the Mining Code and examining the precautionary thresholds applicable in the ISA context.

5.2 Law-making Powers of the ISA

Adopting the Mining Code is the primary process through which the ISA can develop the seabed mining regime. This core competence was foreseen from the start of negotiating the regime. The 1970 *Draft United Nations Convention on the International Sea-Bed Area,* submitted by the US, foresaw that the 'International Seabed Resource Authority shall prescribe Rules and Recommended Practices […] to ensure […] [t]he protection of the marine environment against pollution arising from exploration and exploitation activities.'[3]

Building on these early suggestions, the LOSC requires the ISA to adopt rules, regulations, and procedures for all aspects of prospecting, exploration, and exploitation in the Area,[4] including the effective protection of the marine environment.[5] Furthermore, the ISA must adopt rules, regulations, and procedures for its financial management and internal administration[6] and for the equitable sharing of the financial benefits of seabed mining.[7]

The role of these rules, regulations and procedures is to concretise the legal framework provided by the LOSC and general international law by providing specific and detailed content to the general obligations. Moreover, owing to their binding nature, these rules, regulations and procedures are themselves a source of law and legal obligations. In addition, because of their authoritative status, the environmental standards they set also become benchmarks for domestic

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[3] UNGA, UN Doc A/Ac.138/25 (3 August 1970), article 23.

[4] LOSC, articles 137(2), 160(2(f),(ii) 162(2)(o)(ii), 209, annex III article 17(1). For a detailed discussion on the law-making powers of the ISA, see Harrison (n 1), pages 122-146.

[5] LOSC, article 145.

[6] LOSC, articles 160(2)(f)(ii), 162(2)(o)(ii).

[7] LOSC, articles 82, 160(2)(f)(i), 162(2)(o)(i).

legislation on seabed mineral mining in areas under national jurisdiction.[8]

During the ISA Preparatory Commission negotiations, the chairman of the working group in charge of developing the draft regulations summarised their role pertinently, stating that the Mining Code 'was a regulatory, not a constitutional document. Although the code may be comprehensive and could be read independently from the Convention, it was not legally independent from the Convention.'[9] A 1984 background paper from the Secretariat of the Preparatory Commission stated this even more clearly:

> In the formulation of these rules, regulations and procedures, the primary objective should be to enable the Authority to better carry into effect the provisions of the Convention relating to the conduct of activities in the Area. The rules, regulations and procedures are subsidiary and supplementary to the Convention and are required to be drafted in greater detail and structured in such a way that they become in fact the day-to-day working instruments of the Authority.[10]

In implementing these provisions, the ISA adopts two types of documents, legally binding regulations and non-binding recommendations, which form part of the Mining Code. Although their distinction is discussed in detail in Section 5.3 below, it is necessary to differentiate them at this point because the following analysis explores the ISA's mandate to adopt binding regulations.

ISA regulations are significant in that they are *legally binding* on *all* member states. It is a general rule of international institutional law that international organisations (IOs) can only take binding external decisions, meaning those that 'extend beyond the mere functioning of the organization itself,'[11] if their constitutions expressly provide for it.[12] However, the formulations in constituent treaties are often ambiguous[13] and are not made clearer by the fact that IOs differ widely with respect to the binding character of their external decisions.[14] In the case of the ISA, the legally binding nature of its regulations is articulated in Articles 137 and 153:

> All rights in the resources of the Area are vested in mankind as a whole, on whose behalf the Authority shall act. These resources are not subject to alienation. The minerals recovered from the Area, however, <u>may only be alienated in accordance with this Part and the rules, regulations and procedures of the Authority</u>.[15]

[8] LOSC, article 208.

[9] Preparatory Commission for the ISA and ITLOS, LOS/PCN/L.16 (2 April 1985), paragraph 3.

[10] Preparatory Commission for the ISA and ITLOS, LOS/PCN/SCN.3/WP.1 (8 March 1984), paragraph 2.

[11] Henry G Schermers and Niels M Blokker, *International Institutional Law* (vol 5, Martinus Nijhoff Publishers, 2011), page 766.

[12] Ibid, page 825.

[13] Ibid, pages 823-828

[14] Ibid, page 838.

[15] LOSC, article 137(2) (emphasis added).

> Activities in the Area shall be organized, carried out and controlled by the Authority on behalf of mankind as a whole in accordance with this article as well as other relevant provisions of this Part and the relevant Annexes, and the rules, regulations and procedures of the Authority.[16]

These provisions enable the ISA to adopt detailed terms of seabed mining that are binding on the ISA, sponsoring states, and contractors.

This is significant because, as Schermers and Blokker observe in their comprehensive study on international institutions, '[f]ew constitutions allow international organizations to take binding external decisions.'[17] Some IOs are mandated to make decisions that are binding on all parties, except on those who raise objections. For example, the World Health Organization (WHO) can adopt regulations including on sanitary and quarantine requirements to prevent the spread of disease, international names for diseases, and standards for diagnostic procedures for international use.[18] These become binding on Members unless they object within a certain time-frame.[19] Similar procedures apply for the *International Commission for the Conservation of Atlantic Tunas*[20] and the *International Whaling Commission*.[21] However, given the discretion for members, these decisions 'more closely resemble conventions with a negative ratification procedure […] than binding acts of the organization.'[22] A similar evaluation may apply to the consultative meetings of the parties to the *London Dumping Convention* and the 1996 Protocol[23] that can adopt amendments to the annexes to the *London Dumping Convention*. Such amendments are binding after a certain period of time except for those parties that declare 'that they are not able to accept the amendment at that time.'[24]

In general, it can be observed that the reason for some IOs possessing law-making powers is to avoid the possibly severe consequences of sub-standard or non-compliant conduct by individual states and their nationals.[25] Examples include the WHO and the International Civil Aviation

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[16] LOSC, article 153(1) (emphasis added).

[17] Schermers and Blokker (n 11), page 825. See also Jan Klabbers, An Introduction to International Institutional Law (Cambridge University Press, 2009), pages 187, 200.

[18] *Constitution of the World Health Organization* (as amended), (adopted 22 July 1946, entered into force 7 April 1948) 14 UNTS 185, article 21.

[19] Ibid, article 22.

[20] *International Convention for the Conservation of Atlantic Tuna* (adopted 14 May 1966, entered into force 21 March 1969) 673 UNTS 63, article VIII.

[21] *International Convention for the Regulation of Whaling* (adopted 2 December 1946, entered into force 10 November 1948) 161 UNTS 72, article V(3).

[22] Schermers and Blokker (n 11), pages 794-795.

[23] *1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter* (adopted 7 November 1996, entered into force 24 March 2006) 36 ILM 1.

[24] *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter* (adopted 29 December 1972, entered into force 30 August 1975) 1046 UNTS 120, article XV(2); See also the amendment procedure in Article 16 of the *International Convention for the Prevention of Pollution from Ships* (adopted 2 November 1973, entered into force 2 October 1983) 1340 UNTS 184.

[25] Christopher W Pinto, 'The United Nations Convention on the Law of the Sea: Sustainable

Organization (ICAO). The latter has a mandate to establish rules on aircraft flight and manoeuvring over the high seas.[26] Moreover, it is authorised to adopt international standards and recommended practices inter alia for air navigation and air traffic control.[27] However, even the ICAO's founding agreement, the *Chicago Convention*, leaves room for parties to opt out by notifying the organisation immediately if it they find it 'impracticable' to comply with the measures.[28]

In contrast, ISA regulations are binding on all members without requiring individual consent and, more importantly, without the possibility for members to opt out. This is despite the fact that the regulations are drafted by the Legal and Technical Commission and adopted by the Council, in which a mere 36 out of over 160 member states can vote. Even though the regulations then have to be approved by the Assembly, in which all member states are represented and decisions are aimed to be taken by consensus, there is an option to ultimately adopt the regulations by majority vote.[29] These unusual and far-reaching competencies for an IO have been described as 'an unprecedented experiment in international law-making.'[30]

It must be noted that ISA regulations are binding on the ISA, contractors, and all member states regardless of their potential integration into domestic law. In contrast, decisions by the Organisation for Economic Co-operation and Development (OECD), for example, are not binding on any member 'until it has complied with the requirements of its own constitutional procedures.'[31] Nonetheless, if a member state sponsors a contractor under the ISA regime, the state has a due diligence obligation to ensure that the contractor complies with its obligations, which includes taking domestic legislative and administrative measures.[32] Such measures are not a prerequisite to obtaining an exploration contract with the ISA, but they are necessary to exempt the sponsoring state from liability for non-compliance under international law.[33]

The ISA's exceptional law-making competencies must be understood in the context of its mandate to give effect to the common heritage of mankind. Its role differs from that of other

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Development and Institutional Implications' in Peter Bautista Payoyo (ed) Ocean governance: Sustainable Development of the Seas (United Nations University Press, 1994) 3–27, 14.

[26] *Convention on International Civil Aviation* (adopted 7 December 1944, entered into force 4 April 1947) 15 UNTS 295, article 12.

[27] Ibid, articles 37, 54.

[28] Ibid, article 38; José E Alvarez, *International Organizations as Law-Makers* (Oxford University Press, 2005), page 223; Frederic L Kirgis, *International Organizations in Their Legal Setting* (2nd ed, West Publishing, 1993), page 303-309.

[29] Chapter 3.5.1.

[30] Harrison (n 1), pages 151-152.

[31] *Convention on the Organisation for Economic Co-Operation and Development* (adopted 14 December 1960, entered into force 30 September 1961) 888 UNTS 179, article 6(2).

[32] *SDC Advisory Opinion*, paragraphs 213-226.

[33] Ibid, paragraph 219.

IOs, which take decisions that affect the activities of governments, including within their jurisdictional zones, or the way in which states conduct their international relations; be it by determining which air traffic control signals should be used or setting standards to reduce marine pollution. In contrast, the ISA was established as the custodian or, as Pardo denoted it, the ‘trustee’[34] of the mineral wealth in areas beyond the jurisdiction of any single state. The ISA must represent not only its member states but act on behalf of mankind as a whole. Moreover, it focuses on a specific geographical area and determines the standards that must be complied with in order to access and mine minerals in that area.[35] If any single state could opt out of these standards, it would compromise the integrity of the common heritage of mankind.

In summary, the ISA possesses extensive and significant law-making powers. With its far-reaching competencies to adopt legally-binding regulations the ISA can substantially influence the legal regime for seabed mining in the Area, within the framework established by the LOSC and the IA. These powers provide the ISA with the flexibility to develop the legal regime in line with advances in marine sciences and mining technology. Moreover, the ISA’s law-making powers enable the legal regime to adapt to changes in international law and in social attitudes towards the parameters of mining this common heritage of humankind.

5.3 The Mining Code

Utilising its law-making powers the ISA has been developing the Mining Code. This section introduces both the regulations and recommendations that form part of the Mining Code, which have been adopted by the ISA and those that are currently being developed.

5.3.1 Exploration Regulations

As of July 2015, the ISA has adopted three sets of regulations: *Nodules Exploration Regulations*, *Sulphides Exploration Regulations,* and *Crusts Exploration Regulations* in 2000, 2010, and 2012 respectively. Each set of *Regulations* contains broadly similar provisions with some differences to account for the distinctive characteristics of each type of deposit. Whilst Part I defines the terms used in the *Regulations,* Part II specifies rules regarding prospecting. Part III describes the process of applying for an exploration contract and sets out the requirements for applications and the assessment thereof. Part IV addresses exploration contracts with the provisions closely following Annex III to the LOSC. Part V forms the focus

[34] UNGA, UN Doc A/C.1./PV.1516 (1 November 1967), paragraph 8.

[35] Boyle describes the character of the ISA's work as 'international resource management': Alan E Boyle, ‘Saving the World-Implementation and Enforcement of International Environmental Law through International Institutions’ (1991) 3(2) *Journal of Environmental Law* 229–245, page 240.

of this chapter as it enunciates rules on the protection and preservation of the marine environment. The remaining parts of the *Regulations* address confidentiality issues (Part VI), general procedures (Part VII), dispute settlement (Part VIII), a provision excluding exploration rights over resources other than those that are the focus of the *Regulations* (Part IX), and review options (Part X).

Importantly, the 'Contract for exploration' and the 'Standard clauses for exploration contract' are annexed to the *Regulations*. These basic terms apply to all contractors who obtain an exploration contract under the Regulations. However some important differences between the contractors' obligations remain. Notably, the five-year programme of activities, which is not publicly available, is individually developed by each contractor and annexed to the contract.[36] This programme sets out the specific activities the contractor will undertake in the following 5-year period. Each exploration contract is 15-years and comprises three programmes of activities.[37] Furthermore, contractors that obtained their respective exploration contracts in different years can be bound by different clauses. This is because both the standard clauses and the *Exploration Regulations* themselves are specifically incorporated into the contract.[38] As a result, if the *Regulations* are amended, these amendments do not apply to existing contractors, as they enjoy security of tenure pursuant to Article 153(6) LOSC. Contracts can only be revised with the consent of both the contractor and the ISA.[39] As discussed in Chapter 7.3, this is problematic with respect to the ISA's ability to require contractors to observe particular environmental standards.

Regulations can be amended as specifically provided for in Article 165(2)(g) LOSC, which requires the Legal and Technical Commission to keep the rules, regulations, and procedures under review and recommend amendments to the Council 'as it may deem necessary or desirable.' The *Regulations* themselves require that they be reviewed after 5 years or at any time 'if, in the light of improved knowledge or technology, it becomes apparent that the Regulations are not adequate.'[40] Amendments to the *Regulations* follow the same procedures as for the adoption of new regulations.[41] Pursuant to this procedure, the *Nodules Exploration Regulations* were amended in 2013, to bring them in line with the more recent *Exploration Regulations* for sulphides and crusts, and particularly the more rigorous environmental standards set therein.[42] In

36 *Exploration Regulations*, annex III schedule 2.

37 *Nodules Exploration Regulations*, regulation 28; *Sulphides* and *Crusts Exploration Regulations*, regulation 30.

38 *Exploration Regulations*, annex IV clause 1.

39 LOSC, annex II article 19; *Exploration Regulations*, annex IV section 24.

40 *Nodules Exploration Regulations*, regulation 42; *Sulphides* and *Crusts Exploration Regulations*, regulation 44.

41 Chapter 3.5.1.

42 ISA, ISBA/19/C/7 (9 April 2013).

order to align the three sets of *Exploration Regulations*, amendments were made in 2014 to the provision on application fees in the *Sulphides Exploration Regulations*[43] and the anti-monopoly clause in the *Nodules Exploration Regulation*.[44]

This clearly demonstrates the flexibility incorporated into the regulatory design, to ensure the seabed mining regime develops alongside new realities in ocean sciences, mining standards, social values, and international (environmental) law.

5.3.2 LTC Recommendations

Although not specifically provided for in the LOSC, the ISA develops non-binding recommendations in addition to its legally binding regulations in order to implement its law-making mandate. The difference is clearly stated in the standard terms for exploration contracts, which require contractors to 'comply' with the relevant *Exploration Regulations*, whilst only requiring them to 'observe, as far as reasonably practicable, any recommendations which may be issued from time to time by the Legal and Technical Commission.'[45] These recommendations are of a technical or administrative nature and provide a greater level of detail regarding the obligations of contractors, such as specifying the data to be collected by contractors in order to implement their obligation to establish environmental baselines at a potential mine site. As such, the recommendations can assist contractors in implementing the ISA's regulations.[46]

Although these recommendations are non-binding, they offer important guidance on what is expected of contractors. In practice, they may carry significant weight, not least because the same body that issues the recommendations also decides on whether to recommend approval of a new application for a mining contract.[47]

Interestingly, the competence to develop such recommendations rests exclusively with the LTC. Once adopted by the LTC, the recommendations must be reported to the Council, although the latter has no direct power to annul or amend recommendations. The Council may merely 'request' modifications or withdrawal if it finds a recommendation to be inconsistent with the intent and purpose of the corresponding regulations.[48] Nevertheless, as Harrison highlights, once the Council makes such a request, the recommendations 'will lose much of their persuasive

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[43] ISA, ISBA/20/A/10 (24 July 2014).

[44] ISA, ISBA/20/A/9 (24 July 2014).

[45] *Exploration Regulations*, annex IV section 13.2.

[46] *Nodules Exploration Regulations*, regulation 39(1); *Sulphides* and *Crusts Exploration Regulations*, regulation 41(1).

[47] Harrison (n 1), pages 141.

[48] *Nodules Exploration Regulations*, regulation 39(2); *Sulphides* and *Crusts Exploration Regulations*, regulation 41(2).

authority and there will be less incentive for investors to comply with them.'[49]

The first set of such recommendations was issued in 2002 and focused on assessing the possible environmental impacts arising from exploration work for polymetallic nodules.[50] The 2002 recommendations were revised in 2010[51] and subsequently developed further to incorporate exploration work for all three types of mineral deposits. Consequently, in 2013, the LTC adopted the *Recommendations for the guidance of contractors for the assessment of the possible environmental impacts arising from exploration for marine minerals in the Area* (*EIA Recommendations*).[52] The *EIA Recommendations* inter alia define the biological, chemical, geological and physical components which contractors have to sample and measure to establish environmental baselines,[53] and identify activities that require environmental impact assessment (EIA)[54] and those that do not require EIA.[55] The *EIA Recommendations* also suggest that specific guidelines will be developed on several other environmental protection measures in the future.[56] Further recommendations have been adopted with regards to the obligation of contractors to offer training programmes,[57] and the financial reporting obligations of contractors.[58]

5.3.3 Future Exploitation Regulations

In addition to the existing instruments that form part of the Mining Code, preliminary work on the first regulations for the *exploitation* of polymetallic nodules commenced in 2011.[59] This was prompted by the fact that the first six of the now over 25 exploration contracts granted by the ISA will expire in 2016.

In carrying out the considerable task of developing this comprehensive framework for the commercial-scale exploitation of minerals, the ISA issued a workplan for the formulation of the exploitation regulations[60] and commissioned a technical scoping study that provides a

[49] Harrison (n 1), page 142.
[50] ISA, ISBA/7/LTC/1/Rev.1** (13 February 2002).
[51] ISA, ISBA/16/LTC/7 (2 November 2010).
[52] ISA, ISBA/19/LTC/8 (1 March 2013).
[53] *EIA Recommendations*, paragraph 14-16.
[54] Ibid, paragraph 19.
[55] Ibid, paragraph 18.
[56] *Nodules Exploration Regulations*, regulations 18(b), 31(3)-(4), 32; *Sulphides* and *Crusts Exploration Regulations*, regulation 20(1)(b), 33(3)-(4), 34.
[57] ISA, ISBA/19/LTC/14 (12 July 2013).
[58] ISA, ISBA/21/LTC/11 (14 April 2015).
[59] ISA, ISBA/17/C/21* (21 July 2011), paragraph 20.
[60] ISA, ISBA/18/C/4 (25 April 2012).

comparative analysis of the core features of land-based mineral mining frameworks.[61] In 2014, the ISA also conducted an initial stakeholder survey to seek input regarding the development of the Mining Code.[62] In March 2015, taking into account the survey responses, the ISA published a first draft framework for the regulation of exploitation activities in the Area[63] as well as a *Discussion Paper on the Development and Implementation of a Payment Mechanism in the Area*.[64] Stakeholder feedback on both documents was invited and a revised draft framework was published in July 2015.[65]

From the outset, it was clear that environmental protection measures will be 'amongst the most important elements of such a framework'[66] for the exploitation of minerals. Whilst mineral exploration work can pose serious environmental risks,[67] particularly because it includes test mining, the most serious environmental impacts are expected to occur during exploitation work. This was reflected in discussions in the LTC for the development of the *Sulphides* and *Crusts Exploration Regulations*: 'While environmental considerations were discussed at length, there was agreement that greater attention is required when granting exploitation licenses rather than when granting exploration licenses and that, as such, some of the more critical questions could be addressed at a later date.'[68] Indeed the 2013 technical study argued that '[t]here will be a need for ISA to develop a separate set of environmental regulations governing mining.'[69]

The study also discusses the option of offering 'retention licenses' for those explorers who have to postpone their application for exploitation rights for various reasons. A retention license would enable them to retain exclusive exploration rights in return for payment.[70] However, this could provide incentives to obtain several exploration contracts early to reserve areas with high-grade mineral deposits and prevent others from accessing them. Again, the ISA has not yet addressed retention licenses.

Given that the development of exploitation regulations will require some time yet, but the first contracts expire in 2016, the ISA has adopted *Procedures and Criteria for the Extension of an*

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[61] Allen L Clark, Jennifer Cook Clark, and Sam Pintz, *Towards the Development of a Regulatory Framework for Polymetallic Nodule Exploitation in the Area (Technical Study No 11)* (ISA, 2013).

[62] ISA, *Developing a Regulatory Framework for Mineral Exploitation in the Area: Stakeholder Engagement* (February 2014) <http://www.isa.org.jm/files/documents/EN/Survey/ISA-SSurvey.pdf >.

[63] ISA, ISBA/Cons/2015/1 (March 2015).

[64] Ibid.

[65] ISA, *Developing a Regulatory Framework for Deep Sea Mineral Exploitation in the Area: Draft Framework, High Level Issues and Action Plan, Version II*, (15 July 2015) <https://www.isa.org.jm/files/documents/EN/OffDocs/Rev_RegFramework_ActionPlan_14072015.pdf>.

[66] ISBA/18/C/4 (n 60), paragraph 5.

[67] *EIA Recommendations*, paragraph 9.

[68] ISA, ISBA/10/C/4 (28 May 2004), paragraph 15.

[69] Clark, Cook Clark, and Pintz (n 61), page 33.

[70] Ibid, pages 29-31.

Approved Plan of Work for Exploration.[71] These allow extensions of exploration contracts of no more than five years, provided the contractor can demonstrate that for reasons beyond his control he was rendered unable to complete the exploration work, or that the prevailing economic circumstances do not justify proceeding to the exploitation stage.[72] Moreover, the contractor must submit the data and results obtained during exploration work, including a table summarising all environmental baseline data collected in accordance with the *EIA Recommendations*, which is then reviewed by the LTC.[73]

5.4 The ISA's Environmental Obligations as Developed by the Mining Code

As this thesis has demonstrated, the LOSC and the IA set the legal framework for the seabed mining regime and equip the ISA with a comprehensive environmental mandate. They also confer law-making powers upon the ISA to develop the seabed mining regime and fill the gaps left by the founding agreements. Building on these powers, the ISA has been developing the Mining Code.

An important element of the Mining Code is to develop specific environmental standards and protective measures. This was already foreseen during the work of the Preparatory Commission, when the Group of Technical Experts stated:

> The Group wishes to draw the attention of the Preparatory Commission to the importance of the environmental protection provisions of modern regulatory regimes. […] This part of the deep seabed mining regime has yet to mature and there are many details and procedures to be worked out.[74]

Responding to this necessity, Part V of the *Exploration Regulations* addresses environmental protection. However, as the then Chief of the Office of Legal Affairs at the ISA Secretariat observed in relation to the *Nodules Exploration Regulations*:

> The provisions relating to the protection and preservation of the marine environment were among the most controversial [provisions] to be addressed during the process of negotiation of the Regulations. Whilst, on the one hand, contractors and potential contractors strongly preferred an incremental approach to environmental regulation, with an emphasis on the need to gather more data during the exploration phase, other participants in the negotiations considered there was a need to take a precautionary approach to any activities from the outset. Ultimately, what is contained in the

[71] ISA, ISBA/21/C/19 (23 July 2015).

[72] Ibid, appendix I.

[73] Ibid, annex paragraph 9, appendix I.

[74] Preparatory Commission for the ISA and ITLOS, LOS/PCN/BUR/R.32 (1 February 1994), paragraph 29.

Regulations is somewhat of a mixture of the two approaches.[75]

This mixture is explored in the remainder of this chapter and in Chapter 7.3.

The environmental provisions in the *Exploration Regulations* can broadly be divided into the following five categories. First, the *Regulations* reiterate the obligation of the ISA to actively develop and implement environmental protection standards and to keep them under review.[76] Second, they identify applicable principles, such as the need to apply the precautionary approach.[77] Third, the *Regulations* extend the environmental obligations of states and the ISA to contractors, including private entities, who are not directly bound by the LOSC. The *Regulations* require that 'each contractor shall take necessary measures to prevent, reduce and control pollution and other hazards to the marine environment arising from its activities in the Area […].'[78] In order to give effect to this general obligation, each contractor must establish environmental baselines against which to assess the environmental impacts of his work, and a monitoring programme to continuously identify environmental challenges.[79] Fourth, they set out specific, substantive protection measures, such as establishing protected areas and requiring best environmental practices.[80] Lastly, the *Regulations* set out further details regarding the ISA's compliance and enforcement competencies[81] as well as the liability of each contractor for environmental damage.[82]

It will be recalled that Article 145 LOSC mandates the ISA to take 'necessary measures' to give effect to its environmental mandate. The aforementioned provisions of the *Exploration Regulations*, together with the *EIA Recommendations* provide some guidance as to the meaning of 'necessary measures.'[83] Nevertheless, these will likely change over time. In this context, when working on the *Exploration Regulations* for sulphides and crusts, the working group on

[75] Michael W Lodge, 'Environmental Regulation of Deep Seabed Mining' in Andree Kirchner (ed), *International Marine Environmental Law: Institutions, Implementation and Innovations* (Kluwer Law International, 2003) 49–59, page 54.

[76] *Nodules Exploration Regulations*, regulation 31(1); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(1); Chapter 4.3.2.

[77] *Nodules Exploration Regulations*, regulations 2(2), 5(1), 31(2)-(3); *Sulphides* and *Crusts Exploration Regulations*, regulations 2(2), 5(1), 33(2)-(3).

[78] *Nodules Exploration Regulations*, regulation 31(5); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(5).

[79] *Nodules Exploration Regulations*, regulation 32; *Sulphides and Crusts Exploration Regulations*, regulation 34.

[80] *Nodules Exploration Regulations*, regulation 21(6), 31(5); *Sulphides and Crusts Exploration Regulations*, regulations 23(6), 33(5); Chapters 5.4.2, 5.4.3.

[81] *Nodules Exploration Regulations*, regulation 33; *Sulphides and Crusts Exploration Regulations*, regulation 35.

[82] *Nodules Exploration Regulations*, regulation 30; *Sulphides and Crusts Exploration Regulations*, regulation 32.

[83] Satya N Nandan, Michael W Lodge, and Shabtai Rosenne, *United Nations Convention on the Law of the Sea, 1982: A Commentary, Volume VI* (Martinus Nijhoff Publishers, 2002) page 198.

environmental issues within the LTC 'considered that it was appropriate […] to reflect in the draft regulations the developments in international environmental law achieved since the adoption of the Convention in 1982.'[84] This evolutionary approach to environmental standards was also supported by the *SDC Advisory Opinion*[85] and it is envisaged in the *Exploration Regulations* themselves, which provide for further supplementary rules, regulations and procedures, 'in particular on the protection and preservation of the marine environment.'[86]

In sum, adopting and revising the Mining Code is a crucial way in which the ISA gives shape to its environmental mandate. The following sections explore in detail the aforementioned categories of environmental provisions. They sets out the specific obligations with respect to EIAs, monitoring of environmental effects, marine protected areas, best environmental practices, emergency orders and environmental liabilities, and of course, the obligation to apply the precautionary principle. The latter is reserved for the final section of this Chapter as it builds the foundation for and leads into to Part III of this thesis.

5.4.1 Assess and Monitor Environmental Impacts

The LOSC sets out the general obligation to prevent, reduce and control pollution and other hazards to the marine environment arising from seabed mining activities.[87] The ISA extended this obligation to contractors[88] and developed it further by requiring each contractor to carry out three distinct yet related tasks, namely to establish environmental baselines, carry out EIAs, and continuously monitor the effects of its activities on the marine environment. Each of these obligations is discussed individually in the following sections.

5.4.1.1 Environmental Baselines

The necessity for environmental baselines against which the environmental effects of seabed mining activities can be assessed was first specifically stated in the IA. Section 1(7) of the Annex to the IA requires that every application 'for approval of a plan of work shall be accompanied by […] a description of a programme for oceanographic and baseline environmental studies in accordance with the rules, regulations and procedures adopted by the Authority.' The *Exploration Regulations* incorporate this requirement and specifically add that

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[84] ISA, ISBA/9/C/4 (1 August 2003), paragraph 7.

[85] *SDC Advisory Opinion*, paragraphs 136-137; Chapter 4.4.

[86] *Exploration Regulations*, regulation 1(5).

[87] LOSC, articles 194-196, 208-209.

[88] *Nodules Exploration Regulations*, regulation 31(5); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(5).

the baseline data has to enable an assessment of the impacts of the proposed activities on biodiversity.[89] Moreover, the *Regulations* oblige every contractor to generally gather environmental baseline data and establish environmental baselines.[90]

The *EIA Recommendations*, adopted by the LTC, further specify the obligations by describing the procedure to be followed in the acquisition of baseline data and the data to be collected,[91] including data relating to 'physical, chemical, biological and other parameters that characterize the systems likely to be impacted by exploration and possible test-mining activities.'[92] Moreover, the *Recommendations* require that the 'best available technology and methodology for sampling should be used in establishing baseline data for environmental impact assessments.'[93] The annex to the *Recommendations* refers contractors to specific organisations that have developed best practices for data collection and analytical techniques.[94]

Importantly, the standard terms for exploration contracts specifically state that *prior to the commencement of exploration activities*, the contractor must submit '[d]ata that could be used to establish an environmental baseline against which to assess the effect of the proposed activities.'[95] As such, the establishment of environmental baselines is not only a contractual obligation but also a prerequisite for commencing exploration activities.

However, the Mining Code is unclear with respect to the specific point in time at which a contractor must submit such baseline data. As noted above, when applying for an exploration contract, a mere description of a programme for baseline studies is sufficient. The exploration contracts then require baseline data 'prior to the commencement of exploration activities.'[96] However, *exploration* is defined as including 'the carrying out of studies of the environmental, technical, economic, commercial and other appropriate factors that must be taken into account in exploitation.'[97] Consequently, environmental baseline data must be submitted sometime during the lifetime of an exploration contract, yet prior to start of exploration work. Similarly, the *EIA Recommendations* require contractors 'to provide the Secretary-General' with a status of regional and local environmental baseline data,'[98] without specifying the point at which the

[89] *Nodules Exploration Regulations*, regulation 18(b); *Sulphides* and *Crusts Exploration Regulations*, regulation 24(b).

[90] *Nodules Exploration Regulations*, regulation 32; *Sulphides* and *Crusts Exploration Regulations*, regulation 34.

[91] *EIA Recommendations*, paragraph 9.

[92] Ibid, paragraph 14.

[93] Ibid, paragraph 17, see also paragraphs 14-15, 34.

[94] Ibid, annex, paragraph 55.

[95] *Exploration Regulations*, annex IV section 5.2.

[96] Ibid.

[97] *Exploration Regulations*, Regulation 1(3)(b).

[98] *EIA Recommendations*, paragraph 27(q).

contractor must provide such data. This has proven to be problematic in practice with ISA reports having repeatedly called upon contractors to submit the required environmental baseline data[99] and, given a lack of transparency as discussed in Chapter 7.4, it is unclear whether such data has been submitted.[100] A lack of baselines, in turn, hinders not only the assessment of environmental impacts but also the development of the regulatory framework for mineral exploitation. This is discussed in detail in Chapter 7.2.3.1.

5.4.1.2 Environmental Impact Assessments

The obligation to perform EIAs for activities that could result in significant harm is an obligation under customary international law.[101] It is also closely linked to the precautionary principle with both concepts sharing a similar dilemma; although they are widely accepted, their content remains ambiguous. Indeed, the need for a clear framework concerning the scope and content of EIAs is being discussed in the context of developing a new agreement regarding the protection of marine biological diversity in areas beyond national jurisdiction (ABNJ).[102] Simultaneously, work is underway at the Conference of the Parties of the *Convention on Biological Diversity* specifically concerning the scientific and technical aspects relevant to EIAs in ABNJ.[103]

In general terms, an EIA is a process that results in a written report which guides decision-making and has several related functions:

> First, it should provide decision-makers with information on the environmental consequences of proposed activities and, in some cases, programmes and policies, and their alternatives. Second, it requires decisions to be influenced by that information. And, third, it provides a mechanism for

[99] ISA, ISBA/20/C/20 (16 July 2014), annex I paragraph 12; ISBA/17/C/21* (n 59), paragraph 13.

[100] Seascape Consultants, *Review of Implementation of the Environmental Management Plan for the Clarion-Clipperton Zone* (20 May 2014) <http://isa.org.jm/files/documents/EN/20Sess/LTC/CCZ-EMPRev.pdf>, page 10; ISBA/Cons/2015/1 (n 63), page 41.

[101] *SDC Advisory Opinion*, paragraphs 145, 147-149; Robin Warner, 'Oceans beyond Boundaries: Environmental Assessment Frameworks' (2012) 27 *The International Journal of Marine and Coastal Law* 481–499.

[102] BBNJ Working Group, UN Doc A/68/399 (23 September 2013), paragraph 34; Elisabeth Druel et al, *A Long and Winding Road - International Discussions on the Governance of Marine Biodiversity in Areas beyond National Jurisdiction* (Studies No 07/13, IDDRI, 2013), page 18.

[103] CBD, *Report of the Expert Workshop on Scientific and Technical Aspects Relevant to Environmental Impact Assessment in Marine Areas Beyond National Jurisdiction*, UNEP/CBD/EW-EIAMA/2 (20 November 2009); CBD, *Marine and Coastal Biodiversity: Revised Voluntary Guidelines for the Consideration of Biodiversity in Environmental Impact Assessments and Strategic Environmental Assessments in Marine and Coastal Areas*, UNEP/CBD/COP/11/23 (21 August 2012); Warner (n 101), pages 484-487.

> ensuring the participation of potentially affected persons in the decision-making process.[104]

With seabed mining being a potentially serious yet under-researched threat to marine biodiversity, EIAs form an important part of the ISA's environmental mandate. The basis of this mandate derives from the LOSC. Article 206 requires assessments of environmental impacts in general terms:

> When States have reasonable grounds for believing that planned activities under their jurisdiction or control may cause substantial pollution of or significant and harmful changes to the marine environment, they shall, as far as practicable, assess the potential effects of such activities on the marine environment and shall communicate reports of the results of such assessments in the manner provided in article 205.[105]

This provision applies to all human activities regardless of where they take place.[106] In addition to the obligation of states, the IA specifically introduced an obligation of *future* contractors to include an EIA with every application to the ISA for a plan of work.[107] The Seabed Disputes Chamber highlighted that the obligation of *sponsoring states* to ensure contractors conduct EIAs is not only a direct obligation under the *Exploration Regulations*[108] but also an element of due diligence,[109] making it applicable beyond the *Regulations*.[110]

The LOSC also obliges the ISA itself to conduct EIAs. Article 165(2)(d) creates a general obligation for the LTC to 'prepare assessments of the environmental implications of activities in the Area.'[111] Interestingly, the Mining Code does not specify details for the implementation of Article 165(2)(d) and the LTC has not yet prepared any such assessments.

However, the Mining Code has further developed the general obligation on *contractors* to conduct EIAs, requiring them in two instances. The first assessment is required as part of an application for an exploration contract. However, in contrast to the IA, the *Exploration Regulations* only require a preliminary EIA at that stage.[112] Whilst the LTC can only

[104] Philippe Sands and Jacqueline Peel, *Principles of International Environmental Law* (3rd ed, Cambridge University Press, 2012), page 601.

[105] LOSC, article 206; see also article 165(2)(d)-(f)

[106] Myron H Nordquist et al, United Nations Convention on the Law of the Sea, 1982: A Commentary, Volume IV (Martinus Nijhoff Publishers, 1991), page 124.

[107] IA, annex section 1(7).

[108] *Nodules Exploration Regulations*, regulation 31(6); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(6).

[109] *SDC Advisory Opinion*, paragraphs 141-145.

[110] Ibid, paragraphs 150.

[111] See also LOSC, article 165(2)(f) which highlights the need to take into account 'assessments of the environmental implications of activities in the Area' when drafting rules, regulations, and procedures for the Council.

[112] *Nodules Exploration Regulations*, regulation 18(c); *Sulphides* and *Crusts Exploration Regulations*, regulation 20(1)(c).

recommend approval of an application if a preliminary EIA has been submitted,[113] the meaningfulness of this EIA is questionable. The Mining Code does not specify requirements for this preliminary assessment, and the *EIA Recommendations* exclude most early-stage exploration activities from the need for EIAs.[114] Moreover, EIAs require environmental baseline data to assess impacts against, yet such data is only gathered later in the process, as discussed in Section 5.4.1.1 and Chapter 7.2.3.1.

Second, contractors must submit a full EIA prior to specific exploration activities. The standard clauses for exploration contracts provide the following:

> Prior to the commencement of exploration activities, the Contractor shall submit to the Authority:
>
> (a) An impact assessment of the potential effects on the marine environment of the proposed activities;
>
> (b) A proposal for a monitoring programme to determine the potential effect on the marine environment of the proposed activities; and
>
> (c) Data that could be used to establish an environmental baseline against which to assess the effect of the proposed activities.[115]

Whilst the original *Nodules Exploration Regulations*, adopted in 2000, only required EIAs prior to test mining,[116] this was later expanded to apply to all exploration activities.[117] However, the *EIA Recommendations* limit this provision again. They identify activities with the potential to cause serious environmental harm, and exclude other exploration activities from the scope of EIAs. As a result, EIAs are specifically required for drilling activities, artificial disturbance of the sea floor, specific sampling work, and test mining,[118] which can be carried out under an exploration contract.[119] For those activities, contractors are required to provide the ISA with environmental observations and measurements both during and after the specific activity[120] to establish the extent of the disturbance as well as the rates of recovery. A full EIA is required one year before a contractor commences any of these activities. Consequently, although the Mining Code has developed the obligation to conduct EIAs, it has not necessarily strengthened it. Indeed, the opposite may be argued.

In this context, the very first EIA, prior to dredging operations by one contractor, was submitted

[113] Ibid.
[114] *EIA Recommendations*, paragraph 18.
[115] *Exploration Regulations*, annex IV section 5.2.
[116] ISA, ISBA/6/A/18 (13 July 2000), annex IV section 5.5.
[117] *Nodules Exploration Regulations*, annex IV section 5.2.
[118] *EIA Recommendations*, paragraph 19-21.
[119] *Exploration Regulations*, regulation 1(3).
[120] *EIA Recommendations*, paragraphs 19, 29-30.

in 2014.[121] Despite the fact that several exploration contracts expire in 2016 and exploitation regulations are already being developed, the vast majority of contractors have not yet submitted EIAs. Moreover, since the assessments have to be provided when an exploration contract is already in force, the practical implications of EIAs deserve close attention. Chapters 7.2.3 and 7.3 examine this in detail.

In addition to EIAs, a similar concept called strategic environmental assessment (SEA) must be introduced. SEAs are somewhat less entrenched in international law[122] but no less relevant, especially in the context of a precautionary approach to seabed mining. The term describes the process of evaluating environmental consequences at an early stage, similar to the precautionary principle, when systems-scale policies or programmes are being developed.[123] The *Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context*, defines SEA as:

> the evaluation of the likely environmental, including health, effects, which comprises the determination of the scope of an environmental report and its preparation, the carrying-out of public participation and consultations, and the taking into account of the environmental report and the results of the public participation and consultations in a plan or programme.[124]

Consequently, SEA provides an overarching strategic framework within which EIAs for individual projects can be made. They are a necessary requirement for regional marine spatial planning,[125] including the establishment of marine protected areas.

Given the ISA's mandate to actively develop the Area regime, SEAs could, as Warner notes, 'become a component of discharging the ISA's obligations under Article 145 LOSC' which provides for 'necessary measures […] to ensure effective protection for the marine environment.'[126] Indeed, the ISA's mandate to conduct SEAs can be implied by Article 145 and Article 165(2)(d) and (f) LOSC which require the LTC to 'prepare assessments of the environmental implications' and take them into account when drafting the rules, regulations, and procedures. However, SEAs have not yet been incorporated into the Mining Code. The role

[121] ISBA/20/C/20 (n 99), annex I paragraph 14.

[122] Warner (n 101), page 489.

[123] *'Strategic environmental assessment is the formalized, systematic and comprehensive process of identifying and evaluating the environmental consequences of proposed policies, plans or programmes to ensure that they are fully included and appropriately addressed at the earliest possible stage of decision-making on a par with economic and social considerations'* (CBD COP06, *Decision VI/7,* UNEP/CBD/COP/DEC/VI/7 (19 April 2002), annex paragraph 1(b)).

[124] *Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context* (adopted 21 May 2003, entered into force 11 July 2010), Doc ECE/MP.EIA/2003/2, article 2(6).

[125] Michael Lodge et al, 'Seabed Mining: International Seabed Authority Environmental Management Plan for the Clarion–Clipperton Zone. A Partnership Approach' (2014) 49 *Marine Policy* 66–72, page 72.

[126] Warner (n 101), page 491.

of SEAs in the procedural framework of the ISA is examined in Chapter 7.2.1.

Closely related to the need for SEA is the integration of cumulative impacts into both SEAs and EIAs. These integrate the assessment of the environmental impacts both from multiple activities, of which seabed mining is only one, and numerous mining operations over large areas and sustained periods. Although cumulative impact assessments are not formally required by the LOSC or incorporated into the *Exploration Regulations*, the *EIA Recommendations* provide for the use of environmental baseline data for 'regional environmental management and assessment of cumulative impacts.'[127]

A last shortcoming of the current regulatory framework for EIAs is the failure to account for alternatives. EIAs ordinarily include the consideration of feasible alternatives, such as different 'project location, scales, processes, layouts, operation conditions and the 'no action' option.'[128] Similarly, in identifying possible precautionary responses to environmental risks posed by specific activities, the precautionary principle requires consideration of alternatives to such activities.[129] The relevant question is whether the desired outcome can be achieved through less harmful means. In the seabed mining context, this would comprise assessing the potential environmental impacts of various technologies or methods that form part of the mining process. Could some of these be replaced by safer methods, for example by using different technology or requiring a specific system to dispose of waste and tailings? On a strategic level, such assessment can also extend to the broader question of how to best achieve the level of mineral supply needed, including considering alternatives to seabed mining. This is further discussed in Chapter 7.2.1.

In sum, assessing the environmental impacts of seabed mining activities is a key part of the ISA's mandate. Its implementation in the Mining Code focuses on the requirements for contractors to conduct EIAs during their exploration work. At present, the *Exploration Regulations* omit SEA and cumulative impact assessments, as well as the assessment of alternatives methods to substitute particularly harmful activities. Additionally, the *Exploration Regulations* do not specify what action the ISA must take following the receipt of an EIA.

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[127] *EIA Recommendations*, paragraph 16; Chapter 7.2.1.

[128] John Glasson, Riki Therivel, and Andrew Chadwick, *Introduction to Environmental Impact Assessment* (Routledge, 2013), page 5; Roel Slootweg et al, *Biodiversity in EIA & SEA - Background Document to CBD Decision VIII/28: Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment* (Commission for Environmental Assessment, 2006), pages 29-38; *Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the Assessment of the Effects of Certain Plans and Programmes on the Environment*, OJ L 197/30, article 5(1).

[129] Commission of the European Communities, *Communication from the Commission on the precautionary principle*, COM(2000) 1 final (2 February 2000), page 17.

5.4.1.3 Monitoring Effects on the Marine Environment

To complement EIAs, the ISA's mandate also includes the continuous monitoring of seabed mining activities on the marine environment. Article 165(2)(h) LOSC requires the LTC to:

> make recommendations to the Council regarding the establishment of a monitoring programme to observe, measure, evaluate and analyse, by recognized scientific methods, on a regular basis, the risks or effects of pollution of the marine environment resulting from activities in the Area, ensure that existing regulations are adequate and are complied with and coordinate the implementation of the monitoring programme approved by the Council.

This monitoring programme corresponds to the general obligation of states, pursuant to Article 204 LOSC, to 'observe, measure, evaluate and analyse […] the risks or effects of pollution of the marine environment' and to 'keep under surveillance the effects of any activities which they permit or in which they engage in order to determine whether these activities are likely to pollute the marine environment.'

These obligations were developed further through the Mining Code. The *Exploration Regulations* require contractors to establish a programme for 'monitoring and evaluating the impacts of deep seabed mining on the marine environment.'[130] To this end, each plan of work for the exploration of minerals has to consider three phases of environmental studies: (a) environmental baseline studies; (b) monitoring in order to 'ensure that no serious harm is caused to the marine environment from activities during prospecting and exploration'; and (c) monitoring during and after testing collecting systems.[131] Both prospectors and contractors are required to cooperate with the ISA and the sponsoring state in the establishment and implementation of such monitoring programme.[132] The programmes require contractors to report annually on the implementation and results of the monitoring programme.[133] In sum, the monitoring programme should complement the obligation to conduct EIAs. The explanatory note to the *EIA Recommendations* summarise the linkage:

> The environmental studies to be conducted during exploration will include the monitoring of environmental parameters so as to confirm the findings that there is no serious environmental harm from any activities being conducted on the seabed, in mid-water and in the upper water column'[134]

The programme may, when required by the Council, also include the designation of 'impact

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[130] *Nodules Exploration Regulations*, regulations 31(6), 32; *Sulphides* and *Crusts Exploration Regulations*, regulations 33(6), 34.

[131] *EIA Recommendations*, paragraph 11.

[132] *Nodules Exploration Regulations*, regulations 5(2), 32(1); *Sulphides* and *Crusts Exploration Regulations*, regulations 5(2), 34(1).

[133] *Nodules Exploration Regulations*, regulations 32(2); *Sulphides* and *Crusts Exploration Regulations*, regulations 34(2); Exploration Regulations, annex IV sections 5.5, 10.2(a)

[134] *EIA Recommendations*, annex I paragraph 50.

reference zones' and 'preservation reference zones.'[135] The former will be mined, while the latter will provide pristine areas for comparisons of mining impacts and offer refuge for biodiversity.[136] The practical implementation of these zones presents challenges, as discussed in Chapter 6.3.4. Moreover, the implementation of the monitoring programme in general is examined in Chapter 7.6.

This section has demonstrated that both assessing and monitoring impacts of seabed mining activities on the marine environment form part of the ISA's environmental mandate. To facilitate their implementation, the Mining Code requires contractors to first establish environmental baselines against which to assess and evaluate the impacts. This is particularly important given the inchoate knowledge about deep ocean ecosystems and frontier nature of seabed mining. Interestingly, though, the Mining Code does not develop the ISA's mandate to coordinate, promote, and conduct marine scientific research in the Area, which could further help fill knowledge gaps. The *Exploration Regulations* place the onus of establishing baselines onto the contractors and are silent with respect to the potential role for the ISA in coordinating collaborative, targeted research projects to establish regional environmental baselines. In this context, the Mining Code could conceivably set out a greater role for the ISA in this respect.[137]

5.4.2 Marine Protected Areas

In addition to the obligation to assess and monitor impacts of seabed mining activities on the marine environment, the Mining Code provides for the use of spatial tools to manage and limit adverse environmental impacts from seabed mining. Indeed, as noted in Section 5.4.1, areas in which seabed mining is prohibited as a control measure, then named 'preservation reference zones', are part of the ISA's monitoring programmes.

Marine protected areas[138] (MPAs) are a core element of marine environmental management and feature strongly in the ongoing debate over the lack of protection of marine biodiversity in ABNJ. In order to place the obligations of the ISA in context, this section will first provide a brief summary of the discussion over spatial tools for marine biodiversity protection before analysing specifically the scope of the ISA's obligations in this regard.

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[135] *Nodules Exploration Regulations*, regulations 31(6); *Sulphides* and *Crusts Exploration Regulations*, regulations 33(6).

[136] Ibid; *EIA Recommendations*, paragraph 26(d).

[137] Chapter 6.2.

[138] The International Union for Conservation of Nature (IUCN) defines MPAs as spaces "managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. Management of MPAs can range from strictly protected nature reserves to multiple use areas managed to achieve a variety of conservation objectives" (N Dudley (ed) *Guidelines for Applying Protected Area Management Categories* (IUCN, Gland, Switzerland 2008)).

5.4.2.1 Marine Protected Areas in Areas Beyond National Jurisdiction

The need for a network of representative MPAs has been discussed in the ABNJ context as one of the main management measures that can help to protect both endemic or sedentary species but also migratory species by providing feeding and breeding grounds.[139] Several international instruments have called for the establishment of MPAs, including the *Convention on Biological Diversity*,[140] *Agenda 21*,[141] the *Aichi Biodiversity Targets*,[142] and the Rio+20 outcome document.[143] Moreover, the UN General Assembly has repeatedly called upon states and international organisations to integrate MPAs as a tool to protect marine biodiversity.[144] Indeed, the establishment of marine protected areas 'has been on the political agenda since the beginning of the 1990s.'[145]

Whilst the importance of MPAs is widely accepted, their implementation is hindered by a number of factors.[146] These include an absence of systematic procedures for EIAs, as noted in the previous section. Moreover, the absence of a global process for the establishment of MPAs further complicates any attempt to designate a protected area.[147] Most importantly, however, no one entity has jurisdiction in respect of the conservation and protection of the marine ecosystem and its living resources in ABNJ. The fact that the high seas are *res communis* and human activities in marine spaces are regulated through a sectoral approach has resulted in no one entity being mandated to declare areas that are fully protected from various human activities, such as fishing, pollution, and seabed mining. Instead numerous organisations have jurisdiction over specific marine areas or individual activities, yet leaving parts of the high seas with no

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[139] L M Wedding et al, 'Managing Mining of the Deep Seabed' (2015) 349 *Science* 144-145; Lee A Kimball, *The International Legal Regime of the High Seas and the Seabed Beyond the Limits of National Jurisdiction and Options for Cooperation for the Establishment of Marine Protected Areas (MPAs) in Marine Areas Beyond the Limits of National Jurisdiction (Technical Series No 19)* (Secretariat of the Convention on Biological Diversity, 2005); Kristina M Gjerde and Anna Rulska-Domino, 'Marine Protected Areas beyond National Jurisdiction: Some Practical Perspectives for Moving Ahead' (2012) 27 *The International Journal of Marine and Coastal Law* 351–373, page 353; Karen N Scott, 'Conservation on the High Seas: Developing the Concept of the High Seas Marine Protected Areas' (2012) 27(4) *The International Journal of Marine and Coastal Law* 849–857.

[140] CBD, article 8.

[141] *Agenda 21*, reprinted in UN Doc A/CONF.151/26/Rev.1 (12 August 1992), paragraph 17.86.

[142] CBD COP10, *Decision X/2*, UNEP/CBD/COP/DEC/X/2 (29 October 2010)

[143] UNGA, UN Doc A/Res/66/288 (27 July 2012), paragraph 177.

[144] UNGA, UN Document A/RES/68/70 (9 December 2013), paragraphs 208-213; UNGA, A/RES/63/111 (5 December 2008), paragraph 134.

[145] Erik J Molenaar and Alex G Oude Elferink, 'Marine protected areas in areas beyond national jurisdiction: The pioneering efforts under the OSPAR Convention' (2009) 5(1) *Utrecht Law Review* 5–20, pages 10-11.

[146] For a discussion of these factors, see Gjerde and Rulska-Domino (n 139); Kristina M Gjerde et al, *Regulatory and Governance Gaps in the International Regime for the Conservation and Sustainable Use of Marine Biodiversity in Areas beyond National Jurisdiction* (IUCN, 2008).

[147] Druel et al (n 102), page 16.

regional agreements in place.[148] This situation makes it difficult to establish and manage integrated MPAs across sectors[149] and to take cumulative impacts and additional effects from climate change and ocean acidification into account.

In order to address these issues, a number of states and non-governmental organisations have been lobbying for a new international agreement to regulate the protection of marine biodiversity in ABNJ, including through the establishment of MPAs.[150] Whilst the LOSC already provides for the preservation and protection of the marine environment, a new agreement could regulate the designation of multi-purpose MPAs in ABNJ to overcome both the jurisdictional gap and the fragmented, sectoral approach in the LOSC.[151] However, as discussed in Chapter 4.5, opinions over the desirability of a new agreement still diverge to some degree and, according to the current roadmap, it will likely be some years until a new agreement might be negotiated.

Instead of waiting until a new instrument might be adopted, the OSPAR Commission, established under the *OSPAR Convention*,[152] has already acted. Unlike most regional seas agreements, the *OSPAR Convention* covers significant areas outside the limits of national jurisdiction.[153] The OSPAR Ministerial Meeting in 2003 adopted a recommendation to establish a network of marine protected areas in the North-East Atlantic including in ABNJ.[154] Subsequently, seven protected areas have been established by OSPAR in the high seas,[155] although their practical effect might be impeded because the OSPAR Commission can neither regulate all uses in these areas, nor rely on strong enforcement mechanisms.[156]

In light of the repeated calls for, and indeed a gradual progress towards, establishing MPAs in

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[148] For an overview of the competencies, overlaps, and gaps of the various organisations, see Natalie C Ban et al, 'Systematic Conservation Planning: A Better Recipe for Managing the High Seas for Biodiversity Conservation and Sustainable Use' (2014) 7 *Conservation Letters* 41–54; Gjerde et al (n 146); Druel et al (n 102), pages 13-14.

[149] Jeff Ardron et al, 'The Sustainable Use and Conservation of Biodiversity in ABNJ: What Can Be Achieved Using Existing International Agreements?' (2014) 49 *Marine Policy* 98–108.

[150] BBNJ Working Group, UN Doc A/69/780* (13 February 2015).

[151] UN Doc A/69/780* (n 150), paragraph 12.

[152] *Convention for the Protection of the Marine Environment of the North-East Atlantic* (adopted 22 September 1992, entered into force 25 March 1998) 2354 UNTS 67.

[153] Ibid, article 1(a). For a map of the OSPAR regions see <http://www.ospar.org/content/regions.asp?menu=00020200000000_000000_000000>.

[154] *OSPAR Recommendation 2003/3 on a Network of Marine Protected Areas*. The recommendations were updated in 2010, see *OSPAR Recommendation 2010/2*.

[155] B C O'Leary et al, 'The First Network of Marine Protected Areas (MPAs) in the High Seas: The Process, the Challenges and Where Next' (2012) 36 *Marine Policy* 598–605; Petra Drankier, 'Marine Protected Areas in Areas beyond National Jurisdiction' (2012) 27(2) *The International Journal of Marine and Coastal Law* 291–350, pages 312-318; Molenaar and Oude Elferink (n 145).

[156] Nele Matz-Lück and Johannes Fuchs, 'The Impact of OSPAR on Protected Area Management beyond National Jurisdiction: Effective Regional Cooperation or a Network of Paper Parks?' (2014) 49 *Marine Policy* 155–166.

ABNJ despite the overall jurisdictional gap, the role of the ISA is significant. Its jurisdiction covers prospecting, exploration, and exploitation of seabed minerals on the entire international seabed, protection of the marine environment from the effects of such activities, and marine scientific research in the Area. Although its mandate concentrates on seabed mining and does not allow for regulation of deep sea fishing or other destructive activities, the ISA can make a significant contribution towards establishing networks of marine protected areas[157] not least because it has an extensive environmental mandate, law-making powers, an established institutional framework, and enforcement powers.[158]

5.4.2.2 Mandate of the ISA to Declare Marine Protected Areas

The LOSC does not mention MPAs specifically and the ISA has not yet included them in the Mining Code. However, the LOSC indirectly provides for the protection of certain areas from seabed mining activities, which was developed further in the Mining Code as the following analysis demonstrates.

In the context of assessing applications for exploration contracts, the ISA Council has, under Article 162(2)(x) LOSC, the power to disapprove areas for *exploitation* in cases where ‘substantial evidence indicates the risk of serious harm to the marine environment.’ The LTC has the corresponding task to recommend such action.[159] Moreover, the *Exploration Regulations* require the LTC to not recommend approval of a plan of work for *exploration* if it covers an area disapproved for *exploitation* under Article 162(2)(x).[160] Similarly, prospecting shall neither be undertaken in areas disapproved for exploitation, nor if there is substantial evidence indicating a risk of serious harm to the marine environment.[161] Consequently, once an area has been disapproved for exploitation on environmental grounds, it is also closed for subsequent exploration and prospecting activities. Given that this measure can result in the prohibition of seabed mining activities in a specific area, it may be regarded as a spatial management tool. This power is consistent with the obligation set out in Article 194(5) LOSC, which requires states to ‘protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life.’[162]

Nonetheless, the scope of this mandate is limited by the fact that closing an area for mineral

[157] Stuart Kaye, ‘Implementing high seas biodiversity conservation: global geopolitical considerations’ (2004) 28(3) *Marine Policy* 221–226, page 225.
[158] Chapters 3, 5.2.
[159] LOSC, article 165(2)(l).
[160] *Nodules Exploration Regulations*, regulation 21(6); *Sulphides* and *Crusts Exploration Regulations*, regulation 23(6).
[161] *Exploration Regulations*, regulation 2
[162] LOSC, article 194(5).

exploitation work requires the presence of ‘substantial evidence’ for the risk of serious harm. Neither the LOSC nor the *Exploration Regulations* define what is meant by substantial evidence. In any case, such evidence would likely be acquired through the compulsory EIAs and monitoring programme required during the exploration phase.[163] However, the same standard of evidence applies to prospecting activities, which although regulated by the *Exploration Regulations*, is largely conducted freely in the form of marine scientific research. Requiring ‘substantial evidence’ in the prospecting context sets a high evidentiary threshold which appears impracticable given both the early stage of the activities and the high degree of uncertainty over deep sea ecosystem processes. In fact, setting a high evidentiary burden could be argued to defeat the purpose of the precautionary approach because the very nature of the approach implies the existence of uncertainty, arguably rendering it impossible to provide substantial evidence. This holds true especially for a preliminary activity such as prospecting. The notion of evidence implies the need for prospectors to carry out some form of EIA to be able to determine whether serious harm might arise.[164] However, neither do the *Regulations* require future prospectors to undertake such EIAs, nor would it always be feasible to acquire such data given the early stages of deep sea scientific research. As of 2015 no areas have been disapproved either for prospecting, exploration, or exploitation, not least because the exploitation phase is yet to commence. However nine protected areas have been established as discussed in Chapter 6.3.1.

What remains unclear, however, is whether areas may only be disapproved for seabed mining upon receipt of an application for exploitation, or whether the ISA may use Article 162(2)(x) to proactively identify relevant areas and disapprove mining activities therein. However, reliance on Article 162(2)(x) is not necessary in order to proactively establish MPAs as Article 145 grants broad powers to the ISA to take ‘necessary measures’ to ensure marine environmental protection.[165] The LTC has the specific obligation to make recommendations to the Council *on ‘the protection of the marine environment, taking into account the views of recognized experts in that field.’*[166] There are no restrictions as to the focus or form of such recommendations. As such, the LTC is, in principle, able to recommend the establishment of MPAs. The Council, under Article 162 LOSC, has the competence to establish specific policies ‘on any question or matter within the competence of the Authority’ and can implement recommendations from the

[163] Chapter 5.4.1.

[164] Harrison (n 1), page 138.

[165] Michael W Lodge, ‘Some Legal and Policy Considerations Relating to the Establishment of a Representative Network of Protected Areas in the Clarion-Clipperton Zone’ (2011) 26(3) *The International Journal of Marine and Coastal Law* 463–480; Drankier (n 155), pages 294-295.

[166] LOSC, article 165(2)(e)

LTC with regard to spatial management.[167] Indeed, it is on this basis that the ISA has established MPAs in the Clarion-Clipperton Zone.[168]

The Mining Code provides for a further way in which particular areas of seafloor may be protected from seabed mining. The *Exploration Regulations* require that LTC

> shall develop and implement procedures for determining, on the basis of the best available scientific and technical information […] whether proposed exploration activities in the Area would have serious harmful effects on vulnerable marine ecosystems and ensure that, if it is determined that certain proposed exploration activities would have serious harmful effects on vulnerable marine ecosystems, those activities are managed to prevent such effects or not authorized to proceed.[169]

The *Exploration Regulations* for sulphides and crusts specifically add ecosystems associated with hydrothermal vents, seamounts, and cold water corals as examples for vulnerable marine ecosystems.[170] This provision could ultimately allow for exploration work to be prohibited in areas of vulnerable ecosystems.

These tasks are not specifically provided for under the LOSC, although a justification for such measures may be implied from Articles 145, 194(5), and 197. Article 145 provides for the taking of 'necessary measures' specifically for the 'prevention of damage to the flora and fauna of the marine environment.' Similarly, Article 194(5) requires the protection and preservation of 'rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life.' Moreover, Article 197 requires states to take into account '*characteristic regional features'* when elaborating international rules and standards for marine environmental protection.

These provisions were first included in the *Sulphides Exploration Regulations,* adopted in 2010. They mirror the language used in UN General Assembly Resolution 61/105, which calls upon regional fisheries management organizations to assess whether individual bottom fishing activities would have significant adverse impacts on vulnerable marine ecosystems.[171] If found to have such impacts, bottom fishing must also be 'managed to prevent such impacts, or not authorized to proceed.'[172] Building on this Resolution, the FAO has recently commenced the 'Global Sustainability Fisheries Management and Biodiversity Conservation in Areas Beyond National Jurisdiction' programme.[173] It comprises a programme specifically aimed at reducing

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[167] See also Lodge (n 165).

[168] Chapter 6.3.1.

[169] *Nodules Exploration Regulations,* regulation 31(4).

[170] *Sulphides* and *Crusts Exploration Regulations*, regulation 33(4).

[171] UNGA, UN Doc A/RES/61/105 (8 December 2006), paragraph 83(a), (c).

[172] Ibid; see also UNGA, UN Doc A/RES/64/72 (19 March 2010), paragraphs 114-130.

[173] The programme was approved by the Council of the Global Environment Facility (GEF) in November 2011. The FAO coordinates its implementation in close collaboration with inter alia the UN

the impact of deep sea fisheries on biodiversity in the deep oceans. Such coordination of conservation efforts will be necessary, not least because the aforementioned ecosystems occupy space on both the seafloor and in the water column. Given the sectoral fragmentation of ocean governance, it will be necessary for the ISA to coordinate its efforts with respect to seabed mining in the Area with other organisations that manage further activities that impact these ecosystems.

In sum, it is widely accepted that spatial tools, especially MPAs, must be part and parcel of efforts to protect the resilience of the marine environment and its biodiversity from ever increasing human pressure on the oceans. However, the sectoral approach taken in the LOSC fragments ocean governance into various specific regimes, leaving a jurisdictional gap and a lack of competence to establish integrated, multi-purpose MPAs in ABNJ. Discussions are underway for a potential new agreement addressing this and other management aspects for marine biodiversity in ABNJ. Nonetheless, regardless of the outcome and in default of a new agreement, the ISA plays a central role in protecting marine biodiversity from human interference. The ISA has the competence to establish MPAs, albeit not expressly stated in the regulatory framework. Moreover, it has developed some of its environmental obligations to include special measures for the protection of vulnerable marine ecosystems. The question now is whether these are implemented in practice, which is discussed in Chapter 6.4.

5.4.3 Best Environmental Practices

A further obligation not specifically contained in the LOSC, yet integrated into the *Exploration Regulations* is the requirement for the ISA and sponsoring states,[174] as well as for prospectors[175] and contractors[176] to apply best environmental practices (BEP). BEP are tools to ensure effective environmental protection and 'generally refer to widely-accepted norms or customs of environmental and risk management.'[177]

These requirements were first incorporated into the *Sulphides Exploration Regulations* in 2010 and subsequently in the *Crusts Exploration Regulations* and in the 2013 amendments of the *Nodules Exploration Regulations*. Thus, the contracts concluded pursuant to the original

Environment Programme (UNEP) and the World Bank. See *Common Oceans - Global Sustainability Fisheries Management and Biodiversity Conservation in Areas Beyond National Jurisdiction* (FAO, 2014), page 1.

[174] *Nodules Exploration Regulations*, regulation 31(2). *Sulphides* and *Crusts Exploration Regulations*, regulation 33(2).

[175] *Exploration Regulations*, regulation 5(1).

[176] *Nodules Exploration Regulations*, regulation 31(5); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(5); *Exploration Regulations*, annex IV section 5(1);

[177] ISA, *Environmental Management Needs for Exploration and Exploitation of Deep Sea Minerals (ISA Technical Study No 10)* (ISA, 2012), page 33.

Nodules Exploration Regulations, adopted in 2000, do not contain such obligations. Nonetheless, the Seabed Disputes Chamber found that states who sponsored exploration activities under the early *Regulations* still have to apply best environmental practices, first, as a direct obligation under the Mining Code[178] and, second, as part of their due diligence obligation to ensure the contractor complies with his obligations.[179] Regarding the former, despite the obligation to apply best environmental practices only being included in the then latest *Sulphides Exploration Regulations*, the Chamber found that the first *Nodules Exploration Regulations* 'should be interpreted in light of the development of the law, as evidenced by the subsequent adoption of the Sulphides Regulations.'[180] As a result, although the contractors who are exploring nodules pursuant to the original *Nodules Exploration Regulations* are not bound to apply best environmental practices, their sponsoring states are.

5.4.4 Emergency Orders

The LOSC mandates the ISA to adopt emergency measures to act promptly to prevent or contain environmental harm.[181] The *Exploration Regulations* elaborate on the powers by adding procedural obligations. Before commencing exploration work, each contractor is required to submit a contingency plan 'to respond effectively to potentially harmful incidents.[182] More specifically, contractors are obliged to promptly notify the ISA Secretary-General of 'any incident arising from activities which have caused, are causing or pose a threat of serious harm to the marine environment.'[183] In case such situation eventuates, emergency orders may be issued by the Council following the recommendation by the LTC, and may include suspension or adjustment of operations.[184] Moreover, pending any action by the Council, the ISA Secretary-General has the competence to take immediate measures of a temporary nature, for no longer than 90 days, 'as are practical and reasonable in the circumstances to prevent, contain and minimize serious harm or the threat of serious harm to the marine environment.'[185]

In case the contractor does not comply with an emergency order the Council can take 'such practical measures as are necessary to prevent, contain and minimize any such serious harm or

[178] *SDC Advisory Opinion*, paragraph 122.
[179] Ibid, paragraph 136.
[180] Ibid, paragraph 137.
[181] LOSC, articles 162(2)(w), 165(2)(k).
[182] *Exploration Regulations*, annex 4, section 6.1.
[183] *Nodules Exploration Regulations*, regulation 33(1); *Sulphides* and *Crusts Exploration Regulations*, regulation 35(1).
[184] LOSC, articles 162(2)(w), 165(2)(k); *Nodules Exploration Regulations*, regulation 33(4)-(6); *Sulphides* and *Crusts Exploration Regulations*, regulation 35(4)-(6).
[185] *Nodules Exploration Regulations*, regulation 33(3); *Sulphides* and *Crusts Exploration Regulations*, regulation 35(3).

threat of serious harm to the marine environment.'[186] Importantly, the contractor is required to reimburse the ISA for the expenses incurred in taking such measures.[187] This can ensure a prompt response to emergencies whilst upholding the polluter-pays principle.[188] However, as is discussed in Chapter 6.6, significant challenges remain with respect to implementing these provisions in practice.

5.4.5 Enforcement and Liability

As discussed in Chapter 3.6, the ISA has a far-reaching enforcement mandate pursuant to the LOSC to exercise such control 'as is necessary for the purpose of securing compliance' with the seabed mining regime.[189] The *Exploration Regulations* reaffirm this position of the ISA and require contractors to submit a written undertaking accepting the control by the ISA over exploration and exploitation activities.[190] The exploration contracts require contractors to submit annual reports about their activities.[191] Moreover, they reiterate the ISA's power to inspect vessels and installations used by contractors to carry out their exploration work and to monitor the contractor's compliance as well as the effects of the contractor's activities on the marine environment.[192] The contracts elaborate on the inspection mandate by setting out that logs, equipment, facilities, and 'other recorded data' and relevant documents are subject to inspections.[193] However, as with emergency orders, the real challenge lies in implementing these obligations in practice, which is hampered by the ISA's current institutional structure and lack of resources. These challenges are examined in Chapter 8.2.2.

The *Exploration Regulations* also develop the rules regarding liability for environmental harm. As discussed in Chapter 3.6.2, sponsoring states are under the responsibility to ensure that contractors comply with their obligations under the exploration contracts. Non-compliance entails liability. The standard terms for exploration contracts expressly extend to contractors a liability for damage to the marine environment, except in cases of force majeure.[194] Moreover, the *Exploration Regulations* state that contractors are responsible for 'any damage arising out of wrongful acts in the conduct of its operations, in particular damage to the marine environment,

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[186] *Nodules Exploration Regulations*, regulation 33(7); *Sulphides* and *Crusts Exploration Regulations*, regulation 35(7).

[187] *Exploration Regulations*, annex 4, section 6.4.

[188] Harrison (n 1), page 140.

[189] LOSC, articles 153, 165(2)(c), (m), 165(3), annex III article 18.

[190] *Exploration Regulations*, annex IV section 13.

[191] Ibid, section 10.

[192] Ibid, section 14.

[193] Ibid, section 14.

[194] Ibid, sections 6.4, 17.

after the completion of the exploration phase.'[195] As such, contractors can be held liable for environmental harm, pursuant to their contractual obligations. However, as Bothe points out, this liability can only be enforced by the ISA owing to the contractual nature of the relationship. The ISA will have to consider the interests of third parties, such as other users of the marine resources, when developing its future exploitation regulations.[196]

5.4.6 Applying a Precautionary Approach

The final and perhaps most important obligation the Mining Code expressly incorporates into the seabed mining regime is the need to apply the precautionary approach. Although neither the LOSC, nor the IA mention precaution, Chapter 4.4 demonstrated that the precautionary approach has been gradually integrated into the agreements by way of interpreting them in an evolutionary manner. In line with this evolution, the ISA has expressly integrated precaution into the Mining Code, eliminating any residual doubt over the applicability of the principle in the seabed mining context. The *Exploration Regulations* specifically state:

> In order to ensure effective protection for the marine environment from harmful effects which may arise from activities in the Area, the Authority and sponsoring States shall apply a precautionary approach, as reflected in principle 15 of the Rio Declaration, and best environmental practices.[197]

The LTC must make recommendations to the Council with regards to implementing this obligation.[198] However, as of July 2015, only one recommendation has been made specifically referring to this obligation to apply precaution, namely to adopt the Environmental Management Plan for the Clarion-Clipperton Zone.[199]

In addition to exploration work, a precautionary approach must also be applied during the prospecting phase.[200] Moreover, through incorporating precaution into the exploration contracts, the ISA extends this obligation to contractors. The standard contract clauses state:

> The Contractor shall take necessary measures to prevent, reduce and control pollution and other hazards to the marine environment arising from its activities in the Area <u>as far as reasonably</u>

[195] *Nodules Exploration Regulations*, regulation 30. *Sulphides* and *Crusts Exploration Regulations*, regulation 32.

[196] Michael Bothe, 'The Protection of the Marine Environment Against the Impacts of Seabed Mining: As Assessment of the New Mining Code of the International Seabed Authority' in Peter Ehlers, Elisabeth Mann Borgese, and Rüdiger Wolfrum (eds), *Marine Issues* (Kluwer, 2002) 221–231, 230.

[197] *Nodules Exploration Regulations*, regulation 31(2); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(2).

[198] *Nodules Exploration Regulations*, regulation 31(3); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(3).

[199] ISA, ISBA/17/C/13 (13 July 2011), paragraph 28, Chapter 6.3.1.

[200] *Exploration Regulations*, regulations 2(2), 5(1).

possible applying a precautionary approach and best environmental practices.[201]

Applying precaution, therefore, becomes a contractual obligation and the sponsoring state has the corresponding responsibility to ensure contractors comply.[202]

There may be some confusion as to which part of the sentence the words 'as far as reasonably possible' relate to. Does it limit the general, protective measures to what is reasonably possible, or does it qualify the obligation to apply precaution? It is suggested that the former is the correct interpretation, since the corresponding provision in the body of the *Regulations,* quoted above, includes a comma before mentioning precaution. '[…] each contractor shall take necessary measures to prevent, reduce and control pollution and other hazards to the marine environment arising from its activities in the Area as far as reasonably possible, applying a precautionary approach and best environmental practices.'[203]

Importantly, the original *Nodules Exploration Regulations*, adopted in 2000, only required the ISA and sponsoring states to apply a precautionary approach but did not require contractors or prospectors to do so.[204] This extension was first included in the *Sulphides Exploration Regulations* and was subsequently incorporated in the 2013 revision of the *Nodules Exploration Regulations*. This evidences a gradual strengthening and indeed widening of the obligation to apply the precautionary approach within the regulatory work of the ISA over the past two decades.

However, it also means that the 13 exploration contracts concluded under the original *Nodules Exploration Regulations* do not expressly include the obligation for contractors to apply precaution. Nevertheless, clearly aiming to close this gap for the contractors involved, the Seabed Disputes Chamber in its *Advisory Opinion* highlighted that under the general obligation of due diligence every sponsoring state is under an obligation 'to take measures within the framework of its own legal system in order to oblige sponsored entities to adopt [the precautionary] approach.'[205]

It should be noted that the direct reference to Principle 15 of the *Rio Declaration* in the *Exploration Regulations* introduces an element of discretion by requiring the application of precaution by states 'according to their capabilities.' However, this does not diminish the obligation incumbent on the ISA, as an international organization. Moreover, the Seabed Disputes Chamber attempted to reduce any discretion by noting that 'the reference to

[201] *Exploration Regulations*, annex IV section 5.1 (emphasis added).
[202] *SDC Advisory Opinion*, paragraph 133.
[203] *Nodules Exploration Regulations*, regulation 31(5); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(5).
[204] ISA, ISBA/6/A/18 (13 July 2000), regulation 31(2).
[205] *SDC Advisory Opinion*, paragraph 134.

"capabilities" is only a broad and imprecise reference to the differences in developed and developing states. What counts in a specific situation is the level of scientific knowledge and technical capability available to a given state in the relevant scientific and technical fields.'[206] Additionally, as discussed in Chapter 3.6.2, the Chamber also allows for precaution as an element of due diligence to apply equally to all states not least to prevent 'sponsoring States "of convenience".'[207]

Consequently, applying the precautionary approach is an unequivocal requirement for the ISA, states, and contractors in the context of seabed mining. However, the challenge lies in implementing it. At the 2011 ISA workshop on *Environmental Management Needs for Exploration and Exploitation of Deep Sea Minerals*, the Working Group on Legal Issues 'identified a need for more guidance on how to operationalize the precautionary approach in the context of [deep seabed mining].'[208] Such guidance is particularly pertinent in light of the widespread misunderstanding regarding the content of the precautionary principle.[209] A poignant example is the discussion during the development of the *Nodule Exploration Regulations*. In 1999, the Netherlands submitted a proposal to incorporate the precautionary principle in the then draft regulations.[210] In subsequent discussions, '[s]ome delegations however considered that, in view of the uncertainty associated with seabed exploration, it would be difficult, if not impossible, to identify and apply precautionary measures.'[211] Fortunately, this blatant misapprehension of when the precautionary principle must be applied was not shared by other delegations and the principle was eventually incorporated in the *Nodules Exploration Regulations.*

5.4.6.1 Precautionary Thresholds in the ISA Context

Having established the ISA's obligation to apply the precautionary approach, we need to examine where the threshold for precaution lies in the ISA context. As elaborated in Chapter 2.3, the precautionary approach comprises three elements, namely (a) a threat of environmental harm, (b) uncertainty, and (c) remedial action. In order to trigger the obligation to take remedial action, however, a certain threshold of risk, that is <u>gravity</u> times <u>probability</u> of harm, must be reached. The aim is to exclude precaution from being invoked for every minor or imaginary threat.

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[206] Ibid, paragraph 162.
[207] Ibid, paragraph 158-160.
[208] ISA Technical Study 10 (n 177), page 33.
[209] Chapters 2.1, 2.2.
[210] ISA, ISBA/5/C/L.8 (25 August 1999).
[211] ISA, ISBA/6/C/INF.1 (March 2000), paragraph 15.

The present section relates this threshold test to the ISA context by analysing the formulations of precaution that are most relevant for the present study. In this context, Article 145 LOSC states:

> Necessary measures shall be taken in accordance with this Convention with respect to activities in the Area to ensure effective protection for the marine environment from harmful effects which may arise from such activities.[212]

The same formulation is reiterated in the *Exploration Regulations* which specifically spell out the requirements to apply a precautionary approach:

> In order to ensure effective protection for the marine environment from harmful effects which may arise from activities in the Area, the Authority and sponsoring States shall apply a precautionary approach, as reflected in principle 15 of the Rio Declaration, and best environmental practices.[213]

Both these provision specify that the threat in question derives from potential, harmful effects from the activities in the Area. Moreover, the *Exploration Regulations* add the precautionary approach as 'the primary tool by which this protection from harmful effects is to be achieved.'[214] As for the thresholds involved, the provisions contain reference to both gravity and probability of harm, namely 'harmful effects which may arise.' However, the Mining Code adds a direct reference to the *Rio Declaration* which introduces an additional set of thresholds, the familiar 'threats of serious or irreversible damage.'

> In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.[215]

In addition, the Seabed Disputes Chamber enunciated a surprisingly low threshold for states' obligation to apply the precautionary approach as an element of due diligence:

> The due diligence obligation of the sponsoring States requires them to take all appropriate measures to prevent damage that might result from the activities of contractors that they sponsor. This obligation applies in situations where scientific evidence concerning the scope and potential negative impact of the activity in question is insufficient but where there are plausible indications of potential risks.[216]

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[212] LOSC, article 145.
[213] *Nodules Regulations,* regulation 31(2); *Sulphides* and *Crusts Regulations,* regulation 33(2) (emphasis added).
[214] ISA, ISBA/12/C/2 (Part II) (24 May 2006), paragraph 28.
[215] *Rio Declaration*, principle 15 (emphasis added).
[216] *SDC Advisory Opinion*, paragraph 131 (emphasis added).

The Probability Thresholds

All these formulations provide for uncertainty. Their respective thresholds, which state the likelihood that harm occurs, (*may, plausible indications*, or simply *threats*) allow a wide scope of precautionary obligations.

Furthermore, for those activities which under the *Exploration Regulations* require a higher likelihood of harm, the probability threshold has been lowered in the more recent *Exploration Regulations*. For example, the original *Nodules Exploration Regulations*, adopted in 2000, provided for emergency orders in case of an 'incident resulting from or caused by a contractor's activities in the Area that has caused, or is likely to cause, serious harm to the marine environment.'[217] In contrast the later *Exploration Regulations* require emergency orders for an incident 'that has caused, is causing or poses a threat of serious harm to the marine environment.'[218] These changes were based on the LTC's considerations 'that the use of the term "likely to cause serious harm" as a trigger for action to be taken in pursuance of a precautionary approach implied a degree of certainty that was incompatible with the precautionary approach, which requires that there be only a threat of serious damage.'[219]

The Gravity Thresholds

However, the formulations differ in regard to the gravity of the impact. The due diligence obligation of states already applies in circumstances of *potential risks*. The obligation of the ISA is captured in two different formulations. *Harmful effects* allows for broader precautionary protection than *serious or irreversible damage*, which raises the question, which one applies. Several observations may be made in this regard.

First, the wording in the *Exploration Regulations* is copied from Article 145 LOSC (and Article 17(2)(f) of Annex III) which predates the rise of precaution. Thus, it might be difficult to hold the wording of these provisions against the thresholds that trigger the precautionary approach. However, in accordance with the *Vienna Convention on the Law of Treaties*,[220] subsequent agreements and state practice are relevant. In this context, the IA, modifying Part XI at a time when precaution was being incorporated into virtually every new agreement,[221] strengthened the

[217] ISA, ISBA/6/A/18 (13 July 2000), regulation 32(1) (emphasis added).

[218] *Nodules Exploration Regulations*, regulation 33(2); *Sulphides* and *Crusts Exploration Regulations*, regulation 35(2) (emphasis added).

[219] ISBA/12/C/2 (n 214), paragraph 29.

[220] *Vienna Convention on the Law of Treaties*, (adopted 23 May 1969, entered into force on 27 January 1980) 1155 UNTS 331, article 31(3).

[221] David Freestone and Ellen Hey, 'Origins and Development of the Precautionary Principle' in David Freestone and Ellen Hey (eds) *The Precautionary Principle and International Law: the Challenge of*

ISA's focus on environmental protection.[222] Moreover, the *Exploration Regulations* were being developed when the rhetoric of precaution had become omnipresent in international environmental law. Thus, the importance of the reiteration of the wording of Article 145 may be regarded as an acceptance of the threshold incorporated therein. In a 1998 draft of the regulation the reiteration of Article 145 and the obligation to apply precautionary measures were linguistically separated.[223] Yet, the Council rephrased the provision and, in its 1999 draft, specifically linked the two by requiring precautionary measures 'pursuant to article 145.'[224] Similarly, the final version explicitly requires a precautionary approach 'in order to' ensure <u>effective protection</u> for the marine environment.

Second, any mining activity is likely to cause some damage. Thus, at first glance, the requirement of merely *harmful effects* may be of limited use in establishing a specific obligation. However, omitting a specific threshold for the gravity of harm is common practice and, despite an obvious intention of the drafters to ensure a high level of environmental protection, a minimum threshold may nevertheless be inferred to render the precautionary approach workable.[225] Moreover, it is questionable whether the risks associated with activities at the exploration and exploitation stage would fall beneath a minimum threshold of *significant*. Given the sensitivity of many deep sea environments and the high levels of uncertainty, a precautionary obligation with a wide reach appears to have been a prudent choice by the drafters of the *Regulations*.

Third, further light can be shed on the matter by analysing the activities in the Area for which the *Rio Declaration* threshold of *serious or irreversible damage* is explicitly required. Interestingly, irreversibility is neither referred to in the LOSC, nor in the Mining Code. This may be welcomed since it can be problematic to determine whether an effect is irreversible or merely long-lasting.[226] This is especially difficult in relation to impacts in the deep sea for which long-term studies are mostly lacking. The requirement of *serious* harm was added to the wording of Article 145 in the above mentioned 1998 draft regulations[227] but was ultimately rejected and a direct reference to the *Rio Declaration* was included instead. In the final version

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Implementation (Kluwer Law International, 1996) 3–15, 3.

[222] IA, preamble paragraph 3; Chapter 4.2.

[223] Draft regulation 28 stated: *'Each contractor shall ensure the effective protection of the marine environment from serious harm which may arise from its activities in the Area <u>and</u> shall take precautionary measures to anticipate, prevent or minimize any adverse impacts on the marine environment in the Area as far as reasonably possible using best available technology.'* ISA, ISBA/4/C/4/Rev.1 (29 April 1998) (emphasis added).

[224] Ibid.

[225] Arie Trouwborst, *Precautionary Rights And Duties of States* (Martinus Nijhoff Publishers, 2006), pages 47-48; Chapter 2.3.1.

[226] Ibid, pages 60-62.

[227] ISBA/4/C/4/Rev.1 (n 223), regulation 28.

of the *Regulations*, *serious harm* is used primarily in relation to emergency measures,[228] disapproving prospecting or exploitation at specific sites,[229] and applying additional protective measures or even prohibiting exploration work where it would have serious harmful effects on vulnerable marine ecosystems.[230] Similarly, in the LOSC, *serious harm* is only required for provisional measures,[231] emergency orders,[232] and disapproval of sites.[233] These examples show that *serious harm* is used as the threshold that may lead to mining activities being halted or prohibited. Consequently, a lower threshold to trigger general precautionary obligations would be consistent with an implicit hierarchy of precautionary measures in the *Regulations*.

Fourth, it should be noted that Regulation 1 of the *Exploration Regulations* defines 'serious harm to the marine environment' as:

> any effect from activities in the Area on the marine environment which represents a significant adverse change in the marine environment determined according to the rules, regulations and procedures adopted by the Authority on the basis of internationally recognized standards and practices.[234]

In short, *serious* is expressly defined as *significant*, even though the former may appear to convey a higher threshold. Consequently, any reference in the Mining Code to *serious harm*, or indeed the *Rio Declaration*, may be interpreted as encompassing a lower threshold than what is assumed at first sight. In other words, this definition reduces the difference in gravity thresholds under the LOSC and the Mining Code (*harmful effects*) on the one hand and the *Rio Declaration* (*serious or irreversible damage*) on the other hand. In fact, an analysis of the draft Exploration Regulations for sulphides and crusts prepared by the ISA Secretariat in 2006 specifically notes that 'it may be argued that consistency is achieved by the definition of the term "serious harm to the marine environment" in regulation 1 as a proxy for the "harmful effects" referred to in article 145 of the Convention.'[235] In any case, the *EIA Recommendations* expressly list those activities 'in the exploration area with potential to cause serious harm to the environment.'[236] Not surprisingly, any drilling, rock sampling, or testing of mining equipment

[228] *Nodules Exploration Regulations,* regulation 33; *Sulphides* and *Crusts Exploration Regulations*, regulation 35.

[229] *Nodules Exploration Regulations,* regulations 2, 21(6)(c); *Sulphides* and *Crusts Exploration Regulations,* regulations 2, 23(6)(c).

[230] *Nodules Exploration Regulations,* regulation 31(4); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(4).

[231] LOSC, article 290(1).

[232] LOSC, articles 162(2)(w); 165(2)(k)

[233] LOSC, articles 162(2)(x); 165(2)(l)

[234] *Exploration Regulations*, regulation 1(3)(f).

[235] ISBA/12/C/2 (n 214), paragraph 28.

[236] *EIA Recommendations*, paragraph 9.

falls within this category.[237] Consequently, these exploration activities are doubtlessly subject to the precautionary principle.

Fifth, besides these precautionary obligations for specific and very serious situations, there are good reasons to assume that precaution is to be applied broadly by the ISA. First, the *Rio Declaration* itself requires precaution to be 'widely applied.' Second, Article 145 LOSC imposes a general obligation to prevent harm to the marine environment and is not restricted to particularly vulnerable ecosystems or emergency situations. Third, within the *Regulations*, the obligation to apply precaution is included in the part dealing with the general 'Protection and Preservation of the Marine Environment.'[238] Thus, there is no reason to assume it only applies to particular situations, especially since emergency measures are covered by a separate regulation.[239] Fourth, and perhaps most importantly, the Seabed Disputes Chamber has not only endorsed the precautionary approach but also broadened its application significantly, by identifying precaution as an integral element of the general due diligence obligation of sponsoring states. Thus, precaution becomes applicable even to activities outside the ISA Regulations 'where there are plausible indications of potential risks.'[240]

In sum, the ISA is not only under an obligation to apply the precautionary principle but the thresholds for triggering precaution allow a wide scope of precautionary obligations. The probability threshold for harm occurring is low and has indeed been lowered further for specific activities under the Mining Code over the last 15 years. The gravity element for especially far-reaching measures is set at *serious harm*, which in turn is defined as *significant adverse change*. Moreover, general precautionary obligations seem to be required for *harmful effects which may arise* from exploration and exploitation work.[241] In other words, the legal framework aims to provide for a high standard of environmental protection from seabed mining activities.

The Definition of Harmful Effects and Significant Adverse Change

The remaining question is how to define *harmful effects* and *significant adverse change* in the seabed mining context. The *Exploration Regulations* are largely silent on this crucial question and merely refer to 'internationally recognized standards and practices' in relation to the

[237] Ibid, paragraph 19.

[238] *Nodules Exploration Regulations*, regulation 31; *Sulphides* and *Crusts Exploration Regulations*, regulation 33.

[239] *Nodules Exploration Regulations*, regulation 33; *Sulphides* and *Crusts Exploration Regulations*, regulation 35.

[240] *SDC Advisory Opinion*, paragraphs 131.

[241] *Nodules Exploration Regulations*, regulation 31(2); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(2).

definition of *significant adverse change*.[242]

The Draft Regulations, prepared by the Preparatory Commission, did provide some detail, defining serious harm to the marine environment as:

> any effect from activities in the Area on the living or non-living components of the marine environment and associated ecosystems beyond that which is negligible or which has been assessed and judged to be acceptable by the Authority pursuant to these regulations and the relevant rules and regulations adopted by the Authority and which represent:
>
> (a) significant adverse changes in the living and non-living components of the marine and atmospheric environment;
>
> (b) significant adverse changes in the ecosystem diversity, productivity and stability of the biological communities within the environment; or
>
> (c) loss of scientific or economic values which is unreasonable in relation to the benefit derived from the activity in question.[243]

Guidance can also be drawn from the fisheries context. The Food and Agricultural Organisation defines significant adverse impacts in relation to deep-sea fisheries in relation to compromise to an ecosystem's integrity:[244]

> When determining the scale and significance of an impact, the following six factors should be considered:
>
> i. the intensity or severity of the impact at the specific site being affected;
>
> ii. the spatial extent of the impact relative to the availability of the habitat type affected;
>
> iii. the sensitivity/vulnerability of the ecosystem to the impact;
>
> iv. the ability of an ecosystem to recover from harm, and the rate of such recovery;
>
> v. the extent to which ecosystem functions may be altered by the impact; and
>
> vi. the timing and duration of the impact relative to the period in which a species needs the habitat during one or more of its life history stages.[245]

These examples demonstrate that any definition rests on two elements. First, it requires scientific advice regarding the activity's effect on biodiversity and ecosystem integrity as well as the spatial and temporal scale of the impact. This presupposes adequate data to establish environmental baselines and understand ecosystem structures, at least to some extent. Second, it requires an agreed, value based environmental conservation objective to determine what is

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[242] *Exploration Regulations*, regulation 1(3)(f).

[243] Preparatory Commission for the ISA and ITLOS, LOS/PCN/SCN.3/WP.6/Add.5 (8 February 1990), article 2(2).

[244] FAO, *International Guidelines for the Management of Deep-Sea Fisheries in the High Seas* (2009), paragraph 17.

[245] Ibid, paragraph 18.

unreasonable or *unacceptable* change. Indeed, participants at a 2014 workshop by the Deep Ocean Stewardship Initiative 'recognized the extreme complexity of the issues and the enormous data gaps associated with assessing significant impact,' concluding:

> Huge unknowns make the determination of significant impacts extremely difficult. Such unknowns include the questions related to species rarity and possible extinction; the ecological and social importance of extinction of a single deep sea species; numerical thresholds for significant impact; and ecosystem function […].[246]

These considerations, including the scientific and the social dimension, must be addressed by the ISA, in accordance with its mandate to control seabed mining in the Area on behalf of humankind, to promote and conduct marine scientific research in the Area, and to protect the marine environment from harmful effects of seabed mining.[247]

5.5 Conclusion

The environmental mandate of the ISA is not static. On the contrary, as the present chapter demonstrates, the ISA continuously develops the regulatory framework for seabed mining, primarily through the Mining Code, which is binding on all ISA members regardless of individual consent.

In this context, the first conclusion to be drawn from this part II of this thesis is the inherently evolutionary design of Part XI, which allows the ISA to adopt and review environmental regulations in line with new scientific understandings, current developments in international law, and the changing values society places on seabed minerals, biodiversity, and ecosystems and their functions. This evolutionary design is perhaps most visible when examining the gradual integration of the precautionary approach into the ISA regime. Through both customary international law as well as being implicitly required by the LOSC, the ISA is under an obligation to apply precaution to seabed mining activities. This obligation has been codified and further specified in the *Exploration Regulations*, which can thus be regarded as a preliminary step in implementing the principle.

In addition to the *Exploration Regulations* playing a role in the implementation of the ISA's environmental mandate, by virtue of their binding nature, they are also a source of legal obligations. In fact, the Seabed Disputes Chamber has relied on the *Exploration Regulations* to

[246] Deep Ocean Stewardship Initiative, *Meeting Summary: Defining 'Significance' in Environmental Impact Assessment for Deep-Sea Mining* (Scripps Institution of Oceanography, 26-28 March 2014) <http://www.indeep-project.org/sites/indeep-project.org/f/document/EIA%20Workshop%20Report%20wappendices.pdf>.

[247] LOSC, articles 136, 137, 140, 143, 145, 153(1).

find that sponsoring states are under a *direct* obligation to apply the precautionary approach.[248] As the Chamber observed:

> The provisions of the aforementioned Regulations transform this non-binding statement of the precautionary approach in the Rio Declaration into a binding obligation. The implementation of the precautionary approach as defined in these Regulations is one of the obligations of sponsoring States.[249]

The *Exploration Regulations,* in turn, contribute to the development of international law. Thus, what is included in the *Regulations* can also affect how the LOSC is interpreted. This is again confirmed by the Seabed Disputes Chamber finding that precaution is also an element of the due diligence obligation of sponsoring states. In finding this connection, the Chamber relied, inter alia, on the fact that the ISA had included the obligation to apply precaution as a contractual obligation under the standard contract clauses annexed to the *Exploration Regulations*.[250]

The second conclusion from this chapter is that the ISA is under an obligation to apply extensive environmental requirements with the aim of ensuring the effective protection of the marine environment. This complements its explicit stewardship mandate to organize, carry out, and control seabed mining activities in the Area on behalf of humankind as a whole.[251]

The ISA's environmental mandate relates to the conduct of marine scientific research, assessing and monitoring the effects of seabed mining on the environment, and declaring areas protected from mining. However, as demonstrated in Section 5.4.1, the Mining Code fails to identify the objective of EIAs or to provide an indication of what to do if an EIA finds that an activity is likely to cause significant harm. Moreover, the ISA has, so far, failed to include strategic environmental assessments into the Mining Code. The ISA has allocated the responsibilities with respect to EIAs and the gathering of environmental baseline data to the contractors. Yet, the Mining Code does not incorporate a corresponding obligation of the ISA to provide SEAs, which would incorporate both a macro-scale assessment of the need (or lack thereof) for seabed mining and a regional-scale environmental assessment.

Directly linked to this omission is another important aspect missing from the *Exploration Regulations*, namely the development of the ISA's mandate to promote, encourage, and conduct marine scientific research concerning the Area.[252] If the Mining Code was to allocate the responsibility to gather environmental data not only to contractors but also reiterate the ISA's responsibility in this regard, the ISA could target research efforts to fill the current gaps in the

[248] *SDC Advisory Opinion*, paragraphs 121-122, 125, 131.
[249] *SDC Advisory Opinion*, paragraph 127.
[250] Ibid, paragraph 133.
[251] LOSC, article 153(1).
[252] LOSC, article 143.

data and knowledge about the deep ocean environment. This would help to better facilitate SEAs and EIAs and it would be a *strategic* response to the challenge of identifying ways to minimise the environmental costs of seabed mining, in accordance with the ISA's mandate.

As this chapter demonstrates, the ISA has also developed its competencies regarding emergency measures and enforcement powers. Moreover, it has expressly integrated into the Mining Code the need to deploy best environmental practices and a precautionary approach in ensuring effective protection of the marine environment. The thresholds of both the probability and gravity of harm to trigger the precautionary principle are relatively low, providing for the potential to comprehensively protect the environment from a broad range of seabed mining activities. However, one important omission is a definition of the gravity thresholds of *harmful effects* and *significant adverse change.* This renders uncertain the point at which the ISA is required to take protective measures. This is also closely related to the conclusion drawn in Chapter 2: because the precautionary principle does not provide a blueprint for specific protective measures, the ISA must determine an agreed conservation objective and design its regulatory framework to achieve this objective.

In conclusion, the ISA is equipped with an extensive environmental mandate, law-making powers, enforcement competencies, and a stewardship mandate to act on behalf of humankind. Thus, 'the ISA is ideally placed to play a leadership role in the implementation of the goals and commitments relevant to the protection of biodiversity that have been endorsed by its member States in other fora.'[253]

This thesis could conclude here by stating that the precautionary principle is implemented in the ISA regime, as evidenced by the fact that it has been progressively incorporated into the ISA's regulatory framework. However, this would not only be premature but also misleading and indeed contribute to the widespread misperception as to what implementing the precautionary principle entails. Consequently, Part III examines the implementation of the precautionary principle by the ISA in practice.

[253] Lodge (n 165), page 470.

PART III: IMPLEMENTING PRECAUTION BY THE INTERNATIONAL SEABED AUTHORITY

Chapter 6: Implementing the Precautionary Approach: Protective Measures

6.1 Introduction

‚In spite of the challenges ahead, the Authority […] has taken measures in the evolutionary manner anticipated by the 1994 Implementation Agreement. It will continue to do so in such a manner that as far as possible deep seabed mining is environmentally sustainable.'[1]

Although the preliminary implementation of the precautionary approach by the ISA through its incorporation into the Mining Code has been examined in the previous chapter, much remains to be said about whether the ISA is implementing the precautionary approach *in practice*. As concluded in Chapters 2.4.1 and 2.5, implementing precaution involves three dimensions: (1) *procedural measures* required to conceptualise and assess the risks of seabed mining in light of scientific advice as balanced against the social, economic, political and environmental values ascribed to seabed minerals and the ecosystems associated with them; (2) tangible *protective measures* to prevent 'harmful effects' and 'significant adverse change' to the marine environment;[2] and (3) *institutional capacity* to conduct the risk assessment and give effect to the chosen risk management measures.

The institutional capacity of the ISA is examined in Part II. In particular, Chapter 4 analyses the ISA's environmental mandate under the LOSC and the IA. Chapter 5 examines the manner in which the ISA has been gradually developing its environmental obligations primarily through the adoption of the Mining Code.

Building on this discussion, the following Chapters analyse, in detail, the extent to which the ISA is giving effect to the precautionary approach, beyond including it in the Mining Code. To that aim, Chapters 6 to 8 critically analyse the ISA's implementation of the three dimensions of the precautionary principle. The present chapter begins by examining the protective measures which are designed to reduce the risk of activities in the Area causing environmental harm. Even though these are in some way the 'outcome' of the application of the precautionary principle, it is useful to examine them first to demonstrate what the ISA has done to date. This will then allow an analysis in Chapters 7 and 8 of the extent to which the ISA's procedural and institutional structures provide an explanation for the success or failure of the ISA's protective measures.

This chapter examines a range of protective measures relevant to seabed mining. Trouwborst

[1] Nii Allotey Odunton, 'Current Developments Related to Mining in the Area and the Work of the International Seabed Authority' (28 January 2014) <https://www.isa.org.jm/files/documents/EN/Press/Japan-Jan2014.pdf>.

[2] For a discussion of these terms, see Chapter 5.4.6.1.

reminds us that any measure can be precautionary so long as it meets the criteria of effectiveness and proportionality.[3] In addition, measures to give effect to the precautionary principle must be taken at an early stage, even if uncertainties remain. These three elements, effectiveness, proportionality, and early action, are used as assessment criteria to evaluate the protective measures in relation to the precautionary principle. The protective measures examined are those taken by the ISA or required by the regulatory framework, as well as those measures that could be applicable to seabed mining, as suggested by responses to the ISA's first stakeholder survey in 2014.[4]

To this end, the chapter begins with an examination of the ISA's work with respect to marine scientific research in Section 6.2. Although scientific research is not strictly a protective measure, it is a core ingredient of the precautionary principle and a prerequisite for all protective measures. Section 6.3 then examines the ISA's work on marine protected areas, using as an example the Environmental Management Plan for the Clarion-Clipperton Zone, which incorporates nine areas protected from mining. The discussion also identifies current shortcomings, in particular the lack of multi-purpose MPAs, and protective measures associated with MPAs, such as safety margins. Subsequently, Section 6.4 analyses measures pertaining to particularly vulnerable ecosystems and Section 6.5 discusses the control of particular activities through a listing method. Section 6.6 and 6.7 then consider emergency orders and environmental restoration respectively.

6.2 Marine Scientific Research

As set out in Chapter 4.5, the Authority is under an obligation to promote and encourage the conduct of marine scientific research (MSR) in the Area and coordinate and disseminate the results.[5] Moreover, the ISA itself may carry out MSR concerning the Area and its resources.[6] This is a priority focus under the IA.[7]

Furthering scientific research is an intrinsic aspect of the precautionary principle[8] and affects its implementation in multiple ways. MSR plays a crucial role in identifying and minimising

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[3] Arie Trouwborst, *Precautionary Rights And Duties of States* (Martinus Nijhoff Publishers, 2006), pages 147-156; Chapter 2.3.

[4] ISA, *Developing a Regulatory Framework for Mineral Exploitation in the Area: Stakeholder Engagement*, (February 2014), <http://www.isa.org.jm/files/documents/EN/Survey/ISA-SSurvey.pdf> (*Stakeholder Survey*). All submissions to the Survey are available at <https://www.isa.org.jm/survey/March-2014/stakeholder-responses>.

[5] LOSC, article 143(2).

[6] LOSC, article 143(2).

[7] IA, annex section 1(5)(h)

[8] Chapter 2.4.1; Trouwborst (n 3), pages 174-177.

scientific uncertainties, enhancing knowledge of long-term risk-management options,[9] and identifying best environmental practices (BEP). Additionally, scientific research is relevant for the implementation of the procedural elements of precaution, through assisting in early identification of potential environmental harm and reviewing the continuing suitability of protective measures.

The ISA does not have a dedicated body to coordinate and conduct MSR. Instead, it engages in research in two ways: first, the ISA allocates the requirement to research environmental baseline data at mine sites to contractors; second, the ISA Secretariat co-funds external research projects, commissions technical studies, and organizes workshops to collate information from external MSR. The following Sections examine the ISA's work in relation to research into biodiversity and deep ocean ecosystems.[10]

6.2.1 Research Regarding Faunal Diversity Associated with Polymetallic Nodules

As discussed in Chapter 1, scientific research regarding deep ocean ecosystems is inchoate. Thus, it is unsuprising that in the early 2000s, knowledge about the species residing in areas with a high density of polymetallic nodules was limited. Against this background, the Kaplan project, financed by the J.M. Kaplan Fund and the ISA, was conducted between 2002 and 2007. The project focused on the abyssal plains of the Clarion-Clipperton Zone (CCZ). Albeit limited by relatively small sample sizes, the project resulted in substantial advances in scientific understanding of the biodiversity in the CCZ.[11] The project analysed biodiversity levels, species range and gene flow, as well as their recolonisation processes following disturbances. The results indicated 'high, unanticipated, and still poorly sampled levels of species diversity' for all of the three sampled faunal groups.[12] The findings demonstrated that instead of the CCZ being a continuous habitat, biodiversity varies substantially in different geographical locations.[13] The findings enabled the researchers to suggest the establishment of marine protected areas as an option to best manage biodiversity and to identify a number of criteria for designing the areas to ensure protection of the different faunal species across the region.[14] This eventually led to

[9] Ellen Hey, 'The Precautionary Concept in Environmental Policy and Law: Institutionalizing Caution' (1992) 4 *Georgetown International Environmental Law Review* 303–318, 311.

[10] For an overview of the research projects which the ISA has been involved in, see Michael W Lodge, 'Collaborative Marine Scientific Research on the International Seabed' (2008) 3 *The Journal of Ocean Technology* 30–36.

[11] Craig R Smith et al, *Biodiversity, Species Ranges, and Gene Flow in the Abyssal Pacific Nodule Province: Predicting and Managing the Impacts of Deep Seabed Mining (Technical Study No 3)* (ISA, 2008), page 29.

[12] Ibid, pages 2, 28.

[13] Ibid, page 29.

[14] Ibid, pages 29-30.

establishment of the Environmental Management Plan for the CCZ, which is discussed in Section 6.3.1 below.

6.2.2 Research Regarding Ecosystems Associated with Polymetallic Sulphides and Ferromanganese Crusts

Scientific knowledge over polymetallic sulphides and crusts and ecosystems associated with them was, and still is, even less developed than that for nodules. The ISA has started to address this lack of knowledge, albeit not in a comprehensive manner.

In the context of developing the *Exploration Regulations* for sulphides and crusts in 2003, the Legal and Technical Commission noted that 'in order to carry out its responsibilities in relation to the protection and preservation of the marine environment, it was essential for the Authority to improve its understanding of seabed and deep ocean environmental processes, including biodiversity.'[15] As recommended by the LTC,[16] the ISA organised a workshop in 2004 to identify specific environmental baseline requirements for sulphides and crusts deposits respectively.[17] The workshop participants suggested details, which the LTC could incorporate into the guidelines for the requirements of environmental baseline data, such as sampling for 'taxonomic identification, DNA sequencing and voucher collections.'[18] The participants also identified the need to gather regional environmental baseline data to be able to determine the ecosystem's sensitivity to local mining activities.[19] Although the workshop participants noted this requirement in relation to the contractors' obligations, it might be argued that acquiring *regional* baseline data could also be achieved by MSR coordinated by the ISA itself, and perhaps financed by contractors. This would ensure baseline data is collected beyond allocated exploration areas.

In 2006, the ISA organized a further *Workshop on Cobalt-Rich Crusts and the Diversity and Distribution Patterns of Seamount Fauna*[20] to identify additional data and information that will be required from contractors in order to establish environmental baselines and associated monitoring programmes. The workshop also highlighted the lack of scientific knowledge in

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[15] ISA, ISBA/9/C/4 (1 August 2003), paragraph 15 (emphasis added).

[16] ISBA/9/C/4 (n 15), paragraph 1.

[17] See <https://www.isa.org.jm/workshop-establishment-environmental-baselines-deep-seafloor-cobalt-rich-crusts-and-deep-seabed>.

[18] ISA, *Polymetallic Sulphides and Cobalt-rich Ferromanganese Crusts Deposits: Establishment of Environmental Baseline and an Associated Monitoring Programme during Exploration*, Proceedings of the ISA Workshop held in Jamaica (6-10 September 2004) (ISA, 2004), page 423.

[19] Ibid, 424.

[20] See <https://www.isa.org.jm/workshop-cobalt-rich-crusts-and-diversity-and-distribution-patterns-seamount-fauna>.

respect of the biodiversity of seamounts that are located in areas of commercial activity.[21] Following both workshops, the LTC concluded in 2006 that there was a 'very limited understanding of the physical, geochemical and biological conditions at potential sites for exploration for those resources', which 'contrasted sharply' with the starting position for polymetallic nodules.[22] Participants at a 2006 workshop[23] recommended 'major data acquisition programmes' by future contractors to allow for the development of environmental guidelines.[24]

However, comprehensive data-gathering requirements were found to be impractical and a 'significant discouragement' to future contractors.[25] In other words, attracting new contractors was prioritised over setting environmental standards. This is problematic, as the experience with polymetallic nodules demonstrates; Even though the *Nodules Exploration Regulations* benefited from MSR conducted before the ISA was established, environmental baseline data for nodules mining areas is currently inadequate.[26]

Despite this lack of data, the ISA is attempting to develop a regulatory framework for the mineral exploitation phase. The starting point with respect to data on polymetallic sulphides and ferromanganese crusts is worse than for nodules, which will only magnify the challenges. Again, one has to wonder why the gathering of baseline data was only discussed in relation to the contractors' obligations. As noted in Chapter 5.4.1.3, by placing the onus of research only on the contractors, the Mining Code has not fully developed the ISA's broad mandate to coordinate and conduct MSR, which is a key element to implementing the Authority's environmental obligations.

Nonetheless, although no major data acquisition programmes were pursued, the ISA has collaborated with the Census of Marine Life on Seamounts, known as CenSeam, a major 10-year research initiative investigating the diversity, distribution, and abundance of marine life.[27] The collaboration focused on obtaining new data on seamount biodiversity in the western Pacific Ocean between 2007 and 2009.[28] The results were published in the ISA Technical Study No 8, which developed a detailed set of faunal records from sites in the Hawaiian Archipelago[29]

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[21] Lodge (n 10), page 33.

[22] ISA, ISBA/12/C/8 (11 August 2006), paragraph 25

[23] See <http://isa.org.jm/workshop-mining-cobalt-rich-ferromanganese-crusts-and-polymetallic-sulphides-technological-and>.

[24] ISBA/12/C/8 (n 22), paragraph 25

[25] Ibid.

[26] Chapter 7.2.3.1.

[27] See <http://www.coml.org>.

[28] ISA, ISBA/12/A/2 (13 June 2011), paragraph 108.

[29] Malcolm Clark et al, *Fauna of Cobalt-Rich Ferromanganese Crust Seamounts (Technical Study No 8)* (ISA, 2011), page 72.

and identified a number of issues requiring further research.[30] These results were confirmed at a follow up workshop organized by the ISA in 2011,[31] where participants made recommendations regarding protective measures for seamounts, in particular marine protected areas and the size and location thereof. The participants noted:

> the structure of biological assemblages is significantly different on seamounts located in and outside the cobalt-rich crust region. This means that applying spatial conservation measures only to seamounts outside the region is unlikely to capture the full range of biological features present in the cobalt-rich crust region. If the management objective is to protect representative ecological communities, seamounts within the cobalt-rich crust region will need to be conserved.[32]

As of July 2015, the ISA has not developed any protected areas for seamounts, even though four applications for contracts to explore ferromanganese crusts on seamounts have been accepted.[33]

In parallel to the work on seamounts, the ISA commissioned a study on the management of chemosynthetic ecosystems associated with sulphide deposits. The scientists engaged, whose findings were published in the ISA Technical Study No 9, reviewed the relative impact of various human activities on vents and seeps and suggested design principles to apply marine spatial planning to chemosynthetic ecosystems and to establish a network of chemosynthetic ecosystem reserves.[34] As such, the study identified specific management options and best environmental practices, most notably the creation of marine protected areas. However, as of July 2015, this recommendation has not been discussed further, whilst six plans to explore sulphides have been accepted.[35]

6.2.3 Discussion About the ISA's Engagement in Marine Scientific Research

As these examples show, the ISA has actively collaborated in external MSR projects and has organized regular scientific workshops, the majority of which have addressed environmental considerations.[36] Moreover, the ISA has disseminated some of the information in the form of technical studies and workshop reports. However, the ISA has not yet disseminated any research

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[30] Ibid, pages 76-77.

[31] ISBA/12/A/2 (n 28), paragraph 108.

[32] Thomas A Schlacher et al, 'Seamount Benthos in a Cobalt-Rich Crust Region of the Central Pacific: Conservation Challenges for Future Seabed Mining' [2013] *Diversity and Distributions* 1–12, 7.

[33] See <https://www.isa.org.jm/deep-seabed-minerals-contractors?qt-contractors_tabs_alt=2#qt-contractors_tabs_alt>.

[34] C L Van Dover et al, *Environmental Management of Deep-Sea Chemosynthetic Ecosystems: Justification of and Considerations for a Spatially-Based* Approach (Technical Study: No. 9) (ISA, 2011).

[35] See <https://www.isa.org.jm/deep-seabed-minerals-contractors?qt-contractors_tabs_alt=1#qt-contractors_tabs_alt>.

[36] See <https://www.isa.org.jm/scientific-activities>.

data from contractors,[37] although the *Exploration Regulations* specifically classifies such data as non-confidential.[38]

As noted at the outset, the role of MSR is to increase the knowledge base regarding the deep oceans, in order to identify both uncertainties and appropriate protective measures to ensure the precautionary development of seabed mining in line with environmental protection obligations. The question is: has the ISA utilized its mandate regarding MSR to further these goals? Certainly, its activities have contributed to the identification of uncertainties and indeed the identification of protective measures, primarily MPAs. However, to date, the ISA has only acted upon some of the information generated. The Kaplan project has been instrumental in leading to the establishment of protected areas in the Clarion-Clipperton Zone, discussed in Section 6.3.1, to reduce the potential harm from nodule mining. In contrast, although recommendations for declaring protected areas were made regarding seamounts and chemosynthetic ecosystems in 2011, these have not yet been considered further. Furthermore, as analysed in Section 6.4 below, the regulation specifically dealing with vulnerable marine ecosystems, such as cold-water corals at seamounts and chemosynthetic ecosystems associated with hydrothermal vents, has not yet been implemented.

The discussion also illustrates that the research projects that have generated new scientific data were not necessarily outcomes of the ISA initiatives in the framework of a strategic research agenda. Instead, the Authority collaborates with external MSR projects, such as the Kaplan project and the Census of Marine Life. Although collaborations can be beneficial to maximize efficiency and research capacity, the question is whether the ISA fully utilizes its mandate to actively set research agendas with respect to the protection of the marine environment from seabed mining. In this context, it must be noted that much research remains to be done, including concerning the cumulative impacts of mining operations and other influences. Pursuant to its mandate, the ISA can commission, or indeed conduct, research into these questions and does not have to wait until an external research institution takes up the challenge. The implementation of this mandate, of course, depends on the availability of financial and institutional resources.[39]

A further point worth noting is the role that external scientists play not only in providing the ISA with information relevant to establishing protective measures, but also in driving the research agenda, and consequently also in influencing the management agenda, of the ISA. ISA

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[37] Seascape Consultants, *Review of Implementation of the Environmental Management Plan for the Clarion-Clipperton Zone* (20 May 2014) <http://isa.org.jm/files/documents/EN/20Sess/LTC/CCZ-EMPRev.pdf>, page 10.

[38] *Nodules Exploration Regulations*, regulation 36(2); *Sulphides* and *Crusts Exploration Regulations*, regulation 38(2).

[39] Chapter 8.

workshops, together with technical studies commissioned by the ISA Secretariat, provide a platform for external scientists and other experts to contribute to the work of the ISA. As the discussion demonstrates, their suggestions can be influential. Such influence may be beneficial as it provides an opportunity to source detailed expertise from the scientific community and ensure best scientific advice, in accordance with precautionary decision-making. This is further explored in relation to the development of the environmental management plan for the CCZ in Section 6.3.1.

In sum, the ISA has actively collaborated in MSR projects, commissioned technical studies, and organized scientific workshops. The ISA has utilized at least some of the recommendations that have resulted from these efforts to inform the development of management measures to protect the marine environment from harmful effects of seabed mining. In order to contribute to the implementation of the precautionary approach, research findings have to be considered closely in the assessment and management of the risks of seabed mining. The following sections will examine the extent to which the ISA has adopted protective measures and whether these measures adequately reflect and incorporate the findings of these MSR projects to give effect to the precautionary principle.

6.3 Marine Protected Areas

The previous section demonstrated that recommendations to establish marine protected areas (MPAs) are amongst the key outcomes of the ISA's engagement in marine scientific research. MPAs are increasingly recognized as a tangible measure contributing to the implementation of a precautionary approach to the protection of marine biodiversity. As discussed in Chapter 5.4.2.1, this momentum is supported by widespread calls for MPAs, including by the UN General Assembly, in order to manage the conservation of the oceans and protect marine biodiversity.[40] Against this background, establishing protected areas constitutes a best environmental practice,[41] which the ISA is required to apply under the Mining Code.[42]

As discussed in Chapter 5.4.2.2, although the ISA's regulatory framework does not mention MPAs specifically, it does provide for the protection of parts of the Area from seabed mining activities. Moreover, the ISA has a mandate to declare MPAs as a 'necessary measure' to ensure marine environmental protection pursuant to Article 145 LOSC. The LTC has the corresponding obligation to make recommendations to the Council regarding environmental protection

[40] UNGA, UN Document A/RES/68/70 (9 December 2013), paragraph 208-213.

[41] ISA, ISBA/17/LTC/7 (13 July 2011), paragraph 21 (EMP-CCZ).

[42] *Nodules Exploration Regulations*, regulation 31(2); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(2).

measures and the Council can decide on specific policies including the establishment of MPAs.[43] So has the ISA utilised its mandate to give effect to the calls for MPAs? The answer, in short, is that it has started to. The Environmental Management Plan for the Clarion-Clipperton Zone was the ISA's a first step in creating MPAs.

6.3.1 The Environmental Management Plan for the Clarion-Clipperton Zone

The Environmental Management Plan for the Clarion-Clipperton Zone (EMP-CCZ), adopted in 2012,[44] is one of the most significant management measures endorsed by the ISA. The CCZ in the eastern central Pacific is approximately six million km^2 in size, broadly comparable to the size of Europe,[45] and has a particularly high abundance of polymetallic nodules.[46] The CCZ has been the focus of scientific research, prospecting, and exploration activities since the 1960s. Over 15 contracts to explore for nodules in this area have been concluded with the ISA. As such, it is an area that could experience significant impacts from numerous parallel seabed mining operations.

The EMP-CCZ is the first of its kind and can be regarded as an important step in implementing the ISA's environmental mandate. The EMP-CCZ is a document setting out a spatial management plan for the region. It designates nine Areas of Particular Environmental Interest (APEI) that are closed to mining activities[47] but open to scientific research.[48] The EMP-CCZ specifies operational objectives for: (a) the entire Clarion-Clipperton Zone; (b) areas assigned to contractors; and (c) the APEIs. The overarching goal of the EMP-CCZ is to facilitate seabed mining 'in an environmentally responsible manner.'[49] It reiterates the requirement for contractors to apply best available environmental practices and to collect environmental data in their contractual area. Given that all current exploration contracts in the Clarion-Clipperton Zone focus on nodules, the EMP-CCZ was designed to manage the environmental impact from nodule mining, although the Plan does not specifically exclude other mineral deposits.

The EMP-CCZ introduces two novel elements into the ISA's work. First, it provides some indication of a conservation objective, namely to protect marine biodiversity and ecosystem structures and functions in the Clarion-Clipperton Zone.[50] The Plan's vision also highlights the

[43] LOSC, articles 162, 165(2)(e).
[44] EMP-CCZ (n 41).
[45] Michael Lodge et al, 'Seabed Mining: International Seabed Authority Environmental Management Plan for the Clarion–Clipperton Zone. A Partnership Approach' (2014) 49 *Marine Policy* 66–72, 72.
[46] EMP-CCZ (n 41), paragraphs 14-17.
[47] ISA, ISBA/18/C/22 (26 July 2012), paragraph 6; EMP-CCZ (n 41), paragraph 39.
[48] ISBA/18/C/22 (n 47), paragraphs 8-9.
[49] EMP-CCZ (n 41), paragraph 35(a).
[50] Ibid, paragraphs 33, 35, 36, 39.

preservation of representative and unique marine habitats and species.[51] Although these formulations leave considerable room for interpretation, they are more specific than the objectives of protecting the marine environment against 'harmful effects' of seabed mining and preventing 'interference with the ecological balance of the marine environment' and 'damage to the flora and fauna', as stated in the LOSC.[52]

The second novelty is the designation of APEIs, which spatially restrict mining activities in the CCZ. As such, APEIs are a form of protected area. Despite initial confusion over the ISA's mandate to designate MPAs,[53] the APEIs have been established, as illustrated in Figure 6-1. In doing so, the ISA has, for the first time, applied its broad powers under Article 145 as well as Articles 165(2)(e) and 162 LOSC in order to restrict mining activities in specific locations for environmental reasons.

In addition to protecting representative habitat, the APEIs are designed to facilitate marine scientific research. The aim is to integrate biological data from the APEIs and contractors' areas into a Geographic Information System (GIS) database for the CCZ, which the ISA Secretariat is developing in order to establish inter alia a repository of biodiversity in the region.[54] This will enhance knowledge over appropriate ecosystem-based, spatial management options if sufficient data regarding minerals and living resources is made available.[55] However, two factors impede this aim.[56] First, the lack of raw tabular data associated with environmental baseline studies.[57] Second, although contractors are required to collect and submit environmental baseline data for their contract areas,[58] they have no obligation to do so for the nine APEIs, where scientific research is merely encouraged.[59] The 2014 review of the EMP-CCZ noted that '[v]ery limited research into the biology of the APEIs has been carried out since the adoption of the EMP […].'[60] To address this shortage of data, which undermines the implementation of the EMP-CCZ, 'efforts of the secretariat [over the last year] have been directed towards suppliers of

[51] Ibid, paragraph 32.

[52] LOSC, article 145.

[53] Michael W Lodge, 'Some Legal and Policy Considerations Relating to the Establishment of a Representative Network of Protected Areas in the Clarion-Clipperton Zone' (2011) 26(3) *The International Journal of Marine and Coastal Law* 463–480.

[54] ISA, ISBA/19/A/2 (22 May 2013), paragraph 82.

[55] Ibid.

[56] Aline Jaeckel, 'An Environmental Management Strategy for the International Seabed Authority? The Legal Basis' (2015) 30 *The International Journal of Marine and Coastal Law* 93–119, page 105.

[57] Chapter 7.2.3.1; ISA, ISBA/21/LTC/9/Rev.1 (3 March 2015), paragraph 7.

[58] *Nodules Exploration Regulations*, regulation 32; *Sulphides* and *Crusts Exploration Regulations*, regulation 34; IA, annex, section 1(7).

[59] EMP-CCZ (n 41), paragraph 43; ISBA/18/C/22 (n 47), paragraph 8; Seascape Consultants (n 37), page 15.

[60] Seascape Consultants (n 37), page 18.

data.'[61] In addition, a research cruise to a number of the APEIs in scheduled for 2015[62] under the EU funded MIDAS research project, short for *Managing Impacts of Deep-seA reSource exploitation*.[63] In sum, the APEIs are a significant protective measure, although formally integrating research efforts would enhance their value.

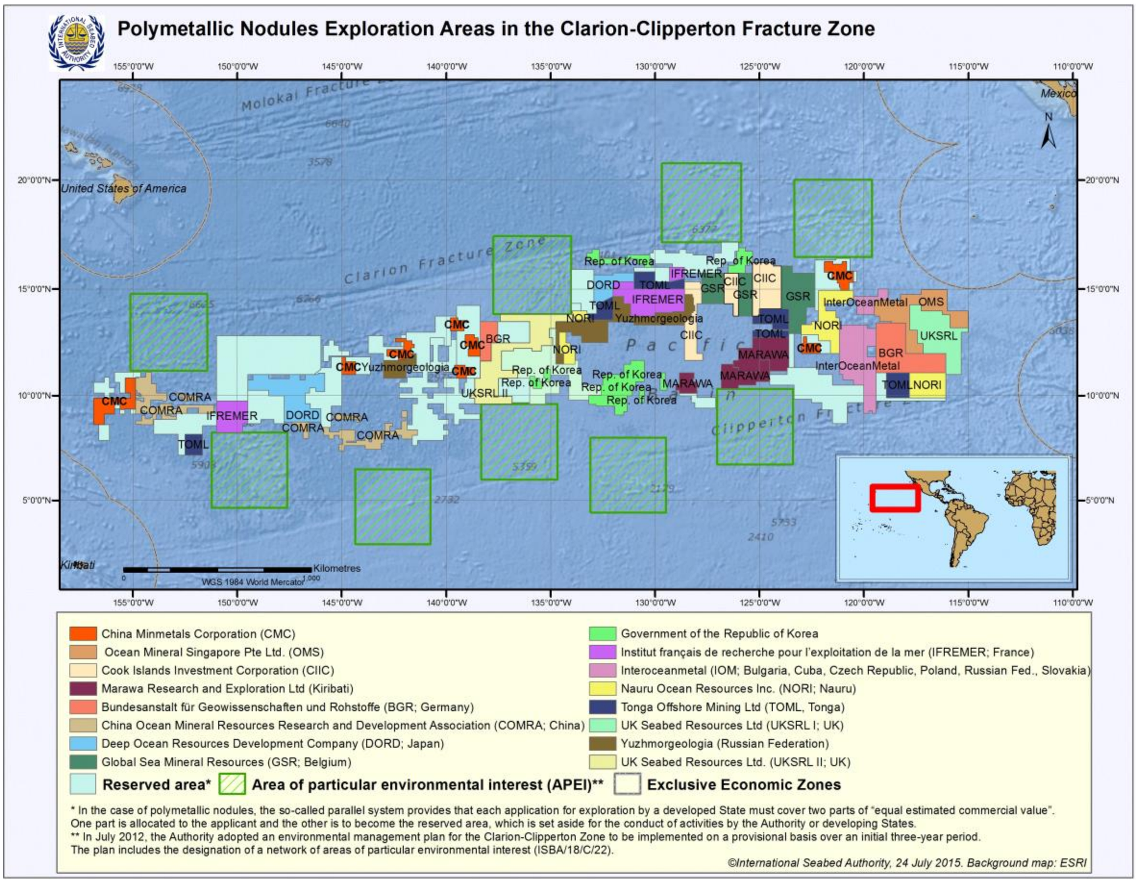

Figure 6-1: Map of the exploration areas in the Clarion-Clipperton Zone.
Source: ISA (July 2015).

An analysis of the development and content of the EMP-CCZ evidences the distinctly precautionary nature of this measure, albeit the approach was ultimately minimised by pragmatic realities. Following the recommendation from the Kaplan project[64] to establish MPAs as an option to best manage biodiversity in the CCZ, a workshop was organized in 2007.[65] The objective of the expert workshop was to design MPAs for seamounts and the abyssal nodule

[61] ISBA/21/LTC/9/Rev.1 (n 57), paragraph 6.

[62] Seascape Consultants (n 37), page 13.

[63] MIDAS is a multidisciplinary project, set up in 2013, to investigate the environmental impacts of extracting mineral and energy resources from the deep seabed. See <http://www.eu-midas.net>.

[64] Chapter 6.2.

[65] See <http://www.soest.hawaii.edu/oceanography/faculty/csmith/MPA_webpage/MPAindex.html>.

regions in the Pacific, applying ecosystem based management and the precautionary principle.[66] This demonstrates that the precautionary principle informed the development of the EMP from its outset. The workshop participants recommended the establishment of a system of nine protected areas, one in each of the biogeographic sub-regions of the CCZ, protecting a total of approximately 25 percent of the CCZ.[67] Each protected area was suggested to be 400 x 400km, which included a core area of 200 x 200km and a 100km buffer on each side.

When discussing the proposal, the LTC suggested convening another workshop with scientists, contractors, and members of the LTC to further study the proposal.[68] The outcome of that workshop, held in 2010, was a draft environmental management plan, which foresaw the possibility of APEIs, although some participants expressed doubts over the scientific basis for the APEIs.[69]

The remaining scientific uncertainties, however, did not prevent the plan from being adopted. In 2011, after having worked on the EMP-CCZ for three years the LTC made a recommendation to the Council to adopt a provisional EMP '[t]o give effect to the precautionary approach called for by the regulations.'[70] Crucially, however, the LTC had adjusted the location of the APEIs to avoid conflict with existing contract areas.[71] This resulted in 'substantial modifications to the spatial location of the science-based recommendations for the proposed MPA network.'[72] Thus, the effectiveness of the APEIs was compromised in order to avoid changes to existing exploration contracts. Given that *early* action and effectiveness of a protective measure in reaching the conservation goal are core elements of the precautionary approach, this relocation of the APEIs compromises their contribution towards implementing precaution.

The LTC's proposal for an EMP-CCZ included a plan for an expert workshop to 'peer-review and critique the existing proposal and any new data and information from the contractors.'[73] The Council, although recalling the need to apply the precautionary approach to improve management of risks to vulnerable marine biodiversity,[74] declined to adopt the EMP. Instead, it requested the LTC to examine further the proposal together with the outcome of the proposed

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[66] *Proceedings of Pew Workshop on Design of Marine Protected Areas for Seamounts and the Abyssal Nodule Province in Pacific High Seas, University of Hawai'i at Mānoa* (23-26 October 2007) <http://www.soest.hawaii.edu/oceanography/faculty/csmith/MPA_webpage/documents/Proceedings_PEW_Workshop_MPAs_October_2007.pdf>, page 9.

[67] ISA, ISBA/14/LTC/2* (28 March 2008), paragraph 19

[68] ISA, ISBA/15/C/5 (27 May 2009), paragraph 12.

[69] Lodge (n 53), pages 464-465.

[70] ISA, ISBA/17/C/13 (13 July 2011), paragraph 28.

[71] EMP-CCZ (n 41), paragraph 26; ISA, ISBA/17/LTC/2 (6 April 2011), paragraphs 17, 22.

[72] L M Wedding et al, 'Managing Mining of the Deep Seabed' (2015) 349 *Science* 144–145.

[73] EMP-CCZ (n 41), paragraph 42.

[74] ISA, ISBA/17/C/19 (21 July 2011), preamble paragraph 4.

workshop and to present a revised version in the following year.[75] The workshop was held in late 2011,[76] although its outcomes could not be considered by the LTC in a comprehensive manner at its next meeting due to insufficient time.[77] Critically, in 2012, the LTC:

> expressed concern that there may be new urgency in considering the plan given the increasing number of applications being made to the Authority for new licenses in the CCZ. It also noted that the plan, which is based on application of the precautionary approach, includes regular reviews to include new knowledge as and when it is generated, allowing the plan to be a living blueprint addressing best environmental practice as it develops.[78]

The LTC's recommendation was crucial in light of the danger that further parts of the CCZ could be allocated to contractors before protected areas were designated. This could have further jeopardized the effectiveness of the APEIs. Fortunately, the proposal received overwhelming support[79] and the Council finally adopted the EMP-CCZ in 2012.[80]

The decision by the Council expressly noted that the EMP-CCZ 'gives effect to the precautionary approach.'[81] Indeed, the plan specifically recognises precaution as a guiding principle.[82] The EMP-CCZ is the only protective measure taken by the ISA that specifically notes its relevance to the precautionary approach. However, the EMP-CCZ was only adopted when numerous areas in the CCZ were already locked up in exploration contracts and as a result the location of the APEIs had to be changed. This is at odds with two core elements of the precautionary approach, namely that it 'draws attention to the time factor, the temporal dimension […],'[83] and requires *effective* protective measures at an *early* stage. Since the geographical location of exploration areas will determine the location of commercial seabed mineral production in the future, spatial management needs to be applied before exploration contracts are granted. Thus, whilst the EMP-CCZ may be considered an example of good practice,[84] its value in serving as a precautionary measure has been reduced by the fact that the EMP-CCZ was only adopted after numerous exploration contracts had been concluded, thereby affecting the area that could be protected.

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[75] Ibid, paragraph 3.

[76] ISA, ISBA/18/LTC/4 (17 April 2012); ISA, *Environmental Management Needs for Exploration and Exploitation of Deep Sea Minerals (ISA Technical Study No 10)* (ISA, 2012).

[77] ISA, ISBA/18/C/20 (20 July 2012), paragraph 24.

[78] Ibid, paragraph 26.

[79] ISA, *Seabed Council gets Reports from Legal and Technical Commission; Discusses Environmental Management Plan for CCZ,* Press Release SB/18/9 (23 July 2012).

[80] ISBA/18/C/22 (n 47).

[81] Ibid, paragraph 1.

[82] EMP-CCZ (n 41), paragraph 13(b).

[83] *Whaling in the Antarctic* (Australia v Japan: New Zealand intervening) (Judgment) (ICJ, 31 March 2014) (Separate Opinion of Judge Cançado Trindade), paragraph 71.

[84] Lodge et al (n 45), page 72.

The decision by the Council to adopt the EMP-CCZ also stated that for a period of at least five years no application for exploration or exploitation rights should be granted in the APEIs.[85] Although a significant step, given that the APEIs were not universally supported as noted above, the protected areas were only adopted on a 'provisional basis' and, thus, do not yet ensure long-term protection. Indeed, the EMP-CCZ itself was only adopted initially for a period of three years and is subject to periodic review.[86] The first review by a consultant, published in May 2014, confirms the ongoing appropriateness of the plan's vision, goals, and strategic aims and recommends retaining the current configuration of APEIs for at least a further five-year period.[87] In light of this review, the Council has encouraged the ISA Secretariat and LTC to continue their work on the implementation of the EMP-CCZ 'up to and beyond 2015.'[88] This demonstrates that while the EMP-CCZ has been celebrated for its scale and its integration of spatial planning focused on the exploration *and* exploitation phase, the Council could only agree to it on a temporary basis. As a group of scientists who contributed to the planning process for the APEIs notes, if the ISA permanently protects the APEIs from mining 'then it will set a major international precedent in marine management in areas beyond national jurisdiction.'[89]

Interestingly, the APEIs were first developed and proposed by a group of external scientists. Moreover, while the Council was reluctant at first, it required an urgent call from the LTC to achieve adoption of the EMP-CCZ. This illustrates not only the important role of the LTC but also the involvement of external stakeholders in the ISA's decision-making. In addition, it exemplifies the importance of marine scientific research in the implementation of precaution.

In sum, the EMP-CCZ is a notable, albeit so far temporary, step for the ISA in giving effect to its environmental obligations. It contributes to the implementation of the precautionary principle, although its value is limited by the fact that it was not adopted before numerous exploration contracts had been granted.

6.3.2 Environmental Management Plans for Other Areas?

The EMP-CCZ examined in the previous section applies only to the Clarion-Clipperton Zone, although exploration contracts have also been granted for the Atlantic and the Indian Ocean.[90] In July 2013, addressing this discrepancy, delegates in the Assembly and the Council highlighted

[85] ISBA/18/C/22 (n 47), paragraphs 1, 6.
[86] EMP-CCZ (n 41), paragraph 46.
[87] Seascape Consultants (n 37), page 19.
[88] ISA, ISBA/20/C/31 (23 July 2014), paragraph 9.
[89] L M Wedding et al, 'From Principles to Practice: A Spatial Approach to Systematic Conservation Planning in the Deep Sea' (2013) 280 *Proceedings of the Royal Society of London. Series B. Biological Science* 20131684–20131693, page 20131690.
[90] See <https://www.isa.org.jm/contractors/exploration-area>.

the desirability of further EMPs.[91] The UN General Assembly has substantiated this call by inviting the ISA 'to consider developing and approving environmental management plans in other international seabed area zones, in particular where there are currently exploration contracts.'[92] In response to this call, the Council encouraged the LTC, in 2014, to consider further environmental management plans (EMPs).[93]

In light of this call, an EMP for the Mid-Atlantic Ridge has been suggested,[94] a region in which there has been growing interest in seabed minerals. The ISA has granted two contracts to explore for sulphides along the Mid-Atlantic Ridge south of the Azores and 'several other States have conducted marine scientific research or have been prospecting for minerals on the Mid-Atlantic Ridge.'[95] Additionally, one plan of work to explore for crusts in the south Atlantic has been approved by the ISA.[96]

Against this background, a 'group of scientists has recently taken the initiative to convene an expert workshop to initiate a scientific and technical process to explore the possibility of developing such [an EMP].'[97] The ISA 'has been invited to co-sponsor and participate in the workshop.'[98] Similar to the process that led to the adoption of the EMP-CCZ, this push towards an EMP for the Mid-Atlantic Ridge is being generated by external scientists, not the ISA.[99]

Participants at the workshop, held in June 2015, agreed on a road map for the development of an EMP for the Atlantic in the Area, and the strategic aims and goals of such a plan.[100] Such an EMP will have to differ from the existing EMP-CCZ, in that it will have to address the management needs of particularly vulnerable ecosystems associated with polymetallic sulphides and crusts. The early push for an EMP, at a time when only a few areas along the Mid-Atlantic Ride are subject to exploration contracts, is a positive sign. Nonetheless, it remains to be seen whether the ISA will take up the development of an EMP for the Mid-Atlantic Ridge and do so before further exploration contracts are granted for the area.

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91 ISA, ISBA/19/C/18 (24 July 2013), paragraph 13.

92 UN Doc A/RES/68/70 (n 40), paragraph 51; UNGA, UN Doc A/RES/69/245 (29 December 2014), paragraph 51.

93 ISA, ISBA/20/C/L.10 (21 July 2014), paragraph 9.

94 ISBA/21/LTC/9/Rev.1 (n 57), paragraphs 9-11.

95 Ibid, paragraph 9.

96 ISA, ISBA/20/C/30 (21 July 2014).

97 ISBA/21/LTC/9/Rev.1 (n 57), paragraph 10.

98 Ibid, paragraph 10.

99 See also L M Wedding et al, 'Managing Mining of the Deep Seabed' (2015) 349 *Science* 144-145.

100 For a summary of the workshop outcomes, see <https://webgate.ec.europa.eu/maritimeforum/en/node/3718>.

6.3.3 Multi-Purpose Marine Protected Areas

Although the APEIs designated by the Authority are a significant step in giving effect to the ISA's environmental mandate, a remaining challenge is to establish multi-purpose MPAs, that is areas which protect the environment not only from seabed mining but also from other impacts, such as fishing or waste dumping. Whilst ecosystems in the APEIs are protected from seabed mining activities, they could nevertheless be adversely impacted by ocean activities outside the scope of competencies of the ISA. This both potentially undermines the objectives of the APEIs and can affect studies concerning the environmental impact of seabed mining, which rely on comparisons between mineable and protected areas.

This problem is not unique to the seabed mining context, as marine management in areas beyond national jurisdiction is fragmented both spatially and sectorally. In addressing this problem, a significant first step was taken by the North-East Atlantic Fisheries Commission (NEAFC) and the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic. Both organisations have declared a number of areas in the North-East Atlantic, which are protected from adverse impacts associated with specific activities within their mandate, including pollution and bottom fishing, and which overlap with the protected areas by the respective other organization.[101] Building on this collaboration, the NEAFC and the OSPAR Commission concluded a *Collective Arrangement Between Competent International Organizations on Cooperation and coordination regarding selected areas in Areas Beyond National Jurisdiction in the North-East Atlantic.* This arrangement was entered into by both parties in 2014 and focuses on MPAs designated by either party in order to commits them to 'cooperate and seek coordination to ensure that suitable measures for the conservation and management of these areas are implemented […].'[102] This collaboration, although non-binding, could broaden the existing cooperation between both organisations to include a general, mutual recognition of MPAs adopted by either party with respect to the sectoral activities within their competence.

In July 2014, the ISA Council discussed whether to join this collective arrangement.[103] No agreement could be reached although the ISA Secretariat was requested to enter into discussions with the NEAFC and the OSPAR Commission.[104] If the ISA joins the arrangement, [105] this could

[101] OSPAR Commission, *2012 Status Report on the OSPAR Network Network of Marine Protected Areas* (2013) <http://www.ospar.org/documents/dbase/publications/p00618/p00618_2012_mpa_status%20report.pdf>.

[102] ISA, ISBA/20/C/15 (1 July 2014), enclosure II, paragraph 5.

[103] ISBA/20/C/15 (n 102).

[104] ISA, ISBA/20/C/32 (23 July 2014), paragraph 27.

[105] Since 2008, the ISA has developed its cooperation with the OSPAR Commission through a Memorandum of Understanding and reciprocal observer status. See ISA, ISBA/18/C/10 (28 June

provide an opportunity to ensure that the marine protected areas established by the OSPAR Commission and NEAFC will also be protected from potential harm associated with seabed mining. This could go some way towards developing multi-purpose MPAs, albeit only in the North-East Atlantic. If successful, such an arrangement could also be formed with other organisations that have competence over maritime activities. In fact, the International Maritime Organisation (IMO) is currently considering whether to also join the collective arrangement between the NEAFC and the OSPAR Commission.[106]

6.3.4 Preservation Reference Zones

A further spatial management measure relevant to the ISA's implementation of the precautionary approach, is the establishment of both *preservation reference zones* and *impact reference zones*, as provided for in the *Exploration Regulations*.[107] The former are pristine areas in which no mining is allowed and which should be similar to the mined areas in terms of environmental characteristics and biota. *Impact reference zones* on the other hand will be mined and should be representative of the environmental characteristics of the Area to allow an assessment of the effects of activities in the Area on the marine environment, including changes in the biodiversity.[108] These zones are foreseen as part of the monitoring programme that contractors have to establish to continuously monitor the effects of their mining activities on the environment. Moreover, the EMP-CCZ reiterates the need for impact and preservation reference zones and foresees them as part of each contractor's 'site-specific environmental management plans'[109] in the Clarion-Clipperton Zone.

However, the parameters of impact and preservation reference zones are yet to be developed. In particular, two questions remain uncertain. First, the time at which these zones will have to be designated is unclear. Under the original *Nodules Exploration Regulations* adopted in 2000, the designation of such zones was only required 'if the Contractor applies for exploitation rights.'[110] Thus impacts of exploration work were neglected, which could result in a distortion of the baseline on which the impact of exploitation work would then be assessed. This changed with the *Sulphides* and *Crusts Exploration Regulation*s, which also led to the *Nodules Exploration Regulations* being updated. Thus, both types of reference zones are now foreseen during the

2012).

[106] ISA, ISBA/21/C/9 (3 June 2015), paragraph 4.

[107] *Nodules Exploration Regulations*, regulation 31(6); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(6).

[108] Ibid; EMP-CCZ (n 41), paragraph 41(c); ISA, ISBA/19/LTC/8 (1 March 2013), paragraph 26(d) (*EIA Recommendations*).

[109] EMP-CCZ (n 41), paragraph 41.

[110] ISA, ISBA/6/A/18 (13 July 2000), regulation 31(7).

exploration phase, although only 'when required by the Council.'[111] This change was 'justified by the lack of knowledge of the characteristics of the marine environment at potential exploration sites for sulphides and crusts, the considerable uncertainties surrounding potential effects on the marine environment and the need for better monitoring.'[112] However, the Council has not yet required such zones to be designated, perhaps because the *EIA Recommendations* only require a monitoring programme for specific exploration activities that have the potential to cause serious environmental harm, such as creating artificial disturbances on the seafloor, which contractors have not yet commenced.[113] Furthermore, the EMP-CCZ only foresees these zones as part of each contractor's site specific environmental management plan to be submitted with their 'proposed mining plan prior to operations,' that is prior to the exploitation of minerals.[114] However, should test mining, an element of exploration work,[115] be undertaken without prior identification of these zones, their value could be undermined.

Second, the size and location of preservation reference zones, as well as any potential buffer zone, remains unclear.[116] It is suggested that the relatively close proximity to mined areas of *preservation reference zones* could facilitate recolonisation post-mining.[117] However, in order not to be impacted by mining, preservation reference zones will need to be both large and located away from any direct or indirect effects of mining operations, including sediment plumes.[118] Integrating the zone into a contractor's exploitation area will 'likely not succeed in its objective of ensuring representative and stable biota.'[119] Therefore, designating large no-mining zones outside of contracted areas may be a viable alternative,[120]although this will likely compromise recolonisation efforts following mining operations. In any event, assessments of environmental impacts using these zones could be distorted by activities other than seabed mining. Similarly, it has yet to be discussed whether some of the uses of preservation reference zones could be fulfilled by larger MPAs, such as the APEIs in the Clarion-Clipperton Zone.[121] A workshop to develop specific guidelines for the establishment of both impact and preservation

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[111] *Nodules Exploration Regulations*, regulation 31(6); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(6).
[112] ISA, ISBA/12/C/2 (Part II) (24 May 2006), paragraph 26.
[113] *EIA Recommendations* (n 108), paragraph 19.
[114] EMP-CCZ (n 41), paragraphs 18, 41(a).
[115] *Exploration Regulations*, regulation 1(3)(b).
[116] Seascape Consultants (n 37), page 11.
[117] Ibid.
[118] *EIA Recommendations* (n 108), paragraph 26(d).
[119] Lodge (n 53), pages 466-467.
[120] Seascape Consultants (n 37), page 11-12. For a summary of the discussion on the various zonal options, see Lodge (n 53), pages 466-467.
[121] Seascape Consultants (n 37), page 15.

reference zones is envisaged in the EMP-CCZ[122] and the 2014 review of the EMP recommended that the ISA organise such a workshop in 2015.[123]

The review of the EMP-CCZ also suggests that instead of individual contractors deciding on the location of *preservation reference zones*, their location could be based on Strategic Environmental Assessments (SEAs),[124] whereby environmental baselines data from contractors could be integrated into a regional dataset to identify optimal locations for the zones. This could ensure that any decision regarding the location of preservation reference zones would take into account regional spatial planning to ensure preservation reference zones are located a reasonable distance away from any mining operations in an adjacent contract area.[125]

In sum, although incorporated into the Mining Code, impact and preservation reference zones have not yet been translated into practice. Thus, reference zones and environmental management plans for individual contract areas, as foreseen by the EMP-CCZ, present *potential* precautionary measures. Because reference zones facilitate environmental impact assessments (EIAs) and essentially represent MPAs, albeit very small ones, they could become an important element in the ISA's implementation of the precautionary principle.

6.3.5 Safety Margins

A protective measure relevant to the implementation of the precautionary principle and often directly associated MPAs is a safety margin; an ecological buffer to minimise environmental harm in the absence of scientific certainty.[126] The ISA has utilised precautionary safety margins in the form of physical protection zones in establishing the nine APEIs in the Clarion-Clipperton Zone.[127] The core of each APEI is surrounded by 100km buffer zones in each direction to ensure mining operations in adjacent areas will not impact the biodiversity and ecosystem functions within the APEIs.[128] This size is estimated to protect the APEIs from the limits of dispersal of plumes, although lack of research required the size to be determined as a 'best guess'.[129]

In addition to being spatial management tools, safety margins can also take the form of quotas,

[122] EMP-CCZ (n 41), paragraph 50.
[123] Seascape Consultants (n 37), pages 10-11, 17-19.
[124] Chapter 5.4.1.2.
[125] Seascape Consultants (n 37), page 11.
[126] Trouwborst (n 3), pages 169-170; Rosie Cooney, *The Precautionary Principle in Biodiversity Conservation and Natural Resource Management: An Issue Paper for Policy-Makers, Researchers and Practitioners* (IUCN, 2004), page 30.
[127] Chapter 6.3.1.
[128] EMP-CCZ (n 41), paragraph 25.
[129] Lodge et al (n 45), page 71; see also Wedding et al (n 89), page 20131687.

for example cautious catch limits as applied in the fisheries context.[130] The margin of error can be expanded with increased uncertainties. In the seabed mining context, this could be used to set quantitative limits for exploration and exploitation activities in a particular region, in light of the environmental harm suspected from cumulative impacts. It remains to be seen whether such measures will be adopted for the exploitation phase.

This section has examined the ISA's implementation of MPAs. Instead of repeating the conclusions drawn in each of the sections, some macro-level observations might be useful. Although it is significant that the ISA has started to utilize spatial planning and APEIs, a form of MPA, it only designated the first APEIs in 2012, eleven years after the first six exploration contracts were granted for the Clarion-Clipperton Zone. This is perhaps even more noteworthy, when it is realized that the APEIs are not the product of strategic environmental assessments by the ISA but rather of the recommendations of scientists engaged in research on the deep ocean environment. Nevertheless, while the lack of strategic environmental assessments by the ISA *before* exploration contracts are given out can be criticized, the involvement of external scientists is a positive characteristic of the ISA's decision-making. Given the uncertainties involved in seabed mining, any risk assessment and risk management decision must be based on best available science. In line with this aim, the example of regional EMPs illustrates the ISA's active collaboration with the scientific community.

6.4 Measures Pertaining to Particularly Vulnerable Ecosystems

A further precautionary measure, aimed at particularly vulnerable ecosystems, is provided for in the *Exploration Regulations*. The *Regulations* recognize that vulnerable marine ecosystems, such as hydrothermal vents, seamounts, and cold water corals, may require special management.[131] The LTC is required to develop and implement procedures for determining whether proposed <u>exploration</u> activities in the Area would have serious harmful effects on vulnerable marine ecosystems. If this is the case, the LTC must ensure 'those activities are managed to prevent such effects or not authorized to proceed.'[132]

Although this obligation could lead to MPAs around vulnerable ecosystems, as discussed in Chapter 5.4.2.2, it extends further than that. The formulation of the provision is non-restrictive and could allow the LTC to decide to prohibit mining, and indeed exploration work, around

[130] FSA, article 6, annex II; *FAO Code of Conduct for Responsible Fisheries* (adopted 31 October 1995), article 7(5).

[131] *Sulphides* and *Crusts Exploration Regulations*, regulation 33(3). The *Nodules Exploration Regulations* have been updated in 2013 to integrate this and other provisions, see *Nodules Exploration Regulations*, regulation 31(4).

[132] *Nodules Exploration Regulations*, regulation 31(4); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(4).

vulnerable marine ecosystems. Because it enables action at an early stage, during mineral exploration, this provision has significant potential to support the ISA's implementation of the precautionary approach. The importance of this provision is illustrated in the summary of the LTC's work on the *Sulphides* and *Crusts Exploration Regulations*:

> [T]he Commission recalls the way in which polymetallic sulphide and cobalt-rich ferromanganese crusts occur in parts of the marine environment that are now known to host complex — and, in many ways, unique — marine ecosystems, and of a type that may be susceptible to major trauma. There is <u>some potential for serious and permanent harm</u> in these areas during the process of seabed mining. While this may also be, to some extent, the case for nodule mining (we are still not absolutely sure of this), the nodule deposit is one that, by its nature, covers so wide an area that the extent of such harm may be mitigated. For sulphides occurring at active sites, the deposits are very localized, hence the <u>potential impact at a mine site is likely to be significant</u>. For these reasons, there has been much more emphasis on the protection and preservation of the marine environment in the draft regulations on prospecting and exploration for polymetallic sulphides and cobalt-rich ferromanganese crusts in the Area.[133]

However, despite this importance and the fact that this obligation was incorporated into the Mining Code in 2010, the LTC has not yet acted upon it. What is more, the UN General Assembly has repeatedly called upon the ISA and other international organisations to 'urgently consider' means to manage the risks to these vulnerable ecosystems.[134] However, no action has been taken under these provisions. In the meantime, the ISA has already granted exploration contracts for polymetallic sulphides, associated with hydrothermal vents, to China, Russia, Korea, France, India, Germany and exploration contracts for ferromanganese crusts on seamounts to Japan, China, Brazil, and Russia without having considered whether special protective measures are necessary.[135] Moreover, the ISA has granted over fifteen exploration contracts to explore for nodules.[136] Some of these exploration areas include vulnerable ecosystems that could be impacted by nearby nodules exploration work.[137] These developments are particularly alarming since the experience in the CCZ demonstrated that for MPAs to be most effectively located, they need to be agreed before dividing marine spaces into various contract areas. This failure to act and to give effect to an important provision in the Mining Code significantly undermines the ISA's implementation of the precautionary approach.

As indicated at the outset of this section, the protection of vulnerable marine ecosystems could extend beyond the creation of particular MPAs and could ultimately lead to a restriction or

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133 ISA, ISBA/11/C/5 (12 August 2005), paragraph 15.

134 UNGA, UN Doc A/Res/67/78 (11 December 2012), paragraphs 190-191; UN Doc A/RES/68/70 (n 40), paragraphs 206-207; UN Doc A/RES/69/245 (n 92), paragraph 221-222.

135 See <https://www.isa.org.jm/deep-seabed-minerals-contractors>.

136 Ibid.

137 EMP-CCZ (n 41), paragraph 15.

prohibition of exploration activities near particularly vulnerable ecosystems. In other words, instead of permitting seabed mining everywhere except for in MPAs, mining could generally be restricted within a certain radius of vulnerable ecosystems. A parallel may be drawn with deep sea fisheries, which are to be restricted around these ecosystems.[138] A general restriction of seabed mining near vulnerable ecosystems would address some of the scientific uncertainties regarding the effects of mining. With respect to cobalt-rich crusts, for example, the LTC noted that biological communities differ at various locations on the seamount depending on the substrate available as well as the location of the oxygen minimum zone. 'There is also a great deal of variation between seamounts that makes it difficult to predict impacts on one seamount from research on another.'[139] This in turn impedes any determination as to whether local effects from mining activities could have global effects, 'such as the extinction of endemic species.'[140] Against this background, individual MPAs might not be able to fully protect vulnerable ecosystem associated with seamounts. Certainly, if future exploitation regulations limit or prohibit commercial mining in areas around particularly vulnerable ecosystems, it would be coherent to apply similar restrictions for exploration activities, not least to avoid contractors spending unnecessary time and funds exploring for minerals in those 'exclusion zones.'

Prohibiting a potentially harmful activity is one of the most far-reaching precautionary measures. Whilst a general moratorium raises questions of proportionality[141] the international community has recognized moratorium as a viable, albeit exceptional, measure for the protection of particularly vulnerable species and ecosystems. For example, moratoria have been applied to large-scale pelagic drift-net fishing on the high seas,[142] and commercial whaling.[143] In the specific case of seabed mining, the now defunct 1988 *Convention on the Regulation of Antarctic Mineral Resource Activities* (CRAMRA) provided for the prohibition of seabed mineral mining in the Antarctic in 'any area designated as a Specially Protected Area or a Site of Special Scientific Interest under Article IX(1) of the Antarctic Treaty'[144] and specifically allowed prohibitions based on ecological and environmental reasons.[145] Before entering into

[138] FAO, *International Guidelines for the Management of Deep-Sea Fisheries in the High Seas* (FAO, 2009).

[139] ISA, ISBA/10/C/4 (28 May 2004), paragraph 15.

[140] Gwénaëlle Le Gurun, 'Environmental Impact Assessment and the International Seabed Authority' in Timo Koivurova and C J Bastmeijer (eds), *Theory and Practice of Transboundary Environmental Impact Assessment* (Brill Academic Publishers, 2007) 221 –264, 239.

[141] Chapter 2.3.3.

[142] UNGA, UN Doc A/RES/46/215 (20 December 1991).

[143] *Convention on the Conservation of Antarctic Marine Living Resources* (adopted 20 May 1980, entered into force on 7 April 1982) 1329 UNTS 48, schedule as amended by the Commission at the 65th Meeting (September 2014), paragraph 10(e).

[144] *Convention on the Regulation of Antarctic Mineral Resource Activities* (opened for signature 2 June 1988, not in force) 27 ILM (1988), article 13(1).

[145] Ibid, article 13(2).

force, however, CRAMRA was replaced by the 1991 *Protocol on Environmental Protection to the 1959 Antarctic Treaty*, which established a moratorium on *all* mineral resource activities in the Antarctic.[146]

The integration into the Mining Code of an obligation for the LTC to consider special protection measures for vulnerable marine ecosystems during the exploration phase was an important step in line with the precautionary approach and the ISA's environmental mandate. However, the ISA has failed to act upon that obligation. The LTC has not yet performed the required assessment as to whether exploration work would have serious harmful effects on these ecosystems, let alone adopted management measures. Instead, the number of exploration contracts being granted is rapidly increasing. This begs the question: how can restrictive environmental standards be imposed once 15- year exploration contracts have been concluded?[147] This failure to act early jeopardizes the effectiveness of any further management measures and significantly undermines the ISA's implementation of the precautionary approach.

6.5 Listing of Particular Activities

A further precautionary measure is the listing of activities or substances that are presumed either to cause or not cause serious environmental damage. This measure allows grouping of activities to apply particular conditions to such groups. It can be applied in a variety of ways. For example, a list can indicate all activities presumed to *not* cause serious environmental harm, which may then be carried out with few or no restrictions. Other activities can be either prohibited or subject to restrictions. The *OSPAR Convention*, for instance, applies listing in relation to pollution by dumping or incineration whereby '[t]he dumping of all wastes or other matter is prohibited, except for those wastes or other matter listed in paragraphs 2 and 3 of this Article.'[148] Similar measures can be applied to processes or indeed to biodiversity, by declaring all species as protected unless they are specifically listed as non-endangered.[149]

Conversely, lists can name all activities that are presumed to be harmful, which are then either subject to stricter requirements or prohibited unless they can be shown not to cause serious environmental damage. This in effect incorporates a reversal of the burden of proof and is, thus, also a procedural measure. The *Convention on Persistent Organic Pollutants*, for example,

146 *Protocol on Environmental Protection to the Antarctic Treaty* (adopted 4 October 1991, entered into force on 14 January 1998) 30 ILM 1455 (1991), article 7.

147 See Chapter 7.3.

148 *Convention for the Protection of the Marine Environment of the North-East Atlantic*, (adopted 22 September 1992, entered into force 25 March 1998) 2354 UNTS 67, annex II article 3(1).

149 But see the discussion about potential negative side effects of directly linking the biological status of species with specific management responses in Cooney (n 126), pages 34-35.

prohibits and restricts the use and production of listed chemicals.[150]

The ISA uses listing albeit in a limited manner. The *EIA Recommendations* specifically list those exploration activities requiring prior EIAs as well as environmental monitoring during and after the activity.[151] Additionally, the *Recommendations* specify those activities considered to have no potential for causing serious environmental harm and which are consequently not subject to EIAs.[152] Although the use of these lists does not result in a reversal of the burden of proof, it provides recommendations to the contractors and indeed the sponsoring states as to how to implement their legal obligations with respect to EIAs and the environmental monitoring programme.

Listing could be used in additional ways in the seabed mining context. For example, listing could be deployed to permit only specific mining activities compiled in lists or to register rare or particularly important species in order to afford specific protective measures to them. For the latter, a better knowledge of deep sea species and ecosystems will likely be a prerequisite, not least, as discussed in Chapter 2.3.3, to ensure the measure will be both effective and proportionate. Nonetheless, in line with the precautionary principle, it is not necessary to overcome all uncertainty.

6.6 Emergency Orders

Emergency orders are an important measure to prevent and limit environmental harm in the case of urgent incidents. As discussed in Chapter 5.4.4, emergency measures are foreseen in the LOSC[153] and the *Exploration Regulations* add a response mechanism that enables the ISA to intervene in case activities by a contractor 'have caused, are causing or pose a threat of serious harm to the marine environment.'[154] In these situations, the Council, upon recommendation by the LTC, may order suspension or adjustment of operations. Moreover, the ISA Secretary-General has the competence to take immediate measures of a temporary nature, for no longer than 90 days. If the contractor does not comply, the Council is authorised to take 'such practical measures as are necessary to prevent, contain and minimize any such serious harm or threat of serious harm to the marine environment.'[155]

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[150] *Convention on Persistent Organic Pollutants* (adopted 22 May 2001, entered into force 17 May 2004) 2256 UNTS 119, article 3(1).

[151] *EIA Recommendations* (n 108), paragraphs 19-25.

[152] Ibid, paragraph 18.

[153] LOSC, articles 162(2)(w), 165(2)(k).

[154] *Nodules Exploration Regulations*, regulation 33; *Sulphides* and *Crusts Exploration Regulations*, regulation 35.

[155] *Nodules Exploration Regulations*, regulation 33(7); *Sulphides* and *Crusts Exploration Regulations*,

However, it remains entirely unclear how to give effect to emergency orders and which practical measures such orders could entail. In particular, it is unclear how the Council and the LTC can decide over measures in an emergency, when both bodies only meet one to two times a year. Moreover, it is unclear which practical measures such orders could entail. A brief examination of the history of the *Exploration Regulations* illustrates this difficulty. In adopting the first set of *Exploration Regulations* in 2000, the Council noted its concern regarding 'the need for appropriate forms of guarantee to enable the Council to take immediately the necessary measures to implement an emergency order in the event of failure or inability on the part of a contractor to comply with such orders.'[156] Such guarantees include availability of financial resources as well as contingency plans and emergency response strategies. Whilst the Council noted this deficiency and appreciated that significant risks for the marine environment would arise at the phase of testing of collecting systems and processing operations,[157] it chose to postpone consideration of the matter. Nevertheless, it did decide to consider guarantees for emergency orders by contractors prior to any test mining.[158] To that end, the Council requested the Secretariat, in 2000, to carry out comparative studies of appropriate options to inform its future discussions on the matter.[159] However, as of July 2015, no studies or discussions have been published. This is important because emergency orders are not limited to the exploitation phase. Test mining and other activities that the LTC has recognized as having the potential to cause serious environmental harm[160] can be carried out under an exploration contract. Indeed, one contractor submitted an intention in 2014 to undertake the first dredging operation.[161] In short, although provided for in the Mining Code, the ISA has, at present, failed to fully provide for the implementation of emergency orders.

In conclusion, in line with the precautionary approach, the *Exploration Regulations* elaborate on emergency orders as foreseen in the LOSC by determining the roles of the Secretary-General, the Council, the LTC, and contractors in identifying and responding to an emergency.[162] However, the *Regulations* currently fall short of specifying the details of such orders and they fail to require guarantees to give effect to emergency orders. Moreover, the ISA has not yet ensured the institutional capacity necessary to fully implement emergency orders. As such, whilst emergency orders are a protective precautionary measure, their implementation remains compromised.

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regulation 35(7).
[156] ISA, ISBA/6/C/12 (13 July 2000), part II preamble paragraph 3.
[157] Ibid, part II, preamble, paragraph 1.
[158] Ibid, part II, paragraph 1.
[159] Ibid, part II, paragraph 2.
[160] *EIA Recommendations* (n 108), paragraph 19.
[161] ISA, ISBA/20/C/20 (16 July 2014), annex I, paragraph 14.
[162] See Chapter 5.4.4.

6.7 Environmental Restoration

Restoring habitat and facilitating resettlement of biota in mined areas constitutes a further potential measure within the spectrum of environmental protection tools. Whilst not a precautionary measure as such, owing to its focus on remediation rather than prevention, an early consideration of restoration possibilities can influence the assessment of the risks associated with seabed mining. In other words, knowing about the feasibility of restoration affects the degree of caution to be exercised at an early stage.

Restoration potential will likely differ for the three types of mineral deposits. Polymetallic nodules require millennia to grow and build the hard substrata for diverse biota. Once removed, it is difficult to restore ecosystems associated with this substratum.[163] As Van Dover et al observe, 'How do we begin to contemplate restoration of nodule beds, bearing in mind factors such as these? In such a case, restoration simply may not be the optimal goal or tool for environmental management.'[164] The same is likely true for cobalt-rich crusts, not least because cold-water corals on seamounts are exceptionally long-lived and stable ecosystems.[165] As representatives of the aforementioned MIDAS research project noted:

> For nodule and crust areas the species are likely to be long lived and slow growing with a low potential to recolonise. […] The removal of the nodules and crusts will effectively take away that habitat and this cannot be restored as the resource takes millions of years to form under particular conditions. One must be very careful to suggest restoration and rehabilitation with these habitats.[166]

Polymetallic sulphides are associated with hydrothermal vent ecosystems, which are dynamic ecosystems that undergo natural catastrophic disturbances through tectonic or volcanic activity.[167] They are more likely to recover than ecosystems associated with nodules or crusts. However, high degrees of endemism around hydrothermal vents exacerbate the challenges of resettling biota following mining operations.[168] Moreover, an identification of those ecosystem functions that are critical to restore is not yet possible owing to a lack of knowledge over ecosystem functions in the deep ocean.[169] In general, the outcome of even well-planned

163 C L Van Dover et al, 'Ecological Restoration in the Deep Sea: Desiderata' (2014) 44 *Marine Policy* 98–106, 103.

164 Ibid.

165 J Murray Roberts, Andrew J Wheeler, and André Freiwald, 'Reefs of the Deep: The Biology and Geology of Cold-Water Coral Ecosystems' (2006) 312 *Science* 543–547.

166 Submission to the Stakeholder Survey (n 4) by MIDAS, 4.

167 Van Dover et al (n 163), page 102; Maria C Baker et al, 'Biogeography, Ecology, and Vulnerability of Chemosynthetic Ecosystems in the Deep Sea' in Alasdair McIntyre (ed), *Life in the World's Oceans: Diversity, Distribution, and Abundance* (Wiley-Blackwell, 2010) 161–182.

168 Baker et al (167), page 164.

169 Submission to the Stakeholder Survey (n 4) by Professor Hjalmar Thiel and Dr Gerd Schriever, 4; by DOSI, pages 12-13.

environmental restoration is uncertain.[170]

In addition to these challenges, costs for restoration efforts in the deep sea 'will be high (likely orders of magnitude higher) relative to those on land or in shallow water due to the remote and technically challenging aspects of deep-sea manipulations.'[171] Consequently, restoration of deep ocean ecosystems will likely be nearly impossible for some ecosystems and will require high, potentially prohibitive expense in any case.[172]

Against this background, strong precautionary measures are required. The environmental harm of removing mineral deposits that provide habitat for deep ocean ecosystems will in some cases be irreversible in human timescales.[173] As discussed in Chapter 2.3, any long-term, or indeed irreversible, effects influence the evaluation of the proportionality and effectiveness of a precautionary measure.[174] This underlines the importance of taking early and strong precautionary measures, such as declaring MPAs and putting in place measures to protect vulnerable marine ecosystems as examined in Chapters 6.3 and 6.4 respectively.

The importance of concentrating on precautionary measures as opposed to restoration has been appreciated by the ISA, as a brief summary of its considerations of restorative options demonstrates. Neither the LOSC nor the *Exploration Regulations* specifically mention requirements with respect to environmental restoration. However, the Environmental Management Plan for the CCZ requires contractors to 'develop plans to ensure responsible environmental management to enhance the recovery of habitats and faunal communities.'[175] In developing the regulatory framework for exploitation, the ISA had started to consider restoration options more broadly. The draft framework for exploitation published in July 2015, foresees a regulation to require contractors to undertake restoration where feasible and references 'technical feasibility' and 'cost-efficiency' in this respect.[176] Yet it also notes there is '[g]eneral consensus by stakeholders for focus to be on impact minimisation and mitigation

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[170] Katharine N Suding, 'Toward an Era of Restoration in Ecology: Successes, Failures, and Opportunities Ahead' (2011) 42 *Annual Review of Ecology, Evolution, and Systematics* 465–487.

[171] Van Dover et al (n 163), page 100.

[172] Ibid; Kathryn J Mengerink et al, 'A Call for Deep-Ocean Stewardship' (2014) 344 *Science* 696-698, page 697.

[173] Hjalmar Thiel, 'Evaluation of the Environmental Consequences of Polymetallic Nodule Mining Based on the Results of the TUSCH Research Association' (2001) 48 *Deep Sea Research II* 3433–3452, page 3443.

[174] Commission of the European Communities, *Communication from the Commission on the precautionary principle*, COM(2000) 1 final (2 February 2000), pages 17-18.

[175] EMP-CCZ (n 41), paragraph 38(d); see also paragraph 41(f).

[176] ISA, *Developing a Regulatory Framework for Deep Sea Mineral Exploitation in the Area: Draft Framework, High Level Issues and Action Plan, Version II*, (15 July 2015) <https://www.isa.org.jm/files/documents/EN/OffDocs/Rev_RegFramework_ActionPlan_14072015.pdf>, 35.

measures rather than restoration at this time.'[177]

What is important for the purpose of this thesis is that whilst restoration will likely form part of the legal framework for the exploitation of seabed minerals, its efficacy remains unknown. As such, the focus must be on adopting strong precautionary measures to minimise harm before widespread and partly irreversible damage occurs as well as conducting marine scientific research to support the development of effective protective measures.[178]

6.8 Conclusion

This chapter has clearly demonstrated that what is incorporated into the ISA's *Regulations* and *Recommendations* is not necessarily what is implemented in practice. There are at least two positive examples of actions not mentioned in the Mining Code, yet implemented in practice. First, the EMP-CCZ, with its establishment of nine protected areas, is perhaps the single most important environmental protection measure the ISA has adopted. It was adopted despite neither EMPs nor marine protected areas being specifically mentioned in the Mining Code or the LOSC. The EMP, although temporary in nature, is justifiably presented as an example of good environmental practice[179] because of its regional-scale, ecosystem-based management. The EMP was specifically adopted to give effect to the precautionary approach, although its value in doing so is limited by the fact that it was not adopted before numerous exploration contracts had been granted. Consequently, the location of the protected areas was changed because some of the seafloor that should have been protected was already locked up in exploration contracts.

The second positive example is the involvement of the ISA in marine scientific research. As concluded in Chapter 5.5, whilst the Mining Code specifies research obligations for contractors, it does not specifically develop the ISA's mandate to promote, encourage, and conduct marine scientific research concerning the Area.[180] Nevertheless, in practice the ISA has engaged in several research projects. It is noteworthy though that much of the research that generated new scientific data was not necessarily conducted on the ISA's initiative but was instead conducted by external research institutions with whom the ISA then collaborated. Pursuant to the precautionary principle, scientific research must be an important element in the adoption of particular protective measures. This was indeed the case for the nine APEIs in the Clarion-Clipperton Zone which were recommended by external scientists following the Kaplan research project. However, the same cannot be said with respect to the recommendations from scientists

[177] Ibid.
[178] Mengerink et al (n 172), page 698; Van Dover et al (n 163), page 102.
[179] Lodge et al (n 45).
[180] LOSC, article 143.

to utilise spatial management tools for the protection of seamount ecology and chemosynthetic ecosystems around sulphide-rich hydrothermal vents. These recommendations have yet to be taken up.

In contrast to these two largely positive examples, some important protective measures foreseen in the Mining Code have not yet been implemented. Most importantly, the LTC has not yet deliberated over the impacts that mineral exploration work can have on particularly vulnerable ecosystems, such as cold-water corals and hydrothermal vent communities. The Mining Code allows for far-reaching measures to be adopted, including the possibility that these activities are 'not authorized to proceed' if they are found to be seriously harmful.[181] Instead of acting upon these provisions, the ISA has continued to grant exploration contracts in areas around vulnerable ecosystems without assessing the potential impacts. This is particularly alarming because the discussion regarding restoration measures demonstrate that post-mining restoration is impossible in some cases and certainly very costly in any case. Consequently, it is all the more important to minimize harm before widespread and partly irreversible damage occurs. The ISA's failure to act with respect to vulnerable marine ecosystems, despite repeated calls by scientists, significantly undermines the ISA's implementation of the precautionary approach.

Similarly, the ISA has not yet given effect to preservation reference zones or utilized safety margins in the form of quotas. The latter could allow the ISA to address the cumulative risks of numerous parallel exploration and exploitation activities. However, despite the EMP-CCZ recognizing the importance of addressing such risks, no action has yet been taken. Lastly, the ISA is at present unprepared to deal with environmental emergencies. Although the Mining Code develops a basic procedure, it is unclear how emergency orders would be implemented.

It is of course true that seabed mining is currently only in the exploration phase and that the implementation of these measures will be most important during the forthcoming exploitation stage. However, the analysis of the ISA's current implementation of protective measures is nonetheless important for two reasons. First, environmental harm can already be caused during exploration work, which includes test mining, drilling, and creating artificial disturbances on the seafloor.[182] Second, an analysis of the strengths and weaknesses of the ISA's work during the exploration stage helps to identify critical issues relevant to the development of the regulatory and institutional framework for the exploitation stage.

To add some high-level concluding remarks to this chapter, the discussion has demonstrated the challenge for the ISA in applying protective measures at an *early* stage, which in turn

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[181] *Nodules Exploration Regulations*, regulation 31(4); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(4).

[182] *EIA Recommendations* (n 108), paragraph 19.

compromises its implementation of the precautionary approach. In particular, the need to act in a timely manner is problematic with respect to the designation of impact and preservation reference zones, the protection of particularly vulnerable ecosystems, and the setting of APEIs in the Clarion-Clipperton Zone.

A further conclusion that can be drawn is that there is a lack of a strategic vision for balancing seabed mining and environmental protection. The protective measures were adopted through ad hoc decisions. To counteract this, the adoption of a comprehensive environmental management strategy would not only be in line with the ISA's mandate but it would ensure that protective measures could be integrated into a broader vision and that each measure would supplement or complement the others.[183] This could also facilitate measures being taken at an early stage in line with the requirement of timing under the precautionary principle.

Building on this lack of strategic vision, a last point that must be highlighted is the role of third parties. The discussion on marine scientific research demonstrates that much of the research is driven by external scientists. This raises the question: to what extent can the adoption of a protective measure be attributed to the ISA? The ISA is, of course, the decision-making body and the involvement of the scientific community must be warmly welcomed. However, one may wonder whether the EMPs, both for the Clarion-Clipperton Zone and for the Mid-Atlantic Ridge, would have made it onto the ISA's agenda if it were not for the work of external scientists. Whilst the involvement of scientists in the decision-making process is in line with the precautionary principle, a *reliance* on external scientists taking initiatives to research and propose protective measures supposes a secondary role for the ISA that can be problematic.

However, positing the need for a clear and comprehensive environmental strategy for the ISA, presupposes that strategic environmental assessments will identify potential protective measures and compare them at an early stage. This raises the question of whether the ISA's procedural framework, including the ISA's procedural competence to conduct environmental assessments, can provide some explanations as to why some protective measures have been taken and others have not. The following chapter turns to the analysis of this question.

[183] Jaeckel (n 56).

Chapter 7: Implementing the Precautionary Approach: Procedural Elements

7.1 Introduction

'[T]*he procedural deficit in global environmental law requires our attention.*'[1]

The previous chapter demonstrated that the International Seabed Authority has implemented some important protective measures, such as designating nine marine protected areas in the central Pacific. However, several other measures foreseen in the *Exploration Regulations* have not yet been given effect. In particular, the ISA has not deliberated over the impacts that mineral exploration work can have on particularly vulnerable ecosystems, such as cold-water corals and hydrothermal vent communities. As a result, no protective measures have been put in place. Similarly, the ISA has not yet utilized quotas to regulate the number of mineral exploration activities occurring in parallel, or during a certain time period, in a particular region. The discussion has demonstrated the challenge of acting in a timely manner, in line with the precautionary principle. Furthermore, it has demonstrated that there is no discernible strategic vision regarding the balancing of seabed mining and environmental protection. On the contrary, the adoption of protective measures to date appears to have been on an *ad hoc* basis.

As will be recalled from Chapter 2.4.1, implementing precaution involves three dimensions. Adopting *protective measures* at an early stage is one such dimension, and essentially the outcome of applying the precautionary approach. In order to achieve the adoption of protective measures, the two other dimensions of the precautionary principle are relevant: the institution tasked with implementing precaution must have the *procedural* and *institutional capacity* to conduct risk assessments of seabed mining activities and give effect to protective measures to manage the risk. In the seabed mining context, this means that, although the ISA is required to 'apply a precautionary approach' and to 'ensure effective protection for the marine environment from harmful effects which may arise' from seabed mining,[2] if the Authority's procedural and institutional arrangements do not facilitate such behaviour, there will be little tangible protection. As discussed in Chapter 2, this is fundamental to the challenge of implementing the precautionary principle.

Against this background, this chapter analyses whether the ISA has designed a procedural framework that facilitates the implementation of the precautionary approach. In doing so, the analysis relates the ISA's protective measures to the procedural structures to identify strengths

[1] Ellen Hey, 'Global Environmental Law: Common Interests and the (Re)constitution of Public Space' (2009) 1 *Iustum Aequum Salutare* 41–57, page 57.

[2] *Nodules Exploration Regulations*, regulation 31(2); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(2).

and weaknesses of the current regulatory framework.

The procedural steps required to give effect to precaution were developed in Chapter 2.3 and 2.4 and visualised in the implementation cycle included in Chapter 2.5. They include the process of assessing the risks and selecting protective measures, which must take into account scientific advice as balanced against the social, economic, political and environmental values ascribed to seabed minerals and the ecosystems associated with them. Thus, as highlighted in Chapter 2.4.2, it is critical that the precautionary decision-making process is transparent and facilitates the participation of stakeholders and the public. This is particularly relevant in the seabed mining context, given that the ISA is required to act on behalf of humankind as a whole.[3] The present chapter, therefore, discusses whether the ISA's procedures are sufficient to:

(1) assess the risks and uncertainties of seabed mining;

(2) flexibly amend environmental standards;

(3) ensure transparent and participatory decision-making;

(4) place the burden of proof so as to ensure effective and equitable implementation of precaution; and

(5) monitor compliance with environmental protection measures.

Each of these aspects is discussed individually. Section 7.2 examines how risks and uncertainties are assessed by the ISA at three different stages: strategic environmental assessments; project-specific preliminary environmental impact assessments in the context of assessing new applications for exploration contracts; and environmental impact assessments during exploration work. Subsequently, Section 7.3 examines the ISA's procedural competencies to set and amend environmental standards in line with developments in scientific research. This includes a discussion about the procedural safeguards that would be necessary for the ISA to be able to apply adaptive management to seabed mining. Section 7.4 then examines the ISA's procedure in light of the need to ensure transparent and participatory decision-making and Section 7.5 analyses the placing of the burden of proof in the ISA context. Section 7.6 completes the discussion with an analysis of the ISA's procedural competencies to monitor compliance with protective measures before concluding remarks are drawn in Section 7.7.

[3] LOSC, articles 136, 137, 140, 145, 153(1).

7.2 Assessing Risks and Uncertainties…

In order for the ISA's decision-making procedures to facilitate the implementation of the precautionary approach, they need to include both assessment of risks and identification of uncertainties,[4] which can then be addressed through environmental protection measures. Environmental impact assessments (EIAs) are a procedural tool to integrate such information. Given their importance in providing environmental information, EIAs can be considered as 'precautionary enabling devices.'[5]

Chapter 5.4.1.2 discusses the ISA's mandate over EIAs and identifies the two EIAs provided for in the *Exploration Regulations*. The first *preliminary* EIA must be submitted by future contractors as part of an application for an exploration contract.[6] Second, a full EIA must be submitted by each contractor during the exploration phase. Although not incorporated into the *Exploration Regulations*, strategic environmental assessments (SEAs) are equally relevant for seabed mining. These systems-scale assessments can integrate environmental planning at a regional or global level, to provide an overarching strategic framework within which EIAs for individual projects can be made. SEAs are beyond the scope of individual contractors and would necessarily have to be conducted by the ISA.

The following sections analyse the extent to which these assessments are incorporated into the ISA's decision-making processes and whether they lead to the identification of risks and uncertainties. Using a chronological order, the discussion starts with SEAs.

7.2.1 …through Strategic Environmental Assessment

'The dimension of the precautionary principle goes beyond the problems associated with a short or medium-term approach to risks. It also concerns the longer run and the well-being of future generations.'[7] This statement by the European Commission captures the need for precautionary decision-making to integrate a long-term vision. Although risk assessments for individual exploration projects are crucial, the role of the ISA as the central administrator of the Area is also to act upon a strategic environmental vision on behalf of humankind. This includes considerations as to how many mining operations can be conducted in parallel within a

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[4] Jacqueline Peel, *The Precautionary Principle in Practice: Environmental Decision-Making and Scientific Uncertainty* (Federation Press, 2005), pages 222-224.

[5] James Cameron, 'The Precautionary Principle: Core Meaning, Constitutional Framework and Procedures for Implementation' in Ronnie Harding and Elizabeth Fisher (eds), *Perspectives on the Precautionary Principle* (Federation Press, 1999) 29–58, page 53.

[6] *Nodules Exploration Regulations*, regulation 18(c), annex II section 24(b); *Sulphides* and *Crusts Exploration Regulations*, regulation 20(1)(c), annex II section 24(b); see also IA, annex section 1(7).

[7] Commission of the European Communities, *Communication from the Commission on the precautionary principle*, COM(2000) 1 final (2 February 2000), page 7.

particular region or over a certain timeframe without jeopardising conservation objectives. It also includes questions regarding whether mining should only occur beyond a buffer zone around particular, vulnerable marine ecosystems. These considerations, both regional and global, can be integrated into decision-making processes through SEAs and made publicly available.[8]

At present, SEAs are not provided for in the ISA's procedural framework.[9] However, the *Environmental Management Plan for the Clarion-Clipperton Zone* (EMP-CCZ)[10], discussed in Chapter 6.3.1, may be regarded as the outcome of an informal strategic assessment,[11] in as much as it introduces regional environmental planning into the ISA's work and establishes nine protected areas.[12] However, based on the information that has been published regarding the process of developing the EMP-CCZ, it is questionable whether this process could be compared to the stages of an SEA. Figure 7-1 illustrates the basic stages involved in an SEA, as developed by the Organisation for Economic Co-operation and Development (OECD). In this context, the publicly accessible information regarding the EMP-CCZ does not indicate consideration of, for example, public participation or alternative protective measures. Moreover, no SEA report was published.

[8] Riki Therivel, *Strategic Environmental Assessment in Action* (Routledge, 2012), page 19.

[9] But see LOSC, article 165(2)(d).

[10] ISA, ISBA/17/LTC/7 (13 July 2011), paragraph 15 (EMP-CCZ).

[11] Michael Lodge et al, 'Seabed Mining: International Seabed Authority Environmental Management Plan for the Clarion–Clipperton Zone. A Partnership Approach' (2014) 49 *Marine Policy* 66–72, page 72.

[12] Chapter 6.3.1.

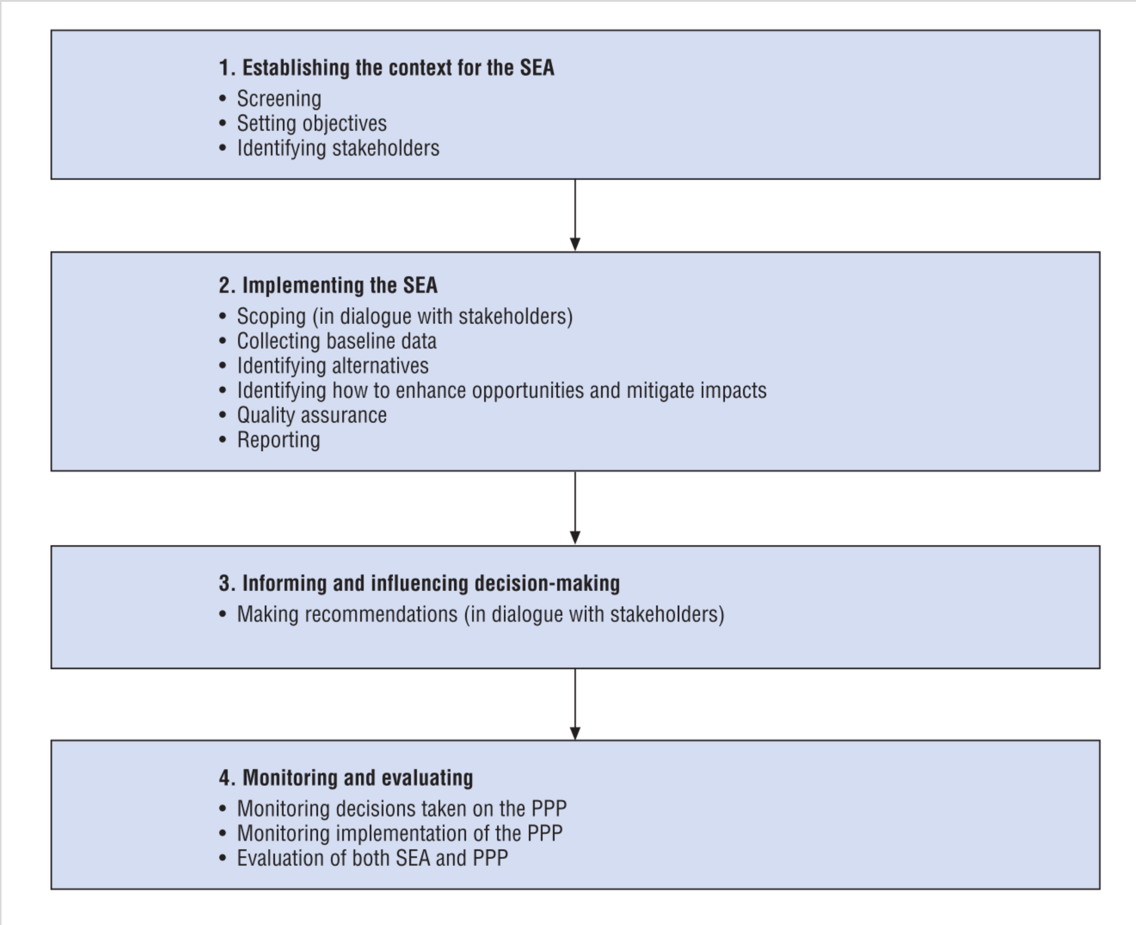

Figure 7-1: Basic stages of strategic environmental assessments.
In this figure, 'PPP' is short for policy, plan, and programmes. Source: OECD, *Applying Strategic Environmental Assessment: Good Practice Guidance for Development Co-Operation*, (2006) <http://www.oecd.org/development/environment-development/37353858.pdf>, page 54.

Perhaps most importantly, the EMP-CCZ was an *ad hoc* measure. As discussed in Chapter 6.2 and 6.3.1, the establishment of protected areas in the Clarion-Clipperton Zone was based on the recommendation of scientists following the Kaplan project, a research project aimed at enhancing knowledge about biodiversity in that area. At present, conducting an SEA or establishing environmental management plans is neither a prerequisite for granting an exploration contract, nor formally required at any other point in the decision-making process. Thus, the procedural framework neither provides for the identification of conservation objectives nor the determination of whether the sum of the protective measures actually achieves particular conservation objectives. This hinders the implementation of the precautionary principle, which requires the taking of *effective* and *proportionate* protective measures that must be assessed against agreed conservation objectives.[13]

[13] Chapter 2.3.3.

The EMP-CCZ foresees the assessment of cumulative environmental impacts, an element of SEAs.[14] To this end, the EMP-CCZ requires the ISA Secretariat to 'complete a cumulative impact assessment for seabed mining in the Clarion-Clipperton Zone.'[15] Moreover, the EMP-CCZ foresees that the ISA will periodically issue 'a publicly available environmental quality status report of the region, based on the data and information compiled from contractors and independent science.'[16] Establishing these substantive requirements is a significant step. However, the crucial question is whether they are integrated into the procedural framework, so as to ensure they do not become empty phrases. In other words, when precisely will these assessments be conducted? At present, neither of these documents (cumulative impact assessments and quality status report) has been published even though new exploration contracts have been granted in the Clarion-Clipperton Zone.[17]

The question then is how can SEAs be integrated into the ISA's procedural structure? One option would be to build on the recent proposal by the Netherlands to introduce the 'compulsory establishment by the Authority of an environmental management plan as a requirement for granting contracts for exploitation in a designated area.'[18] The proposal was supported by Council and will be considered further by the Legal and Technical Commission.[19] If adopted, this would be a significant step toward incorporating protected areas and regional-scale management as compulsory elements in the Mining Code. Importantly, requiring EMPs as *prerequisites* for concluding exploitation contracts would also ensure they are fully integrated into the procedural framework.

However, in order to design this step as an SEA, the Authority will also have to issue procedural guidelines to enable best practice with respect to the stages and elements required for SEAs. As noted above, SEAs require public participation as well as an assessment and comparison of various protective measures, such as protected areas, buffer zones, and regional quotas, to determine which measures could be both effective in and proportionate to reaching an agreed conservation objective.

Furthermore, if regional environmental planning is only required prior to mineral exploitation, the difficulties experienced with the EMP-CCZ might be repeated. As discussed in Chapter 6.3.1, the location of the protected areas in the Clarion-Clipperton Zone had to be changed to accommodate existing exploration contract areas. Since exploitation contracts will logically be granted in areas previously held under exploration contracts, only requiring regional planning

[14] EMP-CCZ (n 10), paragraphs 34, 37, 40(b), 43.
[15] Ibid, paragraph 51.
[16] Ibid, paragraph 52.
[17] See <https://www.isa.org.jm/deep-seabed-minerals-contractors>.
[18] ISA, ISBA/20/C/13 (3 June 2014), paragraph 12.
[19] ISA, ISBA/20/C/32 (23 July 2014), paragraph 15.

prior to exploitation will likely be too late, as the seafloor might already be largely divided up into contract zones. In this context, it must be recalled that the precautionary principle requires *timely* action.

In addition to regional SEAs, the Mining Code could also incorporate a global SEA, which could incorporate global risk assessment and a comparison of globally relevant risk management measures. Specifically, this could include determining general conservation objectives taking into account scientific advice as well as elucidating public opinions with respect to the values placed on seafloor minerals, biodiversity protection, and ecosystem services in addition to equity considerations regarding access to minerals and ecosystem services for future generations.[20] Moreover, a global SEA could assess and compare various protective measures to determine their effectiveness in meeting the conservation objective. This might include the use of listing of particular activities, exclusion zones around vulnerable marine ecosystems, or quotas, all of which are discussed in Chapter 6:.

In principle, although unlikely in practice, a global SEA could also address fundamental questions regarding the environmental sustainability of seabed mining. This might include a high level global assessment of whether an increased supply of minerals is required[21] and whether seabed mining is likely to be the most sustainable method of supplying minerals, as compared to alternatives such as recycling of electronic waste and building material, land-based mineral mining, replacement of rare minerals with alternative materials, reductions in mineral consumption, and potentially asteroid mining in the future. Although such alternatives are important to consider within the wider debate over mineral consumption and the green economy,[22] the role of the ISA in these considerations is limited since its mandate focuses on seabed mining. Another organisation, such as the UN General Assembly, might be better suited to lead this discussion. Nonetheless, as the central organisation overseeing assessments of the environmental impacts of seabed mining operations in the Area, the ISA must be part of these discussions.

Any spatial or temporal restriction of seabed mining, which SEAs might lead to, will likely be

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[20] See Chapter 2.4.2.

[21] This remains uncertain at present. In response to a consultation by the European Commission regarding seabed mining, Seascape Consultants, who coordinate the EU MIDAS project on the environmental impact of deep-sea mining, stated: 'We are looking into this aspect and we have not completed our data gathering. However, our information to date does not suggest there is a significant need for these metals. The costs of deep-sea mining will not be competitive until metals become much more difficult to find on land. For example the demand for cobalt is less than 80,000 tons per year and many mines do not bother to extract it.' European Commission, *EU Stakeholder Survey on Seabed Mining: Summary of Responses*, SWD(2015) 119 final (9 June 2015) <http://ec.europa.eu/dgs/maritimeaffairs_fisheries/consultations/seabed-mining/index_en.htm>, pages 18-19.

[22] See also Elaine Baker and Yannick Beaudoin (eds), *Deep Sea Minerals and the Green Economy* (Vol 2, Secretariat of the Pacific Community, 2013).

met with hesitation. As explored in Chapter 3.5.2, during negotiations of Part XI, one of the important concerns of developed states was to ensure that the ISA would not deny access to minerals. Hence, the mandate of the LTC is to approve applications when they meet the criteria set out in the *Exploration Regulations*.[23] At first sight, it might appear as though restrictions of access to minerals would be inconsistent with the LOSC. However, two arguments speak against that. First, as examined in Chapter 5.4.2 in relation to the ISA's mandate to declare marine protected areas, the LOSC specifically provides for the restriction of access to minerals on environmental grounds.[24] Second, the aforementioned concerns of developed states related to the possibility of the ISA discriminating against particular applicants, including for political reasons. A general or regional limit on the duration or number of parallel mining operations would be a general management policy, rather than a discriminatory measure against specific groups of applicants. Of course, some contractors could be disadvantaged both if regional quotas were in place and indeed by the current system, in which an unrestricted number of contracts are granted on a first come first serve basis. Both systems could disadvantage those operators that only develop the capacity to apply for mining rights at a later stage, owing, for example, to a lack of financial and technical resources. Consequently, the ISA will have to take this challenge into account and develop equitable benefit-sharing mechanisms in *any* case.

In sum, the ISA's procedural framework does not incorporate SEAs at present. This undermines the implementation of the precautionary principle as it fails to provide for long-term regional and global scale considerations of the environmental sustainability of mining the deep oceans. The EMP-CCZ, however, represents a first, albeit *ad hoc*, step, towards regional environmental management. The ISA could build upon this example by incorporating it as a compulsory component in the decision-making procedure and adding additional elements to meet the procedural and substantive requirements of an SEA. If adopted, this could allow project-specific environmental impact assessments to be situated within a strategic and long-term environmental management framework.

7.2.2 …in the Context of Assessing New Applications for Exploration Contracts

Following a strategic environmental assessment, the risks and uncertainties associated with a particular project must be identified, in line with the precautionary approach. To this end, the consideration of risks and uncertainties must be integrated into the procedure for assessing new applications for exploration contracts. This section explores the extent to which the ISA's

[23] *Nodules Exploration Regulations*, regulation 21; *Sulphides* and *Crusts Exploration Regulations*, regulation 23.

[24] LOSC, articles 162(2)(x), 165(2)(l).

current procedure provides for such considerations.

At present, the Mining Code does not specifically require the ISA or the contractors to identify the risks and uncertainties of the proposed exploration activities in the context of a new application for an exploration contract. The contractor is, therefore, not specifically required to demonstrate how the risks and uncertainties will be addressed during exploration work. The question then is whether the existing procedures for assessing an application could nevertheless lead to an identification of the risks and uncertainties of proposed exploration work.

The procedure for assessing a new application, discussed in detail in Chapter 3.5.2, can be summarised as follows. When applying for a new exploration contract with the ISA, the applicant must submit a range of documents, including a proposed exploration programme and a *preliminary* EIA.[25] The LTC then assesses the application in closed session.[26] The LTC can normally only spend a relatively short amount of time on each application, since the Commission only meets between one and two times a year for a maximum of two weeks each. Because of its limited time and very significant workload,[27] which includes reviewing the annual reports from over 25 contractors and developing regulations and recommendations,[28] the LTC can be presumed only to spend a day or two on considering each new application. Following its considerations, the LTC adopts its recommendations to the Council, which takes the final decision in respect of an application based on the LTC's recommendations.

There are several problems regarding this process. First, it is unclear what a preliminary EIA entails. The Mining Code provides no guidance and the term is not part of the ordinary vocabulary used in the context of EIAs.[29] As a result, it is unclear what information applicants must provide in a preliminary EIA and the LTC has no guidance as to when it might request further information from the applicant. Second, as noted in Chapter 5.4.1.2, the efficacy of this preliminary EIA is doubtful because environmental baseline data, against which the impacts of exploration work can be assessed, is only collected later in the process during the contractor's exploration work. Consequently, there is a risk that the submission of a preliminary EIA could be little more than a box-ticking exercise. In order to explore this risk, the following paragraphs discuss the factors the LTC has to consider when assessing a new application.

The LTC is required to establish whether the applicant has met the formal requirements for

[25] *Nodules Exploration Regulations*, regulation 18, annex II section 24; *Sulphides* and *Crusts Exploration Regulations*, regulation 20(1), annex II section 24.

[26] LOSC, articles 165(2)(b), 153(3).

[27] ISA, ISBA/19/C/18 (24 July 2013), paragraph 9.

[28] For example ISA, ISBA/21/LTC/L.1* (19 January 2015).

[29] For an overview of the steps ordinarily involved in assessing environmental impacts, see John Glasson, Riki Therivel, and Andrew Chadwick, *Introduction to Environmental Impact Assessment* (Routledge, 2013), pages 4-5.

applying for an exploration contract, which include: financial and technical capabilities of the applicant; compliance with anti-monopoly clauses;[30] and written undertakings accepting control by the ISA over the exploration activities.[31] Importantly, the LTC must also determine whether the proposed plan of work provides for 'effective protection and preservation of the marine environment including, but not restricted to, the impact of biodiversity.'[32] Pursuant to the *Exploration Regulations*, the LTC should only recommend approval of the application if it is satisfied that both this environmental protection requirement and general compliance with the legal framework are met.[33]

However, no definition of 'effective protection and preservation of the marine environment' has been developed.[34] Determining what constitutes effective protection will inevitably involve subjective considerations as to what level of protection is desirable. Thus, the LTC has to make a *discretionary* decision regarding the meaning of this phrase. This is problematic because, as discussed in Chapter 3.5.2, during the negotiations of the seabed mining regime states sought to ensure that any considerations by the LTC would be based on *objective* criteria.[35] Furthermore, since the assessment of new applications takes place in closed meetings, there is little or no transparency with respect to the environmental standards applied by the LTC. The LTC's task reflects a dichotomy that was incorporated into the legal framework from the start. As set out in Chapter 4, the conflicting aims of facilitating seabed mining and protecting the marine environment are reflected in the LOSC. The challenge of finding a balance between both aims was left to the ISA, which has incorporated the same dichotomy into the Mining Code. Thus, it is ultimately left to the 24 individuals comprising the LTC to assess whether a proposed exploration project can meet both aims.

The lack of both objective assessment standards and transparency creates a danger of affording the value-considerations of the 24 LTC members an undue influence upon the decision-making procedure. It may be recalled that Chapter 2.4.2 discussed the role of values in precautionary

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[30] LOSC, annex III article 6(3); *Nodules Exploration Regulations*, regulation 21(6)(d), 21(7); *Sulphides* and *Crusts Exploration Regulations*, regulation 23(7).

[31] LOSC, annex III articles 3(4), 4, 6; IA, annex section 1(6); *Nodules Exploration Regulations*, regulation 21; *Sulphides* and *Crusts Exploration Regulations*, regulation 23.

[32] *Nodules Exploration Regulations*, regulation 21(4)(b); *Sulphides* and *Crusts Exploration Regulations*, regulation 23(4)(b).

[33] *Nodules Exploration Regulations*, regulation 21(5); *Sulphides* and *Crusts Exploration Regulations*, regulation 23(5).

[34] Interestingly, the draft regulatory framework for mineral exploitation does not foresee the need to define this term, even though it does call for a definition of 'significant adverse change' and 'vulnerable marine ecosystems', two terms used in the Exploration Regulations with respect to particular protective measures. ISA, ISBA/Cons/2015/1 (March 2015), pages 43, 51.

[35] The LOSC also obligates the ISA to 'avoid discrimination in the exercise of its powers and functions, including the granting of opportunities for activities in the Area.' LOSC, article 152(1); see also *Nodules Exploration Regulations*, regulation 21(11); *Sulphides* and *Crusts Exploration Regulations*, regulation 23(12).

decision-making and highlighted the need to differentiate between scientific advice and subjective opinions.[36]As Ellis notes:

> Precaution seeks to reinforce an appropriate division of labour between science and law-making: scientists can provide data and analysis regarding actual and potential sources of risk, but they cannot determine what level of risk is acceptable, or what measures and trade-offs are justified in an effort to avoid or diminish risk. This is the task of legislators, ideally in close consultation with affected individuals, including industry and members of the public.[37]

The ISA's decision-making process does not reflect this division of labour. The current concentration of power in a small expert body is problematic with respect to the implementation of the precautionary approach.[38] Indeed, the requirement for an application to provide for environmental protection has not affected the granting of exploration contracts. On the contrary, all 27 applications considered by the LTC as of July 2015 have passed the test of environmental protection. Since none of the preliminary EIAs have been made publicly available, one can only speculate about whether these documents identify risk and uncertainties.

One factor undoubtedly contributing to this universal acceptance of applications is the procedural bias in favour of approving new applications. As discussed in Chapter 3.5.2, where the aforementioned requirements for applying for an exploration contract are met, the LTC *must* recommend approval of the application.[39] The Council, in turn, has limited competence to reconsider or act contrary to recommendations of the LTC.[40] In light of these factors, it is difficult to see how the submission of a preliminary EIA helps to ensure effective protection of the marine environment from the risks of seabed mining.

In conclusion, the ISA's framework does not incorporate a specific requirement for contractors or the ISA to identify the risks of proposed exploration activities or to make remaining uncertainties explicit. Moreover, the current decision-making procedures do not facilitate the identification of risks and uncertainties. The LTC cannot rely on agreed conservation objectives and clear criteria against which it can assess whether an application provides for environmental protection. In short, no differentiation is made between scientific considerations and subjective value-based elements of a decision. This is exacerbated by a lack of transparency over the environmental standards which the LTC applies. Consequently, rather than providing a procedural safeguard against serious environmental harm, the current decision-making

[36] Peel (n 4), pages 223-225.
[37] Jaye Ellis, 'Overexploitation of a Valuable Resource? New Literature on the Precautionary Principle' (2006) 17 *European Journal of International Law* 445–462, pages 450-451.
[38] Chapter 8.3.1.
[39] LOSC, annex III article 6(3); *Nodules Exploration Regulations*, regulation 21(5); *Sulphides* and *Crusts Exploration Regulations*, regulation 23(5).
[40] IA, annex sections 3(5), 3(11).

procedures with respect to the granting of exploration contracts leave little room for explicitly identifying the risks and uncertainties of a proposed exploration project. This in turn means that neither applicants nor the ISA are required to demonstrate how a project will minimise the risks of environmental harm and address scientific uncertainties. Thus, the procedures for granting contracts are not in line with the requirements of the precautionary approach, set out in Chapter 2.

7.2.3 …through Environmental Impact Assessments During Exploration Work

In addition to the preliminary EIA discussed in the previous section, a full EIA must be submitted during the exploration phase. As detailed in Chapter 5.4.1.2, each contractor must submit an EIA one year before the commencement of specific exploration activities[41] which are considered by the LTC to have the potential for causing serious harm to the marine environment. These activities include drilling activities, artificial disturbance of the sea floor, specific sampling work, and test mining.[42] Although these EIAs could provide an opportunity for identifying the risks and uncertainties involved in these exploration activities, a number of procedural challenges exist.

First, the aforementioned activities which require a prior EIA, are only carried out relatively late during the exploration phase. Indeed, despite several 15-year exploration contracts expiring in 2016, not a single EIA has been published. According to ISA documents, the very first EIA, prior to dredging operations by one contractor, was submitted only in 2014.[43] Arguably, it might be considered reasonable to require EIAs for the aforementioned activities only, given that other exploration activities carried out at the beginning of a contractual period, such as oceanographic and hydrographic measurements as well as water, biotic, sediment and rock sampling for environmental baseline study, are unlikely to provoke significant environmental harm.[44] Nonetheless, the current lack of EIAs hinders the development of the regulations for the mineral exploitation phase. Given the frontier nature of seabed mining, the first EIAs could provide essential information regarding the specific risks and uncertainties of mining, which the future regulations will then have to address. If EIAs are only conducted relatively late, then the timeframe for developing exploitation regulations would have to reflect that.

Second, the timing of the EIA has important procedural implications. Because an EIA is only submitted *after* the contractor has been granted exclusive exploration rights for a particular area

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[41] *Exploration Regulations*, annex IV section 5.2.
[42] ISA, ISBA/19/LTC/8 (1 March 2013), paragraphs 19-21 (*EIA Recommendations*).
[43] ISA, ISBA/20/C/20 (16 July 2014), annex I, paragraph 14.
[44] *EIA Recommendations* (n 42), paragraph 18.

for 15 years, the question is whether the ISA can require the contractor to amend its exploration programme based on the outcome of the EIA. In other words, does the EIA have any practical effect? This question is analysed in detail in Section 7.3.

Third, the regulatory framework does not provide for an independent review of the EIAs. The necessity for such a review has been highlighted by several respondents to the first stakeholder survey in 2014.[45] As discussed in Chapter 8.3.1, this is particularly important in light of the fact that the expertise represented in the LTC may not be adequate to perform a detailed and comprehensive review.

A further challenge relates to the content of the EIA. The *EIA Recommendations*[46] provide guidance for contractors regarding the 'procedures to be followed in the acquisition of baseline data, and the monitoring to be performed during and after any activities in the exploration area with potential to cause serious harm to the environment.'[47] However, the *Recommendations* do not specify the details of the EIA process, such as the involvement of stakeholders and the review of EIA documents. Similarly, no guidance is provided with respect to the scope of an EIA, including the consideration of alternative practices to the one proposed.[48]

Some progress was made at the 2011 workshop on *Environmental Management Needs for Exploration and Exploitation of Deep Sea Minerals* where participants developed a draft template for an Environmental Impact Statement.[49] The Statement was to apply to EIAs conducted by exploration contractors, whilst being broad enough to cover future applications for exploitation contracts.[50] The Statement not only requires information on the socio-economic dimensions of the proposed exploration work, but also a detailed EIA to identify the impacts on various aspects of the natural environment, measures to address these effects, and any residual impacts. Despite the exploration stage being fully underway, the template has not yet been endorsed or built upon by the ISA. At its following meeting in 2012, the LTC had insufficient time to comprehensively consider the template[51] and it has not been on the LTC's agenda since.

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45 ISA, *Developing a Regulatory Framework for Mineral Exploitation in the Area: Stakeholder Engagement*, (February 2014), <http://www.isa.org.jm/files/documents/EN/Survey/ISA-SSurvey.pdf> (*Stakeholder Survey*). All submissions are available at <https://www.isa.org.jm/survey/March-2014/stakeholder-responses>; see for example: Submission to the Stakeholder Survey by the Managing Impacts of Deep-sea Resource Exploitation (MIDAS) project, pages 4-5; European Commission, 18; International Union for the Conservation of Nature, 14; Republic of Korea, section 18; Japan Agency for Marine-Earth Science and Technology, section 18; and the United Kingdom, 4.

46 See n 42.

47 *EIA Recommendations* (n 42), paragraph 9.

48 Chapter 5.4.1.2.

49 ISA, *Environmental Management Needs for Exploration and Exploitation of Deep Sea Minerals* (ISA Technical Study No 10) (ISA, 2012), page 17.

50 ISA, ISBA/18/LTC/4 (17 April 2012), paragraph 3.

51 ISA, ISBA/18/C/20 (20 July 2012), paragraph 24.

Against this background, the challenge lies in ensuring that EIAs are effectively implemented to lead to:

(a) the identification and evaluation of risks and uncertainties;

(b) the identification of alternative solutions to avoid, mitigate, or compensate harm; and

(c) decision-making based on the EIAs and value judgments established in a transparent and participatory manner.[52]

If these aims are realised, EIAs can act as a critical component of precautionary decision-making. The following sections examine two core challenges with respect to achieving this role for EIAs in the seabed mining context: (1) the lack of environmental baselines; and (2) the lack of procedural consequences for an EIA.

7.2.3.1 The Lack of Environmental Baselines

In relation to impact assessments for seabed mining, '[a] fundamental prerequisite for any such EIA is an oceanographic and environmental baseline against which to assess significant effects.'[53] The *EIA Recommendations* confirm this importance: 'Baseline data documenting natural conditions prior to test mining <u>are essential</u> in order to monitor changes resulting from test-mining impacts and to predict impacts of commercial mining activities.'[54] Despite the importance of baseline studies, the ISA's procedural framework does not sufficiently account for the challenge of managing the progress towards commercial mining in the absence of adequate environmental baselines. The following paragraphs explore the status quo with respect to baseline data and the associated challenges embedded in the ISA's procedural framework.

As discussed in Chapter 5.4.1.1, the Mining Code requires contractors to gather data in order to establish environmental baselines for their contract areas.[55] Yet, despite this requirement, the ISA 'is currently operating in a data deficient environment, particularly as regards resource data and environmental data.'[56] This shortcoming was highlighted in no uncertain terms in a 2014 review focusing on the Clarion-Clipperton Zone. In relation to the ISA's Central Data

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[52] See for example Philippe Sands and Jacqueline Peel, *Principles of International Environmental Law* (3rd edn, Cambridge University Press, 2012), page 601.

[53] David Johnson and Maria Adelaide Ferreira, 'Current Legal Developments International Seabed Authority' (2015) 30 *The International Journal of Marine and Coastal Law* (forthcoming), page 5; see also G Beanlands, 'Scoping Methods and Baseline Studies in EIA' in Peter Wathern (ed), *Environmental Impact Assessment: Theory and Practice* (Routledge, 1990) 31–46, chapter 2.

[54] *EIA Recommendations* (n 42), paragraph 14 (emphasis added).

[55] *Nodules Exploration Regulations*, Regulation 18(b), 32; Sulphides and Crusts Exploration Regulations, Regulation 20(1)(b), 34; All Exploration Regulations, annex II, section 24(b) and annex IV, section 5.3.

[56] ISBA/Cons/2015/1 (n 34), page 41.

Repository, which is administered by the Secretariat[57] to accumulate data from both private and government funded exploration studies,[58] the review noted:

> The database was last updated in 2008, and the most recent data set in the cruise section is a cruise that took place in 1988. It does not offer access to any data from any contractor. The reason for this is not clear. Environmental baseline data should not generally be regarded as confidential, especially since the Area is defined as being "the common heritage of mankind". This lack of transparency makes it difficult to ascertain what has been achieved to date – for example, has the environmental data been submitted on an annual basis by the Contractors, and has it been added to a database within the ISA? For progress towards the granting of exploitation licences to occur within the CCZ, civil society will need to be convinced that appropriate work has been carried out and to a high standard.[59]

The review also drew attention to the significant differences in progress made by contractors with respect to their exploration work, 'with some Contractors being extremely slow.'[60] In particular, differences exist with respect to the quantity and quality of data submitted by contractors, which affects the development of environmental baselines.[61] The ISA has repeatedly lamented the lack of environmental data provided by contractors[62] and particularly highlighted the need for 'raw tabular data, as well as detailed taxonomic information.'[63] This alludes to two requirements: First, for data to be submitted in a format that allows comparison of data from all contractors, which is 'essential for the assessment of potential cumulative and regional impacts on the marine environment.'[64] Second, contractors must use a common language for identifying new organisms not least to compare biological data obtained from various sites and determine whether specific organisms are endemic or occur beyond a mine site.

Some progress has been made with respect to the latter. The ISA has convened two taxonomy exchange workshop concentrating on standardizing faunal taxonomy in polymetallic nodules

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[57] For the Central Data Repository see <http://iron.isa.org.jm/portal/page?_pageid=6,30740,6_30749,6_30786&_dad=portal&_schema=PORTAL>.

[58] For a discussion of Repository, see Gwénaëlle Le Gurun, 'Environmental Impact Assessment and the International Seabed Authority' in Timo Koivurova and C J Bastmeijer (eds), *Theory and Practice of Transboundary Environmental Impact Assessment* (Brill Academic Publishers, 2007) 221 –264, pages 235-238.

[59] Seascape Consultants Ltd, *Review of Implementation of the Environmental Management Plan for the Clarion-Clipperton Zone - Report to the International Seabed Authority*, (20 May 2014) <http://isa.org.jm/files/documents/EN/20Sess/LTC/CCZ-EMPRev.pdf>, page 10.

[60] Seascape Consultants (n 59), page 10.

[61] Ibid, pages 10, 16-17.

[62] ISA, ISBA/21/LTC/9/Rev.1 (3 March 2015), paragraphs 6-7; ISA, ISBA/20/C/31 (23 July 2014), paragraph 10; ISA, ISBA/17/C/13 (13 July 2011), paragraph 6(e).

[63] ISBA/20/C/20 (n 43), annex I paragraph 12.

[64] ISBA/20/C/20 (n 43), annex I paragraph 12.

exploration areas in the CCZ in 2013 and 2014 respectively.[65] Similar workshops are envisaged for polymetallic sulphides and cobalt-rich ferromanganese crusts contract areas in other ocean areas.[66] These workshops are designed to inform the LTC's future recommendations regarding taxonomies[67] and facilitate the integration of contractors' data, in standardised format, into a Geographic Information System (GIS) database for the CCZ, which the Secretariat is developing.[68] However at present, this aim is impeded by the lack of available baseline data.

Given the crucial importance of environmental baselines, their absence affects not only the efficacy of EIAs but also the development of future regulations for mineral exploitation. The ISA Secretary-General summarises the current dilemma:

> One of the most important responsibilities the Authority has is to develop rules, regulations and procedures for the protection of the marine environment from adverse impacts of mining. In order to do this, we need first to understand the characteristics of the deep ocean environment and second to understand and evaluate the long-term impacts of mining. We can only do this with the cooperation of exploration contractors, who are required under the terms of their contracts to provide the Authority with extensive environmental baseline data to enable us to build up a better understanding of the environmental characteristics of the ocean floor and its biodiversity.[69]

One factor that has contributed to the current situation is the failure of the *Exploration Regulations* to incorporate procedural safeguards to ensure environmental baseline data is collected. Although the *Regulations* specify a substantive requirement for contractors to gather such data, they do not stipulate any consequences for contractors failing to do so. For example, the *Exploration Regulations* could make test mining contingent upon comprehensive EIA reports that must be based on adequate environmental baselines. This is especially important in light of the fact that 'baseline, monitoring and impact assessment studies are likely to be the primary inputs to the environmental impact assessment for commercial mining.'[70] In other words, if environmental baselines are inadequate, this will affect not only the EIA but also the monitoring programme, the future assessment of exploitation activities, as well as the development of exploitation regulations. In this context, the ISA has failed to adopt a strategic vision and to establish regulatory safeguards to ensure that the exploration phase would result in

[65] For information regarding the workshop see <https://www.isa.org.jm/workshop-standardise-megafaunal-taxonomy-exploration-contract-areas-clarion-clipperton-fracture-zone>, <https://www.isa.org.jm/workshop/workshop-taxonomic-methods-and-standardization-macrofauna-clarion-clipperton-fracture-zone>.

[66] ISA, ISBA/20/A/2 (4 June 2014), paragraph 60.

[67] ISA and Korea Institute of Ocean Science & Technology, Wor*kshop on Taxonomic Methods and Standardisation of Macrofauna in the CCZ - Background Document* (ISA, 2014) <http://www.isa.org.jm/files/documents/EN/Workshops/2014b/BD-Final.pdf>, page 5-6.

[68] ISA, ISBA/19/A/2 (22 May 2013), paragraph 82.

[69] Nii Allotey Odunton, 'Statement of the Secretary-General at the Launching of UK Seabed Resources (14 March 2013) <http://isa.org.jm/files/documents/EN/SG-Stats/NAO-Statement.pdf>.

[70] *EIA Recommendations* (n 42), paragraph 19.

a greater availability of data so as to enable the ISA to be in a better position when developing the regulations for commercial-scale exploitation.

In response to the current challenges, a group of ISA consultants suggested a different design for the exploitation phase, namely a staged approach whereby a contractor will first obtain a provisional mining license and only subsequently transitions to a full mining license:

> As part of the application process, a company should be required to submit a report analyzing the environmental aspects of its exploration operations. Based on that data, information and analysis, a prefeasibility study should be required as part of the application for a provisional mining licence. A key part of the prefeasibility study would include an environmental impact statement and a proposed environmental management plan (EMP). <u>Insufficient data for this level of reporting, analysis and input into a prefeasibility study means that the operator has not gathered enough information to proceed with provisional mining</u>.[71]

This could be an important procedural tool for the ISA to retain control and to ensure EIAs will be based on adequate baseline information. This is further discussed in Section 7.3.5

In sum, the current lack of adequate environmental baselines is a significant obstacle for EIAs being embedded in a precautionary decision-making framework. The *Exploration Regulations* fail to provide procedural safeguards. The risk is that test mining and other invasive exploration activities could be undertaken without an adequate EIA as required by the LOSC and the Mining Code. This risk is substantiated because the *Exploration Regulations* do not specify which consequences the ISA has to draw from EIAs. The following section examines this shortcoming.

7.2.3.2 Procedural Consequences of Environmental Impact Assessments

A further challenge with respect to EIAs contributing to precautionary decision-making, is the failure of the Mining Code to set out the extent to which the ISA has to consider EIAs in its decision-making. EIAs, as well as SEAs, identify the harm to be expected from a proposed activity. This provides the basis for determining whether the expected harm reaches an unacceptable level and should, thus, not be allowed to proceed, or should only be permitted with measures to reduce or mitigate the harm. To this aim, environmental conservation objectives must be agreed as well as action to be taken once these objectives are in danger of not being met.

Examples can be found in other international regimes. As discussed in Chapter 2.3.3, the *Fish*

[71] Allen L Clark, Jennifer Cook Clark, and Sam Pintz, *Towards the Development of a Regulatory Framework for Polymetallic Nodule Exploitation in the Area (Technical Study: No. 11)* (ISA, 2013), page 33 (emphasis added), see also pages 4, 28-29, 33.

Stocks Agreement requires states parties to determine 'stock-specific reference points and the action to be taken if they are exceeded.'[72] Article 14(1)(a) of the *Convention on Biological Diversity* uses less determinative language by requiring EIAs 'with a view to avoiding or minimizing [significant adverse] effects.' In contrast, the regulatory framework for exploration of seabed minerals only requires information to be provided through EIAs without specifying particular consequences. EIAs are merely one source of information, which the LTC and Council can take into account. This constitutes a common shortcoming of the manner in which EIAs are integrated into legal documents. As Jay et al observe, '[t]he insistence that EIA is a decision-aiding, rather than decision making, tool may be unduly limiting, placing too great a level of trust on decision-makers to act in accordance with the environmental information provided to them.'[73] However, the normative objective of EIAs goes beyond the supply of information about the likely environmental consequences of an activity. The aim is to result in measures that prevent or mitigate the predicted harm.[74]

Interestingly, the Draft Regulations for mining developed by the Preparatory Commission in the 1980s still incorporated consequences for EIAs:

1. Activities in the Area shall <u>only take place if they do not cause serious harm</u> to the marine environment.
2. Activities in the Area shall <u>only take place if</u>:
   (a) the technology and procedures are available to provide for safe activities and compliance with paragraph I;
   (b) <u>there exists the capacity to monitor key environmental parameters</u> and ecosystem components so as to identify any adverse effects of activities; and
   (c) there exists the capacity to respond effectively to accidents, particularly those which might cause serious harm to the marine environment.[75]

Moreover, Article 110(1) of the Draft Regulations required the LTC to examine each environmental report or environmental impact statement and to determine 'taking into account the analyses and information contained in the applicant's report or statement, whether the exploration or exploitation can reasonably be expected to result in serious harm to the marine environment.' In contrast, the present *Exploration Regulations* neither specify consequences of EIAs, nor requirements for technology and monitoring techniques as prerequisites for seabed mining.

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[72] FSA, article 6(3)(b).

[73] Stephen Jay et al, 'Environmental Impact Assessment: Retrospect and Prospect' (2007) 27 *Environmental Impact Assessment Review* 287–300, page 293.

[74] Jay et al (n 73), page 288.

[75] Preparatory Commission for the ISA and ITLOS, LOS/PCN/SCN.3/WP.6/Add.5 (8 February 1990), article 105 (emphasis added).

In this context, it is important to note that the requirement to perform EIAs must be read in conjunction with the obligation of the ISA under Article 145 LOSC to prevent, control, and reduce pollution to the marine environment and protect and conserve the natural resources of the Area.[76] Thus, a failure to act upon an EIA which advises the ISA of potential serious environmental harm could contravene the ISA's obligations under Article 145. At the same time, most activities for the exploration or exploitation of seafloor minerals will have some impact on the marine environment. As such, the question becomes one of scale, which brings us back to the necessity of an agreed environmental protection standard.

7.2.4 Bringing Environmental Impact Assessments in Line with the Precautionary Approach – Some Suggestions

On a procedural level, the precautionary approach requires the ISA to identify the risks and uncertainties of seabed mineral mining at an early stage and to develop ways to prevent environmental harm beyond that deemed acceptable. EIAs are crucial tools to achieve this aim. The discussion has illuminated the multitude of current impediments to achieving this. The danger is that in the current procedural framework, the obligation to submit an EIA becomes a meaningless formality rather than providing valuable information to facilitate the implementation of the ISA's environmental mandate. This section outlines some suggestions for improvements.

First, the ISA should institute procedural safeguards to ensure that adequate environmental baselines are established. This could, for example, take the form of making test mining contingent upon a comprehensive EIA that must be based on adequate baseline information, both of which must be publicly accessible.

Second, the Mining Code should set out the consequences to be taken based on an EIA. This would require deciding upon conservation objectives in cooperation with the scientific community and the public, as discussed in Section 7.2.1, and incorporating into the Mining Code specific procedures to be followed in case of a risk of not meeting the objective.

Third, the ISA could build upon the Environmental Impact Statement developed in 2011[77] by providing detailed guidance regarding the requirements for and content of preliminary EIAs and EIAs required prior to specific exploration work. This could include guidance regarding the procedural requirements, public participation and transparency, the precise content of EIAs, and templates for the EIA reports.

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[76] *Nodules Exploration Regulations*, regulation 31; *Sulphides* and *Crusts Exploration Regulations*, regulation 33.

[77] Chapter 7.2.3; ISA Technical Study No 10 (n 49), page 17.

Fourth, the ISA could utilise its mandate to conduct marine scientific research to increase the quantity and quality of baseline data. Currently, the obligation to gather baseline data rests solely with the contractors. Although the contractors have a vital role to play in establishing environmental baselines, it is questionable whether baselines solely derived from data gathered by contractors are sufficient, not least because it is difficult if not impossible to verify the data. As Bothe notes:

> This is somewhat problematic, as it is not a matter of course that the information basis furnished by the applicant is really adequate. No provision is made for the Legal and Technical Commission to have access to any additional information which might challenge the correctness of the data furnished by the applicant.[78]

The aforementioned regional GIS database currently under development for the Clarion-Clipperton Zone will be a first step.[79] However, the database will need to incorporate data from a variety of sources so as to minimise the risk of vested interests. One option to achieve this would be for the ISA itself to coordinate and finance research projects conducted by independent scientists to obtain and publish crucial environmental baseline information.

A fifth option to address both the lack of environmental baselines and the verifiability of baseline data would be to pool efforts regarding environmental work. Instead of each contractor gathering environmental data and performing EIAs separately, these could be conducted by a centralised consortium and/or external consultants financed by contractors. The ISA could require such pooling of environmental studies based on its extensive environmental mandate under Article 145 LOSC as well as its powers under Article 153(2) LOSC to carry out marine scientific research in the Area and to enter into contracts for that purpose.

Streamlining environmental studies could increase efficiency, particularly if it included shared ship time, instead of each contractor having to organise and finance individual voyages to a contract area. It could greatly enhance transparency[80] and ensure a quality standard and similar pace for all environmental studies and assessments. It would simplify data standardisation and centralise taxonomic expertise to ensure new species discovered during baseline studies are correctly catalogued, which is currently a major hurdle to establishing regional environmental baselines.[81] Moreover, having environmental assessments carried out by an independent entity, and publicly available for peer review, would reduce the danger of bias in the consideration of values and uncertainties. At present, this danger is particularly apparent where (prospective)

[78] Michael Bothe, 'The Protection of the Marine Environment Against the Impacts of Seabed Mining: As Assessment of the New Mining Code of the International Seabed Authority' in Peter Ehlers, Elisabeth Mann Borgese, and Rüdiger Wolfrum (eds), *Marine Issues* (Kluwer, 2002) 221–231, page 224.

[79] Chapter 7.2.3.1; ISBA/19/A/2 (n 68), paragraph 82.

[80] Chapter 7.4.1.

[81] Chapter 7.2.3.1.

contractors are state parties which deploy scientists from their administration or research institutions, who are directly funded by the government, to provide supporting EIAs for the state party's application for an exploration contract. Centralising environmental studies would also prevent states parties and private corporations from creating a scientific monopoly over biological and genetic information collected during environmental work under a mining contract. As discussed in Chapter 4.5, the question of who owns this (commercially) valuable data remains unanswered. In some cases it might be most efficient to conduct environmental studies during cruises focussed on researching the mineral deposits at particular mine sites. In this context, a team of consultant scientists on the vessels could gather environmental data. In other cases, it might be more suitable to dedicate a cruise to environmental studies in several contract areas, in particular for post-mining monitoring, which is discussed in Section 7.6.

The suggestions presented here offer just some of the possible ways in which the ISA's decision-making procedure could be aligned with the precautionary approach. At present, although the ISA's legal framework incorporates EIAs, several procedural obstacles prevent those assessments from successfully identifying the risks and uncertainties of proposed activities and, importantly, from influencing the decision about permitting proposed activities.

7.3 Amending Environmental Standards

In light of the fact that full EIAs are only required after a contractor has obtained exclusive exploration rights for a particular area for 15 years, the question arises as to whether the ISA can require a contractor to modify operations based on the outcome of an EIA, or indeed a strategic environmental assessment. In other words, whilst the ISA can set environmental standards through its law-making powers,[82] in line with the inherently evolutionary design of the Part XI regime, the question is whether these can be amended *during* the lifetime of an exploration contract.

Such competence is in line with the ISA's law-making powers and mandate. Article 145 LOSC requires the ISA to 'ensure effective protection for the marine environment'[83] and Article 153(1) LOSC specifically provides that activities in the Area 'shall be organized, carried out and controlled by the Authority on behalf of mankind as a whole.' Indeed, the Mining Code requires contractors to submit a written undertaking accepting 'control by the Authority of activities in

[82] Chapter 5.2.

[83] *Nodules Exploration Regulations*, regulation 31(1)-(2); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(1)-(2).

the Area.'[84] However, as this section will demonstrate, the current regulatory framework does not fully provide for such control.

Designing a flexible framework that enables the ISA to amend environmental requirements is essential to enable the ISA to respond to new scientific discoveries in line with its mandate, if EIAs or SEAs are performed only *after* exploration contracts have been granted. Moreover, it is a key criteria if the ISA is to apply adaptive management, as indicated, for example, in the Environmental Management Plan for the CCZ.[85] As discussed in Chapter 2.4.5, adaptive management refers to a gradual yet deliberate approach in which management actions 'are designed as experiments to produce information about the resource being managed. It emphasizes making modest, reversible management interventions, careful monitoring of impacts and continual assessment and refinement of management practice as information increases.'[86] By definition, adaptive management requires the ISA to amend environmental standards for contractors on a continuing basis.

This flexibility will be particularly crucial in the exploitation phase during which the most serious environmental harm is expected. In this context, this section seeks to analyse the strengths and weaknesses of the current regulatory framework for mineral *exploration* so as to inform the development of the *exploitation* framework. To this end, this section analyses four ways in which the ISA could amend the environmental requirements which contractors must observe: (a) amending exploration regulations; (b) amending LTC recommendations; (c) reviewing the 5-year programme of activities; and (d) updating regional environmental management plans.

7.3.1 Amending Regulations

The obligations of mining operators are set out in the standard clauses of their exploration contracts, which are annexed to the *Exploration Regulations*. Thus, the most discernible way for the ISA to change environmental standards which the contractors must observe is to amend the *Exploration Regulations* and the standard clauses. However, any such amendments do not automatically apply to *existing* contractors, as they enjoy security of tenure[87] and both the standard clauses and the *Exploration Regulations* themselves are specifically incorporated into

[84] *Nodules Exploration Regulations*, regulation 14(b); *Sulphides* and *Crusts Exploration Regulations*, regulation 15(b); *Exploration Regulations*, annex II section 25(b), annex IV section 13(2)(c).

[85] EMP-CCZ (n 10), paragraphs 30-31; ISA, ISBA/14/LTC/2* (28 March 2008), paragraph 6;

[86] Rosie Cooney, 'A Long and Winding Road? Precaution from Principle to Practice in Biodiversity Conservation' in Elizabeth Fisher, Judith Jones, and René von Schomberg (eds), *Implementing the Precautionary Principle: Perspectives And Prospects* (Edward Elgar Publishing, 2006) 223–244, page 238.

[87] LOSC, article 153(6), annex III articles 18, 19.

the contract.[88] As such, they can only be revised with the consent of both the contractor and the ISA.[89] Consequently, although amending exploration regulations is a way in which the ISA can set environmental standards for *future* contractors, it is insufficient to automatically bind *existing* contractors unless they specifically agree.

When the *Exploration Regulations* were amended in 2013 to require contractors to pay annual overhead charges to cover the ISA's costs of administering the contracts,[90] the Assembly's decision specifically requested the Secretary-General to renegotiate existing contracts in line with the changes.[91] Two years later, in July 2015, ten out of the 14 contractors that had obtained their contracts prior to July 2013 had agreed to the amendments, while consultations with the other contractors were still ongoing.[92]

In contrast, also in 2013, the *Nodules Exploration Regulations* were formally amended largely to increase environmental standards and obligations. Here, the ISA merely requested pending applications to incorporate the changes.[93] Thus, the operators that obtained contracts to explore for nodules prior to July 2013 continue to be bound by the lower environmental standards under the previous version of the *Nodules Exploration Regulations*.

Importantly, the Seabed Disputes Chamber in its *SDC Advisory Opinion* stressed the need for uniformity and progressive environmental protection standards in the ISA regime.[94] The Chamber demonstrated that the due diligence obligation of sponsoring states to ensure contractors comply with their respective obligations balances out the discrepancies of some of the environmental standards that differed across the sets of *Exploration Regulations*. For example, in relation to states' obligation to apply best environmental practices, the Chamber observed:

> In the absence of a specific reason to the contrary, it may be held that the Nodules Regulations should be interpreted in light of the development of the law, as evidenced by the subsequent adoption of the Sulphides Regulations.[95]

The Chamber clearly aimed to ensure that all sponsoring states would be held to uniform and high environmental standards. Nonetheless, unequal standards for contractors who enter the seabed mining regime at different times are built into the regulatory framework.

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[88] *Exploration Regulations*, annex III clause 1.
[89] LOSC, annex II article 19; *Exploration Regulations*, annex IV section 24.
[90] Chapter 3.7.
[91] ISA, ISBA/19/A/12 (25 July 2013), paragraph 4.
[92] ISA, ISBA/21/LTC/8/Rev.2 (6 July 2015), annex II.
[93] ISA, ISBA/19/C/17 (22 July 2013), paragraph 3.
[94] Chapter 5.4.6.
[95] *SDC Advisory Opinion*, paragraph 137; see also paragraphs 134, 136, 159.

7.3.2 Amending Recommendations

In contrast to the *Exploration Regulations*, amendments to the environmental standards enshrined in the LTC's recommendations apply to all contractors. It will be recalled from Chapter 5.3.2 that recommendations are adopted by the LTC and can be amended flexibly. The standard contract clauses require a contractor '[t]o observe, as far as reasonably practicable, any recommendations which may be issued from time to time by the Legal and Technical Commission.'[96] The flexible incorporation of recommendations into the contract clauses means that amendments to the recommendations, or indeed newly adopted recommendations, apply to *all* contractors. As such, they present a way in which the ISA can require contractors to change environmental standards.

Given the nature of LTC recommendations, as assisting contractors in the implementation of the *Exploration Regulations*, the ISA would not likely be able to establish entirely new protective measures solely through recommendations. Nevertheless, measures such as special protection for vulnerable marine ecosystems that are foreseen in the *Regulations*[97] could be implemented through recommendations.

However, as is clear from the standard contract clauses, recommendations are not strictly binding on the contractors. This could somewhat limit their value as a means to through which the ISA can amend environmental standards. Nevertheless, in practice LTC recommendations carry significant weight, not least because they offer more detail than regulations and are adopted by the same body that will later play a significant role in deciding whether a contractor's application for exploitation rights will be approved.[98] Indeed, in order to obtain an extension for their exploration contracts, contractors must provide specific information 'in accordance with the relevant recommendations […].'[99] As such, amending recommendations could provide a valuable, albeit limited, means by which the ISA can amend existing environmental standards within the scope of the *Exploration Regulations*.

7.3.3 Reviewing a Programme of Activities

A third way in which the ISA could amend the environmental requirements which contractors must observe is through the programme of activities. As discussed in Chapter 5.3.1, each contractor's 15-year exploration period is divided into three five-year programmes of activities.

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[96] *Exploration Regulations*, annex IV section 13.2.
[97] Chapter 6.4.
[98] James Harrison, *Making the Law of the Sea: A Study in the Development of International Law* (Cambridge University Press, 2011), page 141; Chapter 3.5.2.
[99] ISA, ISBA/21/C/19 (23 July 2015), appendix 1.

These programmes describe the specific activities the contractor will undertake in the following 5-year period and they are binding by way of being incorporated into the exploration contract.[100] The first such programme is submitted with an application for an exploration contract, whilst the remaining two are negotiated during the contractual period.[101] The question then arises whether the adoption of a subsequent programme of activity might present an opportunity for the ISA to require the contractor to observe new environmental standards.

The answer is in the negative. Before adopting the second and third programme of activity, the contractor and the ISA Secretary-General jointly review the implementation of the previous programme.[102] The contractor must then indicate its next programme of activities 'in light of the review.'[103] This process does not allow the ISA to *require* the contractor to incorporate certain environmental standards into the next programme of activities. Indeed, the review process does not appear to scrutinise the contractor's environmental work. Even though the Secretary-General must report the review to the LTC and the Council, he merely needs to indicate 'whether any observations transmitted to him by States parties to the Convention concerning the manner in which the contractor has discharged its obligations under these Regulations relating to the protection and preservation of the marine environment were taken into account in the review.'[104] As such, the adoption of a new programme of activities does not equip the ISA with a process for exercising its power to control environmental standards for activities in the Area.

7.3.4 Updating Regional Environmental Management Plans

The last option through which the ISA might be able to amend environmental standards for existing contractors is through regional environmental management plans. At present, the only example of such a plan is the Environmental Management Plan for the Clarion-Clipperton Zone, discussed in Chapter 6.3.1. The EMP-CCZ is centrally managed by the ISA and specifically foresees a flexible design for its nine protected areas to accommodate changes in scientific knowledge in line with the precautionary principle and adaptive management.[105]

The question is whether changes to the EMP-CCZ can create obligations for contractors and impose the environmental standards they must observe. The answer is ambiguous. Because the EMP-CCZ was only established in 2012, environmental management plans are not yet referred

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[100] *Exploration Regulations*, annex III, annex IV section 4.

[101] *Nodules Exploration Regulations*, regulation 28; *Sulphides* and *Crusts Exploration Regulations*, regulation 30; *Exploration Regulations*, annex IV, section 4.4.

[102] Ibid.

[103] Ibid.

[104] Ibid.

[105] EMP-CCZ (n 10), paragraphs 30-31; ISBA/14/LTC/2* (n 85), paragraph 6.

to in the *Exploration Regulations* and are not incorporated in the exploration contracts. Instead, the EMP-CCZ is a regional management plan centrally administered by the ISA and can, thus, be amended flexibly, without individual consent from contractors. In that respect, the EMP demonstrates advantages over de-centralised measures.

However, it also raises the question whether the EMP-CCZ is binding on contractors. At present, its legal status is not clearly defined. It is difficult to judge whether a regional management plan could create new obligations for existing contractors, because the current EMP does not attempt to do so. Instead, it builds on existing obligations enshrined in the *Exploration Regulations* and creates a *future* obligation, by requiring contractors to establish site-specific environmental management plans when they apply for exploitation rights.[106] The core function of the EMP-CCZ was to establish nine protected areas that were located outside of existing contract areas. Nonetheless, the EMP-CCZ informs the work of the LTC, which can, in turn, integrate such information into its development of the Mining Code.

In sum, regional environmental management plans could, in principle, present a means by which the ISA could set environmental standards continuously, not least because they can be amended flexibly. However, at present the role of environmental management plans is somewhat unclear. The ISA could change this by making such plans legally binding on the contractors through their incorporation into the Mining Code.

7.3.5 Some Suggestions for Changes to the Procedural Framework

The previous sections have demonstrated that although the ISA has the mandate to control activities in the Area,[107] the procedural framework does not provide a clear option through which the ISA can amend environmental standards during the lifetime of an exploration contract, in line with new information generated by EIAs for example. In contrast, environmental standards and obligations set prior to entering into a contract can be enforced through the ISA's compliance and enforcement powers.[108] It must, therefore, be concluded that the procedural competencies of the ISA are strongest at the time of assessing an application for a new contract, when the LTC can reject an application if it does not '[p]rovide for effective protection and preservation of the marine environment.'[109] Once an exploration contract is in

[106] EMP-CCZ (n 10), paragraph 41(a).

[107] LOSC, article 153(1); *Nodules Exploration Regulations*, regulation 14(b); *Sulphides* and *Crusts Exploration Regulations*, regulation 15(b); *Exploration Regulations*, annex II section 25(b), annex IV section 13(2)(c).

[108] Chapter 3.6.

[109] *Nodules Exploration Regulations*, regulation 21(4)(b); *Sulphides* and *Crusts Exploration Regulations*, regulation 23(4)(b).

force, the ISA's procedural and substantive powers are significantly reduced.

This calls into question the efficacy of the EIA that the Authority receives during a contractor's exploration work. It also raises the question how the ISA's mandate to control activities in the Area is being implemented. What does 'control' mean if not to require adjustments to mining activities in case new evidence warrants, for instance, the establishment of buffer zones around vulnerable marine ecosystems?

The core challenge is for the regulatory framework, including environmental standards, to be developed incrementally over time. As more environmental baseline data is collected, EIAs can become more meaningful and environmental standards should, in theory, be adjusted accordingly. At the same time, exploration work is moving towards riskier activities, such as test mining, making environmental standards all the more important. Implementing the precautionary principle requires action at an early stage. However, as discussed in Chapter 2.4.5, an incremental approach towards progressively adopting environmental standards does not necessarily have to conflict with the proactive rationale of precaution *if* it follows adaptive management standards and procedural safeguards are in place to require amendment of operations even after they have commenced. Critically, the ISA's current regulatory framework does not provide for this. This shortcoming significantly undermines any chance to apply adaptive management and a precautionary approach to seabed mining.

This situation is illustrative of the general challenge to implementing the precautionary approach. Incorporating it into legal documents, such as the Mining Code, has little meaning unless the institution's procedural and institutional frameworks are designed to facilitate the implementation of the precautionary approach. The following paragraphs discuss a number of options to address the current lacunae.

First, as noted above, the regional environmental management plans could present an opportunity for the ISA to flexibly adjust environmental management measures. In this context, the ISA could make EMPs legally binding on contractors by incorporating them into the Mining Code. This may be linked to the recent proposal by the Netherlands to introduce a 'compulsory establishment by the Authority of an environmental management plan as a requirement for granting contracts for exploitation in a designated area,'[110] highlighted in Section 7.2.1.

Second, the ISA's regulations could stipulate specific consequences of EIAs conducted during a contractual period. For example, if an EIA indicates risks for environmental harm beyond an agreed conservation objective, the regulations could set out specific actions in order to prevent such damage.

[110] ISBA/20/C/13 (n 18), paragraph 12.

Third, the Mining Code could require a staged approach, particularly with respect to mineral exploitation as suggested in the ISA Technical Study No 11.[111]

> '[…] the ISA will need to develop a regulatory method, based upon foreseeable events, to ensure slow, measured development and sufficient regulatory control over a project before it advances to the stage where, if problems arise, it can no longer be clawed back, modified or terminated. One way to accomplish this is to provide for a 'provisional' mining licence that would mandate that an operator demonstrate competence in deep ocean engineering and mining and associated environmental responsibility to the ISA before receiving a 'tenured' mining licence.'[112]

As the Study highlights, to obtain a provisional license contractors should be required to submit an environmental impact statement, a site-specific environmental management plan, and a pre-feasibility study based on previous exploration, transportation, processing and testing data and analysis.[113] This staged approach would provide contractors with a chance to prove environmental and engineering competence, whilst allowing the ISA to adjust the scale and parameters of an exploitation contract before concluding it, based on the knowledge gained during the pilot operation.

It is important to note that contractors require a degree of certainty to provide for financial planning. At the same time, the ISA is specifically mandated to manage the seabed mining on behalf of humankind. Thus, while a regulatory framework should protect contractors from arbitrary obligations imposed during the lifetime of a contract, the regulatory framework also needs to reflect the frontier nature of seabed mining including the financial risks and potential profits that accompany frontier activities. To this end, the Technical Study notes:

> In short, the ISA will need to reserve for itself substantial power and authority to manage, regulate and oversee the exploitation regime based upon the principles of:
>
> 1. High sensitivity to environmental concerns and use of the precautionary principle.
> 2. Highly technical and as yet unknown challenges associated with successful deep ocean mining.
> 3. Obligation to preserve and to direct benefit flows to the developing world.
> 4. Actively demonstrating good governance.
> 5. Maintaining the reputation of the UN as a fair, independent and competent regulator.[114]

A phased approach could allow for some degree of adaptive management, provided the pilot mining is designed so as to produce the comparative information required to inform the design of the exploitation operations. The important point will be for any adjustments to be based on best scientific evidence. This aim could be supported by strategically commissioned marine

[111] Chapter 7.2.3.1.
[112] Clark, Cook Clark, and Pintz (n 71), page 28.
[113] Ibid, page 33.
[114] Ibid, page 20.

scientific research. Combining the phased approach with the aforementioned flexibility during the lifetime of a contract would go some way towards facilitating adaptive management.

7.4 Ensuring Transparency and Participation

The next crucial element of implementing a precautionary approach, as set out in Chapter 2.5, is to ensure transparency and public participation in the decision-making process. This section examines the extent to which both elements are integrated into the ISA's procedural framework and provides some suggestions for improvement.

7.4.1 Transparency

Ensuring transparent decision-making is an emerging requirement under international law[115] and is enshrined in several international instruments.[116] As discussed in Chapter 2.4.2, transparency involves access to meetings of decision-making bodies, publication of minutes and working documents, and also public access to environmental information, such as risk assessment guidelines, EIAs and environmental data. Transparency is particularly relevant for novel activities with global consequences, such as deep ocean mineral mining. It aids the implementation of the precautionary principle in that transparency enables an identification of the extent to which decisions by the ISA are informed by scientific knowledge, uncertainties, and value considerations.[117] In particularly, transparency can help to identify whether EIAs are given sufficient weight in the decision-making as compared to political and economic considerations.[118] Transparency also minimises bias within the information used. This addresses the potential conflict of interest highlighted in Section 7.2.4, which arises when environmental standards for contractors being set based on the data provided largely by the contractors themselves. Despite its importance, however, the ISA regime is deficient when it comes to transparency. Indeed, neither the LOSC, the IA, nor the Mining Code incorporate a specific requirement for transparency in the ISA context.

Although some information, such as technical studies, workshop proceedings, information notes by the Secretariat, and summary reports of LTC and Council meetings are publicly available,

[115] Andrea Bianchi, 'On Power and Illusion: The Concept of Transparency in International Law' in Andrea Bianchi and Anne Peters (eds), *Transparency in International Law* (Cambridge University Press, 2013) 1-19, 6; UNGA, UN Doc A/Res/66/288 (27 July 2012), paragraphs 76, 228.

[116] *Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters*, (adopted 25 June 1998, entered into force 30 October 2001) 2161 UNTS 447 (*Aarhus Convention*); FSA, article 12; *Rio Declaration*, principle 10.

[117] Chapter 2.4.2.

[118] Chapter 7.2.2.

much of the crucial environmental information is not. Decision-making procedures within the ISA only provide for limited transparency, such as a brief public notice describing the general location of proposed exploration work when a new application has been received. The core of the ISA's substantial work takes place in LTC meetings, which are largely closed to observers and indeed even ISA member states.[119] Few open sessions have been held by the LTC to discuss environmental matters.[120]

With respect to new applications for exploration contracts, relatively generic recommendations to the Council are made publicly available online. However, these do not provide details about the LTC's deliberations, its reasons for finding that an application provides for 'effective protection and preservation of the marine environment,'[121] or any contentious aspects about an application. This is highly problematic not least because, as discussed in Chapters 7.2.2, the LTC has to make discretionary judgments in light of the uncertainties involved in seabed mining. Thus, the subjective considerations of 24 LTC members are granted significant weight without accounting for such considerations in a transparent manner.

What is more, as discussed in Chapter 3.5.2, the Council decides over new applications based on this limited information, without having access to LTC minutes or the original application documents. This renders is difficult, if not impossible, to ascertain the basis of the LTC's recommendations. To what extent are they informed by scientific knowledge or political considerations and which uncertainties, if any, have been considered? Were the preliminary EIAs considered in the decision-making process and what did they conclude? As discussed in Section 7.2.2, it is unclear what the preliminary EIAs submitted by applicants entail and to what extent the LTC considers these documents. The reason for restricting access to application documents is to protect confidential data in applications.[122] However, as noted by the ISA on numerous occasions, environmental data should not be confidential but instead freely available.[123]

Similar challenges exist for environmental data collected as part of exploration work. As discussed in Section 7.2.3.1, neither environmental data from contractors nor any preliminary

[119] ISA, *Rules of Procedures of the Legal and Technical Commission*, rule 6.

[120] These include one session each in 2014, 2004, and 2003. ISBA/20/C/20 (n 43); ISA, ISBA/10/C/4 (28 May 2004), paragraph 20; ISA, ISBA/9/C/4 (1 August 2003).

[121] *Nodules Exploration Regulations*, regulation 21(4)(b); *Sulphides* and *Crusts Exploration Regulations*, regulation 23(4)(b).

[122] *Nodules Exploration Regulations*, regulation 36; *Sulphides* and *Crusts Exploration Regulations*, regulation 38.

[123] ISBA/20/C/31 (n 62), paragraph 10; ISBA/18/C/20 (n 51), paragraph 11(n); *Nodules Exploration Regulations*, regulations 7, 36(2); *Sulphides Exploration Regulations*, regulations 7, 38(1); *Crusts Exploration Regulations*, regulations 7, 38(2).

EIAs or the first EIA prior to dredging work submitted in 2014,[124] has been made available to the public. Moreover, because the annual reports submitted by contractors, which contain information on their environmental work, are not published[125] but only general comments are made available,[126] there is little transparency regarding the progress of environmental work. In 2014, following discussions in which '[s]trong interest was expressed in increasing transparency and dialogue on the development of the [LTC's] work',[127] the Council encouraged all contractors to make their environmental data 'readily and publicly available' and requested the LTC 'to explore initiatives to increase transparency.'[128] Nonetheless, the ISA itself keeps environmental data largely private. Whilst the EMP-CCZ states the aim of periodically issuing a public environmental quality status report of the region,[129] the 2014 review of the EMP criticises the lack of publicly available data.[130]

Implementing the precautionary approach requires transparency to ensure separation of facts and values, and an identification of uncertainties. However, as Ardron notes, 'the current de facto confidentiality of ISA mining license data, applications, contracts, and associated decision-making, more reflects the status quo of reticent national governments, rather than a UN body charged with administering the common heritage of mankind.'[131]

In sum, the ISA's current regulatory framework does not provide for transparent decision-making processes,[132] which undermines the ISA's implementation of not only its obligation to act on behalf of mankind as a whole but also to apply the precautionary approach. A positive sign is that the need for more transparency has been acknowledged by the LTC, which in 2015 'has requested the secretariat to draft a stakeholder consultation and participation strategy for the Authority.' The Council, in turn, has requested the LTC 'to continue to explore initiatives to increase transparency and dialogue on the development of its work.'[133]

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[124] ISBA/20/C/20 (n 43), annex I paragraph 14.
[125] ISA, ISBA/19/LTC/6 (22 January 2013).
[126] See for example ISBA/20/C/20 (n 43), annex I.
[127] ISBA/20/C/32 (n 19), paragraph 16.
[128] ISA, ISBA/20/C/L.10 (21 July 2014), paragraphs 10, 11.
[129] EMP-CCZ (n 10), paragraph 52.
[130] Seascape Consultants (n 59), page 10.
[131] Jeff Ardron, *Ocean Sustainability through Transparency: Deep sea mining and lessons learnt from previous resource booms,* Background paper for IASS Ocean Governance Workshop (29-30 October 2014) (unpublished).
[132] Bothe (n 78), page 226.
[133] ISA, ISBA/21/C/20 (21 July 2015), paragraph 12.

7.4.2 Public Participation

Inextricably linked to transparency is the need to ensure participatory decision-making,[134] in order to capture public[135] perceptions of risk and acceptability.[136] As established in Chapter 2.4.2, these political or moral judgments must inform the ISA's decisions, especially where uncertainties prevail. This is particularly important for regimes such as the ISA, which is sitting on the periphery of public attention. Indeed, the need to achieve deep ocean literacy, 'mobiliz[e] public opinion and governmental awareness', and 'map out a strategy for preserving the sea-bed environment' was already highlighted at the Preparatory Commission for the ISA in 1990.[137]

The ISA provides for limited participation by external experts, primarily in the development of the Mining Code and regional management plans, through workshops and expert presentations in LTC meetings.[138] Although participation by external experts is crucial to identifying scientific knowledge and uncertainties, it does not allow the ISA to ascertain moral judgments from the general public. As Peel suggests, 'testing the value assumptions of expert assessors against those of the community as a whole may reveal that the latter place emphasis on different features of a potential hazard, such as who benefits from an activity or technology […].'[139] An illustrative example is the 2012 survey on deep sea biodiversity in Scottish waters, which demonstrated that 73 percent of the Scottish public 'found it worth paying for protection of deep-sea areas, because society would benefit from it in the long-term.'[140] The researchers highlighted that 'policy makers are better off to consider the existence value that people associate with species protection in combination with the direct benefits of marine protection, and that overlooking non-users will necessarily lead to undervaluation of marine ecosystems.'[141] Similarly, Glenn et al demonstrated the high value that the Irish public places on protecting cold-water deep corals off Ireland:

> 87% of respondents agreed that they should be protected to provide [inter alia] raw materials for the

[134] *Aarhus Convention*; *Convention on Environmental Impact Assessment in a Transboundary Context*, (adopted 25 February 1991, entered into force 10 September 1997) 1989 UNTS 309, articles 2(2), 2(6); *Rio Declaration*, principle 10; EMP-CCZ (n 10), paragraph 13(f).

[135] Article 2(5) *Aarhus Convention* defines 'the public concerned' broadly as 'the public affected or likely to be affected by, or having an interest in, the environmental decision-making; for the purposes of this definition, non-governmental organizations promoting environmental protection and meeting any requirements under national law shall be deemed to have an interest.'

[136] David Vanderzwaag, 'The Precautionary Principle and Marine Environmental Protection: Slippery Shores, Rough Seas, and Rising Normative Tides' (2002) 33 *Ocean Development & International Law* 165–188, page 175.

[137] Preparatory Commission for the ISA and ITLOS, LOS/PCN/L.79 (28 March 1990), paragraph 14.

[138] Chapters 6.2, 6.3.1; ISBA/10/C/4 (n 120), paragraphs 13-17.

[139] Peel (n 4), page 157.

[140] Niels Jobstvogt et al, 'Twenty Thousand Sterling under the Sea: Estimating the Value of Protecting Deep-Sea Biodiversity' (2014) 97 *Ecological Economics*, 10-19, page 15.

[141] Ibid, page 18.

> biomedical industry, essential fish habitat and as a carbon sink to assist with climate change. 90% endorsed their protection for the benefit of the next and future generations and 84% considered that they should be protected purely in their own right given the unique and fragile ecosystem they represent.[142]

Guirco and Cooper note the importance of asking the right questions when involving stakeholders. In an Australian consultation on seabed mining, questions about patterns of metal consumption and recycling opportunities were disregarded.[143] Neglecting to situate seabed mining within the broader context of sustainable development can distort the picture.

This was indeed a problem with the broad survey conducted by the European Commission in 2014 to gather opinions about seabed mining from civil society, public authorities, research organisations, and the private sector. The summary of survey responses noted that it did not inquire about 'increasing recycling' because 'boosting resource efficiency and recycling is a separate pillar of the [EU's] Raw Materials Initiative.'[144] Nonetheless, numerous submissions, particularly from civil society, indicated the need consider the recycling of metals in the context of deciding on seabed mining.[145]

Moreover, although all four groups of respondents recommended research on environmental impacts of seabed mining as a clear priority action,[146] the survey responses showed an overwhelming scepticism from civil society towards the possibility of seabed mining contributing 'towards a sustainable and economical supply of raw material for EU industry and agriculture.'[147] Similarly, civil society chose greater caution in dealing with the risks of seabed mining:

> Most researchers and most private companies believe that deep-sea mining is not intrinsically better or worse than other marine activities but it depends on how and where it is done. The civil society response was different. They do consider the impact to be worse. Again our uncertain knowledge of potential damage was given as a reason for caution.[148]

These studies provide an important message to all authorities involved in regulating seabed mining.

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[142] H Glenn et al, 'Marine Protected Areas - Substantiating Their Worth' (2010) 34 *Marine Policy* 421–430, 427; P Wattage et al, 'Economic Value of Conserving Deep-Sea Corals in Irish Waters: A Choice Experiment Study on Marine Protected Areas' (2011) 107 *Fisheries Research* 59–67.

[143] Damien Giurco and Carlia Cooper, 'Mining and Sustainability: Asking the Right Questions' (2012) 29 *Minerals Engineering* 3–12.

[144] *EU Stakeholder Survey on Seabed Mining* (n 21), page 2.

[145] All responses to the survey are listed at <http://ec.europa.eu/maritimeaffairs/seabed-mining-consultation/replies_to_questions.htm>.

[146] *EU Stakeholder Survey on Seabed Mining* (n 21), page 24.

[147] Ibid, page 18.

[148] *EU Stakeholder Survey on Seabed Mining* (n 21), page 23.

Although, as discussed in Section 7.2.1, the ISA has abstained from debating the broader questions over the necessity and sustainability of mining minerals from the seafloor deposits, it has taken a first step towards increasing public participation in its regulatory functions. In 2014, the ISA conducted a first stakeholder survey on inter alia environmental measures required during the mineral exploitation phase.[149] As discussed in Chapter 5.3.3, this survey informed the ISA's development of a draft framework for the regulation of exploitation activities in the Area. Further stakeholder feedback was invited on the draft.

In sum, the ISA has only recently started to take tentative steps towards increasing public participation in its processes, although a precautionary approach must requires such participation. The key is that participation should go beyond notification or consultation to require collaboration with the public and taking into account the outcomes of public participation.[150] This is particularly important in light of the need, highlighted throughout this study, for the ISA to determine conservation objectives, based on which precautionary measures can be judged. Determining these objectives will be the first step in providing the LTC with criteria to assess whether a new applications for a exploration contracts provide 'for effective protection and preservation of the marine environment including, but not restricted to, the impact on biodiversity.'[151]

7.4.3 Some Suggestions for Ensuring Transparency and Public Participation

A precautionary approach to the regulation and administration of seabed mining must provide for transparent and participatory decision-making. This is particularly important in light of the ISA's mandate to act on behalf of humankind as a whole. Since the discussion has highlighted a lack of transparency and public participation in the ISA's current procedural framework, this section identifies potential options for improvements.

To increase transparency of the ISA's decision-making process, possible measures include, first, making EIAs, future environmental impact statements, environmental data collected by contractors, and sections of the contractors' annual reports on environmental studies publicly available.[152] This would create transparency regarding progress and compliance with environmental data gathering requirements and allow peer-review of the data to prevent bias.

[149] See n 45.

[150] *Aarhus Convention*, articles 6(8), 8; Stephen Stec, The Aarhus Convention: An Implementation Guide (United Nations Publications, 2000), pages 122-123.

[151] *Nodules Exploration Regulations*, regulation 21(4)(b); *Sulphides* and *Crusts Exploration Regulations*, regulation 23(4)(b).

[152] See also Seascape Consultants (n 59); ISA Technical Study No 10 (n 49), page 28; Ardron (n 131), page 8.

Second, the LTC and Council could be required to specify which scientific, technical, and value considerations and uncertainties informed a particular decision. Such a procedural requirement would make uncertainties explicit and help to disentangle scientific information from political or value considerations, as required by the precautionary approach.[153]

Third, access to relevant meetings of the LTC and Council, in which environmental considerations are discussed, could be improved. This could include increased access for observers,[154] video-streaming, or publication of summaries and minutes.

Fourth, the aforementioned proposal by the Netherlands, to require regional environmental management plans as a prerequisite for exploitation contracts, could also enhance transparency about regional environmental effects.[155] Such EMPs could be embedded in a strategic environmental assessment, which would require not only the publication of an SEA report but also public participation in the process.

Finally, the suggestion, discussed in Section 7.2.4, to pool environmental work, whereby the gathering of environmental data and conducting of EIAs is not performed by individual contractors but by a central consortium, could also increase transparency.

As regards the need to integrate public participation into the decision-making procedure, the ISA could take a number of further steps, such as utilising the aforementioned surveys by researchers and the European Commission which indicate public opinion regarding the value placed on deep ocean ecosystems and approaches to risk management. Other options include hosting discussion events, and actively engaging with civil society groups and NGOs, including through observer status at ISA meetings.

Public participation might also be institutionalized through an ombudsperson, whose office could create information channels between the ISA and civil society.[156] The Ombudsperson could be a member of the Secretariat charged with coordinating interactions with the public and representing its views at ISA meetings, particularly in the Council. One of the advantages of the ombudsman's institution, as Jávor notes, 'is that its establishment and his nomination does not

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[153] Chapter 2.4.2.

[154] At present observers play a limited role in the ISA. Observers may participate in Council meetings, although only upon the invitation of the Council and on 'questions affecting them or within the scope of their activities.' (*Rules of Procedures of the Council of the International Seabed Authority*, rule 75.) For a discussion about the role which observers play in various multilateral environmental agreements and institutions, see Glenn M Wiser, 'Transparency in 21st Century Fisheries Management: Options for Public Participation to Enhance Conservation and Management of International Fish Stocks' (2001) 4 *Journal of International Wildlife Law and Policy* 95–129, pages 114-118.

[155] Chapter 7.2.1; ISBA/20/C/13 (n 18), annex paragraph 5.

[156] Joyeeta Gupta, 'Glocalization: The Precautionary Principle and Public Participation' in David Freestone and Ellen Hey (eds), *The Precautionary Principle and International Law: the Challenge of Implementation* (Kluwer Law International, 1996) 231–246, page 245.

need the participation of those represented by him […].'[157] Thus, an ombudsperson could also be tasked to represent future generations. This would institutionalise a core obligation of the ISA, namely to give effect to the common heritage of mankind principle, including its inter-generational dimension.[158] Given that the main threat to future generations lies in the damage we inflict now on the global environment, the portfolio of the ombudsperson for future generations would necessarily include environmental protection.[159] However, given the benefit sharing element of the common heritage principle, this ombudsperson's competencies could also encompass the financial interests of future generations.

An important issue would be the procedural integration of an Ombudsperson. Since an Ombudsperson would represent subjective public opinions, these must be clearly distinguished from scientific advice. As such, these opinions could not be relevant to scientific assessments but would be an important factor for the ISA to consider when setting overarching conservation objectives in the context of strategic environmental assessments, as discussed in Section 7.2.1.

A further question relates to the competencies an Ombudsperson might be granted. A detailed discussion thereof is beyond the scope of this thesis and is provided elsewhere.[160] Nonetheless, some brief remarks can be made. A mandate of an Ombudsperson could be limited to reporting the concerns of humankind and future generations to allow the ISA to take these concerns into account. At the other end of the spectrum, an ombudsperson could be empowered to bring cases before the Seabed Disputes Chamber for alleged breaches of environmental obligations. Examples for Ombudsmen with legal standing can be found in the human rights context across Latin American and European states.[161]

These suggestions may present preliminary options to increase the transparency of and public participation in the ISA's decision-making process. At present, the lack of both of these elements presents an obstacle to the implementation of a precautionary approach by the ISA.

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[157] Benedek Jávor, 'Institutional Protection of Succeeding Generations - Ombudsman for Future Generations in Hungary' in Joerg Chet Tremmel (ed), *Handbook of Intergenerational Justice* (Edward Elgar Publishing, 2006) 282–298, page 287.

[158] Rüdiger Wolfrum, 'Common Heritage of Mankind' in *Max Planck Encyclopaedia of Public International Law* (2009), paragraph 22.

[159] Jávor (n 157), page 288.

[160] Gabriele Kucsko-Stadlmayer, *European Ombudsman-Institutions: A Comparative Legal Analysis Regarding the Multifaceted Realisation of an Idea* (Springer, 2008); Ann Abraham, *The Future in International Perspective: The Ombudsman as Agent of Rights, Justice and Democracy*; Linda C Reif, 'Transplantation and Adaptation: The Evolution of the Human Rights Ombudsman' (2011) 31 *Boston College Third World Law Journal* 269–310.

[161] For a discussion about Ombudsmen who enjoy legal standing, see Reif (n 170), pages 304-307.

7.5 The Burden of Proof

A further procedural measure that may be part of implementing the precautionary principle is the deliberate allocation of the burden of proof. As discussed in Chapter 2.4.3, reversing the burden of proof is *not* a necessary element of the precautionary approach, and indeed it would not be appropriate in all circumstances, although it can form part of precautionary procedures in individual situations. Regardless of who carries the burden of proof, the precautionary principle affects the *standard* of proof in that neither side is required to prove absolute harmfulness or harmlessness of a project. Instead the relevant threshold of precaution applies. As discussed in Chapter 5.4.6.1, in the ISA context, the general thresholds are set at 'harmful effects which may' arise from seabed mining;[162] The thresholds for particular measures, such as emergency measures,[163] or disapproving prospecting or exploitation at specific sites,[164] are 'threat of serious harm', which is defined as 'significant adverse change.'[165]

This section sets out the ISA's procedures for the general burden of proof and assesses whether they reflect a precautionary approach to the protection of the marine environment. Subsequently, the section examines the ISA's use of a reversal of the burden of proof as a protective measure in specific cases.

7.5.1 The Status Quo in the ISA's Legal Framework

The ISA regime does not reverse the burden of proof in a strict sense. This is best discussed by analogy with the application of precaution in the *Fish Stocks Agreement*. As outlined in Chapter 2.3.3, the FSA requires states parties to determine 'stock-specific reference points and the action to be taken if they are exceeded.'[166] As Freestone observes:

> […] instead of the burden of proof being on those arguing for conservation to prove definitively that stocks are threatened before conservation measures are put in place (as has been the situation in the past), a number of stock management parameters are established ab initio and if these are exceeded then conservation measures will automatically become applicable.[167]

[162] LOSC, article 145; *Nodules Exploration Regulations*, regulation 31(2); *Sulphides* and *Crusts Exploration Regulations,* regulation 33(2);

[163] *Nodules Exploration Regulations,* regulation 33; *Sulphides* and *Crusts Exploration Regulations,* regulation 35;

[164] *Nodules Exploration Regulations*, regulations 2, 21(6)(c); *Sulphides* and *Crusts Exploration Regulations*, regulations 2, 23(6)(c).

[165] *Exploration Regulations*, regulation 1(3)(f).

[166] FSA, article 6(3)(b).

[167] David Freestone, 'Implementing Precaution Cautiously: The Precautionary Approach in the Straddling and Highly Migratory Fish Stocks Agreement' in Ellen Hey (ed), *Developments in International Fisheries Law* (Kluwer Law International, 1999) 287–325, page 293.

In other words, although the FSA does not reverse the burden of proof, 'it does however constitute a significant shift in the burden, by creating a presumption in favour of conservation.'[168] The question no longer is 'who can prove whether fisheries are risky or not.' Instead, the presumption of harm is enshrined in the FSA together with a conservation objective, namely to 'maintain or restore stocks at levels capable of producing maximum sustainable yield.'[169]

In the ISA context, (prospective) contractors do not have to prove an absence of risk. In fact, Article 162(2)(x) LOSC, for example, provides for the prohibition of mineral exploitation in a specific area only 'in cases where substantial evidence indicates the risk of serious harm to the marine environment.'[170] Moreover, the LTC Recommendations list activities that can be undertaken freely without even the need for EIAs.[171] In contrast, the draft regulations developed by the Preparatory Commission still provided that '[a]ctivities in the Area shall only take place if they do not cause serious harm to the marine environment.'[172]

Nonetheless, the legal framework incorporates a *presumption of harm*. Both the LOSC and the Mining Code recognise that seabed mining could cause environmental damage.[173] The procedural framework goes further and requires the LTC to only recommend approval of an application for an exploration contract, if it is satisfied that the application provides 'for effective protection and preservation of the marine environment.'[174] Whilst proof of an absence of risk is not required, the focus is on demonstrating that environmental protection is ensured. This may be regarded as a moderate form of precaution. However, contrary to the FSA, the regulatory framework for seabed mining fails to define what effective environmental protection entails. This brings us back to the important shortcoming highlighted throughout this thesis: the LOSC fails to establish a clear conservation objective (such as maximum sustainable yield) for seabed mining. This gap was left for the ISA to fill, but it has not yet done so. This failure undermines numerous steps that could contribute to the implementation of a precautionary approach.[175]

Importantly, it also compromises the *equity* and *effectiveness* of the current allocation of the

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[168] David Freestone, 'Satya Nandan's Contribution to the Development of the Precautionary Approach in International Law' in Michael Lodge and Myron H Nordquist (eds), *Peaceful Order in the World's Oceans: Essays in Honor of Satya N. Nandan* (Martinus Nijhoff Publishers, 2014) 308–324, page 320.

[169] FSA, article 5(b), annex II paragraph 2.

[170] LOSC, article 162(2)(x).

[171] *EIA Recommendations* (n 42), paragraph 18.

[172] LOS/PCN/SCN.3/WP.6/Add.5 (n 75), article 105.

[173] LOSC, article 145; *Nodules Exploration Regulations*, regulation 31; *Sulphides* and *Crusts Exploration Regulations*, regulation 33; *EIA Recommendations* (n 42).

[174] *Nodules Exploration Regulations*, regulation 21; *Sulphides* and *Crusts Exploration Regulations*, regulation 23.

[175] Chapters 6.3.2, 7.2, 7.3.5.

burden of proof. As concluded in Chapter 2.4.3, when assessing the allocation of the burden of proof in a given scenario, the aim is to ensure that precaution can work *effectively* and *equitably*. At present the LTC has to determine the environmental risks of exploration activities without the framework of agreed conservation objectives. This can lead to *ineffectiveness* in the application of precaution, because projects may be authorised despite environmental risks, as the LTC can neither follow an assessment standard, nor benefit from a prior strategic impact assessment that provides the LTC with a regional framework and enables the consideration of cumulative effects in that particular region. Moreover, this system might lead to *inequalities*. Given the lack of transparency[176] and the absence of guidance as to the meaning of 'effective protection of the environment', it is not known whether the LTC applies the same standard to each application.

In sum, the general burden of proof is not reversed in the seabed mining context. Whilst the assumption of harm is incorporated into the regulatory framework, an effective application of the precautionary approach is undermined by the lack of agreed conservation objectives. Moreover, whether the current arrangement in which the LTC decides on the environmental agreeability of a project is equitable, is impossible to say, given the lack of transparency over the LTC's decision-making process.

7.5.2 The Reversal of the Burden of Proof in Specific Cases

As discussed in Chapter 2.4.3, regardless of the burden of proof for seabed mining activities in general, a reversal of the burden of proof can be applied as a particular measure to implement precaution in a specific context. The ISA has not yet done so. In order to take a more precautionary and more effective approach, stakeholders have suggested for instance that future regulations could incorporate a presumption against exploitation where new and unique life forms are discovered during baseline studies.[177] Similarly, the ISA could utilise a reversed burden of proof for seabed mining in specific areas, such as around active hydrothermal vents and other vulnerable marine ecosystems.[178]

7.6 Monitoring of Environmental effects

A further procedural element under the precautionary approach that requires attention is the obligation to monitor environmental effects. As set out in Chapter 5.4.1.3, the effects of seabed

[176] Chapter 7.4.
[177] Submission to the Stakeholder Survey (n 45) by Earthjustice, page 11.
[178] Chapter 6.4.

mining on the marine environment must be measured, assessed, and monitored over time. This obligation comprises three aspects. First, the Mining Code requires contractors to measure and analyse the risks or effects of pollution resulting from their mining activities.[179] Second, implementing the precautionary approach includes the requirement to assess and monitor the environmental effects of particular protective measures, including any counter-effects.[180] Third, the EMP-CCZ commits the ISA to integrate ecosystem-based management, including cumulative EIAs.[181] This requires the ISA to measure and assess environmental effects on a regional scale. Each of these requirements is examined sequentially in the following paragraphs.

7.6.1 Monitoring Programme for Contractors

'[…] if the practical objective of EIA is to predict changes in the environmental and social systems resulting from a proposed project, baseline studies provide the before-project records whilst monitoring gives the after-project measurement from which changes over space and time can be assessed.'[182]

As established in Chapter 5.4.1.3, all contractors must establish a programme to monitor the effects of some of their activities on the marine environment.[183] This incorporates those exploration activities which the LTC found to carry a risk of causing serious harm and which are also subject to a prior EIA.[184] The obligation of contractors to assess and monitor environmental impacts is progressive in nature. At present, the implementation of this monitoring programme is limited because exploration work in general has not yet progressed to the stage of test mining or other exploration activities that require full EIAs. As such, there is no evidence to suggest that detailed monitoring programmes have been established. Instead, contractors continue to gather environmental baseline data to facilitate the assessment and monitoring of environmental impacts in the future.[185]

This timing presents challenges, not least because the ISA is already developing exploitation regulations. Without data from environmental baseline, monitoring, and impact assessment studies during exploration work, EIAs for minerals exploitation are difficult to undertake[186] and the development of robust future regulations and specific protective measures is undermined.

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[179] *Nodules Exploration Regulations*, regulations 31(6), 32; *Sulphides* and *Crusts Exploration Regulations*, regulations 33(6), 34.
[180] Chapter 2.4.6.
[181] EMP-CCZ (n 10), paragraphs 35(b), (d), 36; *EIA Recommendations* (n 42), paragraph 16.
[182] Beanlands (n 53), page 40.
[183] *Nodules Exploration Regulations*, regulations 33(6), 34; *Sulphides* and *Crusts Exploration Regulations*, regulations 31(6), 32.
[184] *EIA Recommendations* (n 42), paragraph 19.
[185] Chapter 7.2.3.1.
[186] *EIA Recommendations* (n 42), paragraph 19.

At present, the only monitoring of contractors' activity is through annual reports to the LTC in which contractors outline their progress, findings, and data.[187] These reports are supposed to help the LTC to discharge its obligations, including ensuring that existing regulations are adequate to protect the marine environment,[188] making recommendations to the Council with respect to environmental protection,[189] and applying ecosystem-based management.[190] Although annual reporting provides a means to track a contractor's progress, *compliance* can only be assessed if there is an agreed aim of what is expected after 15 years of exploration work and which annual milestones contractors must reach. In other words, assessing compliance requires standards against which to assess the contractors' work. These have not yet been established.[191]

Moreover, the ISA Secretary-General and LTC highlighted on several occasions that contractors failed to submit sufficient environmental data, despite it being a contractual requirement.[192] Although the ISA has a broad mandate to ensure compliance by the contractors, set out in Chapter 3.6, Lodge notes that 'the sort of compliance measures that have been taken so far have been limited to decisions and resolutions of the Council urging contractors to make better efforts to comply with contractual requirements regarding, for example, the submission of environmental data.'[193]

This prompts the conclusion that although once non-compliance can be established the ISA benefits from a compulsory dispute settlement mechanism for cases of serious breach,[194] the ISA's enforcement powers in less serious circumstances are limited. For example, when contractors do not submit sufficient environmental data, the ISA can only exercise political pressure and conduct bilateral negotiations with the contractor.[195] As established in Section 7.3, the ISA's powers are greatest at the time of assessing a new application and are significantly reduced once an exploration contract is in force. It remains to be seen whether the ISA will take a contractor's insufficient data submissions into account when assessing future applications for

[187] *Nodules Exploration Regulations*, regulation 32; *Sulphides* and *Crusts Exploration Regulations*, regulation 34; *Exploration Regulations*, annex IV sections 5.5, 10.2(a).

[188] LOSC, article 164(2)(h).

[189] LOSC, article 164(2)(e).

[190] EMP-CCZ (n 10), paragraph 35(d).

[191] ISA, *Summary Report of the Chair of the Legal and Technical Commission on the Work of the Commission during the Nineteenth Session of the International Seabed Authority*, ISBA/19/C/14 (9 July 2013), paragraph 8.

[192] ISBA/20/C/20 (n 43), paragraph 12; ISA, *Periodic Review of the Implementation of the Plans of Work for Exploration for Polymetallic Nodules in the Area*, ISBA/19/C/9/Rev.1 (27 July 2013), paragraph 6; ISBA/17/C/13 (n 62), paragraphs 6(e), 8; Seascape Consultants (n 59), pages 10-11.

[193] Michael Lodge, 'Protecting the Marine Environment of the Deep Seabed', in Rosemary Rayfuse (ed) *Research Handbook on International Marine Environmental Law* (Edward Elgar Publishers, forthcoming 2015).

[194] Chapter 3.6, 3.8.

[195] Chapter 7.2.3.

(preliminary) exploitation licenses. In order to do so, future exploitation regulations will have to provide for such considerations. As examined in Chapters 3.5.2 and 7.2.2, the current *Exploration Regulations* incorporate a procedural bias towards approving new applications. If the same is included in future regulations, this will impede the utilisation of the ISA's power to set environmental standards and to provide for adequate enforcement mechanisms, as required by its comprehensive mandate.

One specific option the ISA could incorporate into the Mining Code is to streamline environmental studies and have them conducted by a centrally coordinated consortium and financed by contractors, as discussed in Section 7.2.4. This could address the level of compliance with respect to the obligation to provide environmental data as well as the current lack of transparency with respect to the oversight and outcomes of environmental studies.[196] In relation to the monitoring programmes, pooling such environmental monitoring studies would ensure a degree of independence and thus increase the reliability of the data. Moreover, such a centralised monitoring programme could address the particularly difficult challenge of ensuring that environmental effects are monitored even years after a mine site has been closed.[197] The future exploitation regulations will have to account for the possibility of commercial mining entities ceasing to exist following the completion of mining operations. Although the contractors might have to provide financial guarantees to enable such long-term monitoring,[198] the physicality of actually monitoring a remote area in the absence of any corporate entity charged with the task can be expected to pose challenges. This will be particularly so in situations where the ISA is no longer able to send inspectors to accompany a contractor's regular voyages to the mine site. Once a mining entity ceases to exist, no vessels will be available on which inspectors can sail unless the ISA leases or acquires a vessel of its own. However, given the ISA's current size, staffing and available funds this would appear to be a remote possibility. Centralising the coordination of monitoring programmes could provide the ISA with greater control over these monitoring studies and enable the ongoing monitoring of sites post operations.

7.6.2 Monitoring the Environmental Effects of Protective Measures

At present, it is difficult to assess the ISA's achievements with regards to monitoring the environmental effects of protective measures, including any counter-effects or success in reducing environmental harm. Several measures have not yet been implemented (emergency

[196] Chapter 7.3.1.
[197] *EIA Recommendations* (n 42), paragraph 13, annex I paragraph 18; ISBA/Cons/2015/1 (n 34), pages 14-15.
[198] ISBA/Cons/2015/1 (n 34), pages 30-31.

orders, impact and preservation reference zones, decision to assess whether vulnerable marine ecosystems require special protection). Nonetheless, a preliminary assessment of the EMP-CCZ is possible.

The EMP-CCZ specifically provides for flexibility and reviews of the plan, in particular of the nine protected areas, the APEIs.[199] The 2014 review of the implementation of the EMP-CCZ found that, at this stage, nothing suggests that the location of the APEIs should be amended. However the review noted:

> Very limited research into the biology of the APEIs has been carried out since the adoption of the EMP, hence the Commission is not currently in a position to make any Recommendation to Council regarding their formal implementation. On this basis the APEIs should remain in place as currently positioned, to be reviewed in a further 5 years' time by which time further information may be available.[200]

As such, the environmental effects of the EMP as a protective measure have not yet been evaluated. Given that the EMP was only adopted in 2012 this is perhaps not surprising. However, if APEIs remain under-researched, this could render any future evaluation of the effectiveness and potential counter-effects of APEIs difficult.

7.6.3 Monitoring Environmental Effects on a Regional Scale

In line with the EMP-CCZ, the ISA is also required to monitor environmental changes on a regional scale. However, ecosystem management and cumulative environmental impact assessments, foreseen in the EMP-CCZ, require environmental baselines which are only just being established.[201] Moreover, whilst contractors must monitor the effects of their activities on the marine environment within their contract area and beyond,[202] there is no specific obligation to collect environmental data in APEIs.[203] Consequently, at present the ISA's ability to monitor and assess environmental changes on a regional-scale is undermined because of a lack of the availability of environmental data from both contract areas and beyond. This challenge could be addressed through the aforementioned suggestion to have environmental studies carried out not by each contractor individually but by a consortium or consultants and financed by contractors.[204] Instead of relying on individual contractors or external research projects to collect environmental data from APEIs, a centralised approach could ensure such data is

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[199] EMP-CCZ (n 10), paragraphs 30-31, 42, 43, 46.
[200] Seascape Consultants (n 59), page 17.
[201] Chapter 7.2.3.1.
[202] *EIA Recommendations* (n 42), paragraphs 21, 22.
[203] Chapter 6.3.1.
[204] Chapters 7.2.4, 7.6.1.

acquired and environmental effects are monitored on a regional scale.

7.7 Conclusion

This chapter has identified a number of procedural shortcomings that prevent the ISA from adequately implementing the precautionary principle.

First, with respect to assessing risks of seabed mining activities and identifying remaining uncertainties, the regulatory framework is currently inadequate. Strategic environmental assessments are not yet provided for, which hinders strategic considerations regarding the long-term, regional and global scale environmental sustainability of mining the deep oceans. This explains the *ad hoc* nature of the protective measures adopted by the ISA, of which the EMP-CCZ is an encouraging first step towards regional management.

In addition, while project-specific EIAs are required during the exploration phase, the regulatory framework does not facilitate their full implementation. In particular, there are no requirements regarding the content and format of the *preliminary EIA* that is submitted together with an application for an exploration contract. Since applicants are not specifically required to identify the risks and uncertainties of their project and explain how they will address them, it remains unclear whether applicants do so. The LTC considers these preliminary EIAs without objective evaluation criteria or any transparency in the decision-making process.

Regarding the full EIA required during exploration work, the procedure does not provide for stakeholder involvement in the EIA, independent review, or consequences that must be taken if an EIA identifies risks of serious harm. Moreover, the regulatory framework lacks procedural safeguards to ensure environmental baseline data is adequately supplied. One such safeguard would be to make test mining contingent upon comprehensive EIA reports that require adequate environmental baselines. At present, the danger is for EIAs to be little more than an administrative formality rather than a crucial step in identifying the risks and uncertainties of seabed mining in order to minimise them, as required by the ISA's mandate.

Second, since full EIAs are only conducted once an exploration contract is in force, the ISA requires means through which it can unilaterally require contractors to adjust their operations in light of new environmental standards. Although the ISA's mandate allows it to exercise such control, the current regulatory framework does not provide for clear procedures to that effect. None of the current options to amend environmental standards fully bind existing contractors. This not only undermines the efficacy of EIAs but also largely prevents the application of adaptive management, which rests on the continual adjustment of environmental management measures.

Third, a further procedural challenge relates to the lack of transparent and participatory decision-making as well as the burden of proof. Neither EIAs, nor environmental data obtained by contractors, or details on the progress of contractors are published. This renders public oversight impossible and arguably undermines the concept of common heritage of mankind. Furthermore, although an assumption of harm is incorporated into the regulatory framework, the LTC is tasked to determine, for example, whether an application provides for 'effective protection and preservation of the marine environment.'[205] In doing so, the LTC has to conduct not only scientific and technical assessments but also make subjective determinations regarding the acceptability of risks, without objective evaluation criteria or the benefit of overarching conservation objectives. As the discussion regarding the burden of proof concluded, this can lead to potential *inequalities* as it remains unknown whether all applicants and contractors are held to the same standard. This chapter has also demonstrated that a lack of public participation can lead to undervaluing environmental protection. This in turn, can jeopardise the *effectiveness* of implementing precaution as some activities may be permitted despite risks of serious environmental harm to which the public, if consulted, might not agree. Finally, although the legal framework requires the monitoring of the environmental effects of seabed mining activities, it is too early to evaluate the effectiveness of such monitoring.

In light of these procedural challenges, it must be highlighted that the risks of seabed mining causing serious environmental damage are of course greatest during the exploitation phase. Thus, the ISA still has the opportunity to adapt a strong procedural framework to minimise the environmental damage during commercial-scale mining. This chapter has identified the strengths and weaknesses of the current procedural framework, in order to inform the development of the exploitation framework. The ISA's stakeholder surveys are an encouraging sign for increased participation, which have also lead to the identification of numerous options for protective measures.

However, it may be recalled that the precautionary principle requires *timely* action. The discussion throughout this thesis demonstrates that given the frontier nature of seabed mining, the ISA requires a long-term vision that embeds strategic steps and measures to restrict environmental harm to an agreed limit, in line with the ISA's stewardship of the common heritage of humankind. It is in this context that the *current* shortcomings undermine the implementation of the precautionary approach. Interestingly, the Mining Code reflects some strategic elements, albeit only on a project-specific level, by requiring baseline studies, EIAs, and monitoring programmes for each exploration project. Yet, as this chapter has demonstrated, the procedural framework does not facilitate these steps. The longer the ISA postpones the

[205] *Nodules Exploration Regulations*, regulation 21(4)(b); *Sulphides* and *Crusts Exploration Regulations*, regulation 23(4)(b).

establishment of procedural and substantive measures to protect against unacceptable environmental harm, the more difficult the development of the future exploitation regulations will be and the more unattainable environmental objectives might become.

In short, for the ISA to give effect to its environmental obligations, the Mining Code will need to incorporate strategic environmental assessments, specific consequences for EIAs, agreed conservation objectives based on scientific advice and explicit value considerations developed in a transparent and participatory manner, and procedural safeguards, including ensuring that the ISA can require changes to activities in the Area during the duration of a contract. A phased approach to mineral exploitation coupled with control of the ISA over the exploitation work should be part of the answer. This will require institutional capacity, which forms the focus of the following Chapter.

Chapter 8: Implementing Precaution: Institutional Aspects

8.1 Introduction

'In implementing the precautionary principle, regard needs to be had to the whole institutional context and to understandings about that institutional context.'[1]

Chapters 6 and 7 addressed the *what*, *when*, and *how* of the implementation of the precautionary approach by the International Seabed Authority. However, much remains to be said about the *who*, the ISA's institutional capacity to give effect to the precautionary approach. This chapter examines the extent to which the procedural challenges and those associated with protective measures, identified in the preceding chapters, can be explained by and addressed within the ISA's institutional structure. In particular, given the pending transition from the exploration to the exploitation phase it is necessary to examine the extent to which the ISA's current institutional structure facilitates or hinders the implementation of a precautionary approach to the exploration and exploitation of seabed minerals. In examining the benefits and challenges of the current institutional framework, the discussion illuminates the institutional changes needed to facilitate a precautionary approach to mineral exploitation.

The possibility for such institutional development is foreshadowed in Article 154 LOSC, which requires the ISA Assembly to undertake, every five years, a general and systematic review of the manner in which the Area regime has operated in practice. The aim of this requirement is to provide a regular opportunity to assess whether the novel structure of the Area regime, which was designed in the abstract and in the absence of any previous practical experience, has operated as envisaged. In light of the review, Article 154 then allows the Assembly to take measures to improve the operation of the regime.

The first review was due in 2000; however, the Assembly decided that after only five years in operation it was premature to consider restructuring the regime and thus no review was conducted.[2] Neither has the Assembly conducted any review process in the years since, despite the requirements of Article 154. Nevertheless, in light of the significantly increased workload of the ISA, the pending transition to the exploitation stage, and 'the need to acquire further baseline environmental data for the lesser known deposits of polymetallic sulphides and cobalt-rich ferromanganese crusts,' the ISA Secretary-General noted, in 2014, that 'the Assembly may wish to take the opportunity to revisit article 154 and review the manner in which the

[1] E Fisher, 'Precaution, Law and Principles of Good Administration' (2005) 52 *Water Science and Technology* 19–24, 24.

[2] ISA, ISBA/7/A/2 (18 May 2001), paragraph 6.

international regime has operated in practice.'[3] In July 2015, the Assembly decided to conduct such a review.[4]

This review will assess the performance of the ISA's organs against their mandate.[5] Until now, in line with the evolutionary design of the Part XI regime discussed in Chapter 3.4, the ISA 'has been principally acting as an international organization providing meeting services to member States and expert bodies.'[6] This minimalist institutional capacity will likely not be sufficient for the ISA to discharge its mandate as the central entity administering seabed mining in the Area.

Against this background, the present chapter analyses the current institutional aspects relevant to the implementation of a precautionary approach by the ISA. As with the preceding chapter, this chapter builds upon the elements necessary to implement precaution, identified in Chapter 2.5. For the present analysis, these can be divided into two tasks: (a) mechanisms for the assessment of environmental risks and the selection of protective measures; and (b) mechanisms for ensuring compliance by the contractors with the regulatory framework.

In the first part of this chapter, Section 8.2, these tasks are discussed individually with a view to determining the extent to which they are provided for within the ISA's current institutional framework. The discussion identifies strengths but also shortcomings, mainly with respect to the Legal and Technical Commission and the ISA Secretariat. The capacity and limitations of both of these organs are then analysed in Section 8.3. Based on this discussion, Section 8.4 examines two options for institutional innovation, an Environmental Commission and a Mining Inspectorate, which could address some of the challenges identified throughout this thesis.

8.2 Institutional Mechanisms for Implementing Precaution

8.2.1 Mechanisms for the Assessment of Environmental Risks and Protective Measures

A crucial requirement for implementing the institutional dimension of the precautionary principle is the existence of an entity competent to evaluate scientific knowledge relevant for seabed mining, assess the environmental risks of mining activities, and compare various protective measures. This includes risk assessment on a regional and global scale through strategic environmental assessments (SEAs) as well as project specific environmental impact

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[3] ISA, ISBA/20/A/2 (4 June 2014), paragraph 93.

[4] ISA, ISBA/21/A/9 (24 July 2015).

[5] Ibid.

[6] Allen L Clark, Jennifer Cook Clark, and Sam Pintz, *Towards the Development of a Regulatory Framework for Polymetallic Nodule Exploitation in the Area (Technical Study: No. 11)* (ISA, 2013), page 39.

assessments (EIAs). Each of these is discussed individually in the following paragraphs.

As examined in Chapter 7.2.1, SEAs are not formally part of the ISA's procedural framework. Consequently, no entity within the ISA is specifically assigned the responsibility to coordinate and conduct SEAs. However, the *Environmental Management Plan for the Clarion-Clipperton Zone* (EMP-CCZ)[7] represents a first step towards regional-scale management. Using the EMP-CCZ as an example allows for an examination of the current institutional arrangements concerning regional-scale management.

As discussed in Chapter 6.3.1, although the Council decided on the adoption of the EMP-CCZ, it was the legal and technical experts in the LTC who drafted the plan and recommended its adoption. However, the drafting of the EMP-CCZ was initiated by, and ultimately based on the recommendations of, external scientists. Workshops organised by the ISA Secretariat provided the platform for scientists to make recommendations to the ISA with respect to particular environmental aspects that require scientific research as well as options for collaborative research projects.[8] Based on the knowledge gained from collaborative research, scientists then recommended the establishment of nine protected areas in the Clarion-Clipperton Zone. These recommendations were developed through external workshops organised by the scientific community as well as a technical study commissioned by the ISA Secretariat.[9] This brief summary demonstrates that, although not formally embedded in the ISA's institutional structure, external scientists play a significant role in the work of the ISA. Technical studies and workshops provide an important, semi-formalised exchange between scientists and the LTC as well as the ISA Secretariat. It also illustrates that scientific advice, both from the scientific community and from the LTC, was central to the ISA's development of the EMP-CCZ. The ISA's institutional framework assigns a central role to scientific experts, which is a prominent example of precautionary institutional design.[10]

However, in addition to privileging scientific advice, precautionary decision-making also requires the identification of uncertainties, particularly in the context of selecting protective measures and indeed strategic environmental objectives. These must be informed by subjective

[7] ISA, ISBA/17/LTC/7 (13 July 2011), paragraph 15 (EMP-CCZ).

[8] ISA, *Prospects for International Collaboration in Marine Environmental Research to Enhance Understanding of the Deep Sea Environment*, Proceedings of the ISA workshop held in Kingston (29 July-2 August 2002) (ISA, 2006); ISA, *Standardization of Enviornmental Data and Information - Development of Guidelines*, Proceedings of the ISA Workshop held in Kingston (25-29 June 2001) (ISA, 2002).

[9] Craig R Smith et al, *Biodiversity, Species Ranges, and Gene Flow in the Abyssal Pacific Nodule Province: Predicting and Managing the Impacts of Deep Seabed Mining (Technical Study No 3)* (ISA, 2008).

[10] David Freestone and Ellen Hey, 'Implementing the Precautionary Principle: Challenges and Opportunities' in David Freestone and Ellen Hey (eds) *The Precautionary Principle and International Law: the Challenge of Implementation* (Kluwer Law International, 1996) 249–168, page 264.

judgments as to the value placed by the public on deep ocean minerals, ecosystems, and biodiversity.[11] As established in Chapter 7.4.2, the ISA's decision-making process provides for very limited participation by the public, namely through observer status for NGOs and two stakeholder surveys conducted recently. At an institutional level, the ISA's framework does not currently integrate public participation. Furthermore, the Assembly, as the most representative organ, is not involved in the selection of protective measures or determination of conservation objectives.

A further point worth mentioning is that, as discussed in Chapter 2.3.3, precautionary decision-making requires potential protective measures to be assessed for their *proportionality* and *effectiveness* in achieving the desired level of protection. Whether the ISA's institutional framework provides adequate mechanisms for these tasks is difficult to determine, given that they are not included in the ISA's decision-making process. The ISA has not yet developed a conservation objective against which the proportionality and effectiveness of individual protective measures could be judged. Although the Council's and the LTC's general mandates allow these bodies to address the proportionality and effectiveness of specific protective measures, the absence of procedures to that effect hinders this process.

With respect to the assessment of risks presented by a specific mining project through an EIA, a very limited number of actors are involved. It will be recalled from Chapter 5.4.1 that contractors must gather environmental baseline data, prepare environmental assessments, and continuously monitor the environmental effects of their activities on the marine environment. Within the ISA, it is the LTC that assesses new applications for exploration contracts, which include preliminary EIAs,[12] and evaluates the contractors' EIAs required prior to specific exploration activities.[13] The responsibility for tasks rests exclusively with the LTC. The Council has no access to application documents from prospective contractors, even though it decides whether to approve new applications.[14] With respect to the EIAs required during a contractor's exploration period, it is unclear whether these are accessible for the Council or the Assembly. The *Exploration Regulations* merely foresee the submission of EIAs as well as environmental baseline and monitoring data to the Secretary-General who transmits the information to the LTC.[15] Although the *Regulations* also require environmental information to be treated as non-

[11] Chapter 2.4.2.
[12] Chapter 3.5.2
[13] Chapter 5.4.1.
[14] Chapters 3.5.2, 7.4.1.
[15] *Nodules Exploration Regulations*, regulation 31, annex IV section 5; *Sulphides* and *Crusts Exploration Regulations*, regulation 33, annex IV section 5.

confidential,[16] neither environmental baseline data, nor the first EIA submitted last year has been made publically available. This illustrates a clear institutional focus on the small expert body of 24 individuals with little oversight by other ISA organs or indeed civil society groups or the scientific community.

8.2.2 Mechanisms for Ensuring Compliance

A further important step in implementing a precautionary approach that has institutional implications is that of ensuring compliance with environmental standards. In the ISA context, there is a considerable lack of transparency with respect to compliance by contractors with their obligations, including their environmental obligations. As pointed out in 2014 by two delegations in the Council in the context of discussing extensions for current exploration contracts: ‘it would be useful to know to what extent contractors had fulfilled the requirements of their contract thus far.’[17]

This statement hints at the challenge at hand; very few mechanisms are in place to oversee and ensure compliance of contractors with their contractual obligations. However, the reason is not a lack of competence. The ISA enjoys an extensive mandate and ‘shall exercise such control over activities in the Area as is necessary for the purpose of securing compliance.’[18] Moreover, in the case of non-compliance, the LOSC provides for dispute settlement mechanisms and potential sanctions.[19]

The only method currently used to monitor compliance by contractors is self-reporting. Contractors are required to report annually about their exploration work carried out during the year.[20] These reports are reviewed by the LTC. There is no institutional capacity for other forms of monitoring compliance, despite the fact that self-reporting is a weak mechanism to ensure contractors carrying out activities in very remote marine areas fully comply with their obligations. If the ISA is to fulfil its environmental mandate properly, its powers of oversight must be significantly increased in the course of transitioning to test mining and mineral exploitation activities.

Numerous tools to monitor compliance are available, which the ISA could, in principle, apply. These include satellite tracking as an observation tool for example to ensure vessels are

[16] *Nodules Exploration Regulations*, regulations 7, 36(2); *Sulphides Exploration Regulations*, regulations 7, 38(1); *Crusts Exploration Regulations*, regulations 7, 38(2).

[17] ISA news item (July 2014) <https://www.isa.org.jm/news/seabed-council-discusses-ltc-report-gets-explanatory-note-adopts-amendments-two-regulations>.

[18] LOSC, article 153(4).

[19] Chapter 3.6; LOSC, articles 162(2)(u), (t), 185, annex III article 18(1).

[20] *Exploration Regulations*, annex IV section 10.

conducting mining activities within their contracted areas. Moreover, to monitor contractors' activities underwater, video footage from remotely operated underwater vehicles could be collected and provided to the ISA. There will no doubt be technological challenges for implementing such methods but the relevant question for the present analysis is what *institutional* requirements would be necessary to facilitate their use.

Compliance monitoring will require a team of technical experts within the Secretariat to oversee the implementation of the technology as well as a team to evaluate the data generated by the monitoring tools. In particular, with respect to video footage, identifying irregularities and instances of non-compliance would require detailed knowledge of the conditions and limits placed on contractors. However, capacity within the currently small Secretariat is already limited, as discussed in Section 8.3.2 below.

The facilitation of these monitoring tools will likely require increased specialist capacity for the ISA Secretariat. Suggestions have included the establishment of a Compliance Office and a Data and Archive Centre to enable the ISA to carry out its mandate particularly in light of the transition to test mining and commercial exploitation.[21] These suggestions are discussed in Section 8.4.2 below.

In addition to increasing capacity within the Secretariat, the ISA might be able to collaborate with existing monitoring projects in other sectors. For example, *Global Fishing Watch* is a multi-stakeholder project that provides visualised data from the Automatic Identification System (AIS) of fishing vessels world-wide.[22] The publicly accessible website tracks the movement of fishing vessels to show for example when vessels enter marine protected areas. Collaboration with such existing projects could allow integration of external resources into the ISA compliance structure. An additional benefit would be the opportunity to increase transparency by making the satellite data publicly available as in the case of *Global Fishing Watch.*

In addition to the challenges associated with ensuring compliance in general, one particular aspect requires attention, namely the inspection of mining installations. The ISA is specifically mandated to inspect all installations used by contractors in the Area.[23] The standard terms for exploration contracts also foresee such inspections to monitor the effects of mining operations on the marine environment.[24]

[21] Clark, Cook Clark, and Pintz (n 6), page 78.

[22] See <http://www.globalfishingwatch.org>.

[23] LOSC, articles 153(5); 162(2)(z); *Exploration Regulations*, annex IV section 14.3.

[24] *Exploration Regulations*, annex IV section 14.1(b); see also ISA, Recommendations for the Guidance of Contractors for the Assessment of the Possible Environmental Impacts Arising from Exploration for Marine Minerals in the Area, ISBA/19/LTC/8 (1 March 2013), paragraph 12.

In comparison, although the Antarctic Treaty also allows inspections of all stations, installations, equipment, ships, and aircrafts in Antarctica, these are carried out by nationals of the contracting parties.[25] Similarly, inspection mandates are used in the fisheries context, for example allowing coastal states[26] to send observers on vessels and to establish inspection schemes. Regional Fisheries Management Organisations have also developed observer programmes and inspection schemes not only to collect catch data but also to monitor compliance with conservation and management measures, although these programmes and schemes are carried out by the member states.[27]

The LOSC provides for inspections by the ISA itself, in line with its mandate to act on behalf of humankind.[28] However, the Convention is somewhat ambiguous with respect to the institutional arrangements for such inspections. The Council has a supervisory role and can 'exercise control over activities in the Area', including directing and supervising 'a staff of inspectors' and adopting regulations in this context.[29] The LTC is not only tasked to make recommendations to the Council in this regard,[30] but can also be requested by the Council to supervise activities in the Area.[31] Article 165(3) LOSC provides that members of the LTC 'shall, upon request by any State Party or other party concerned, be accompanied by a representative of such State or other party concerned when carrying out their function of supervision and inspection.' This raises uncertainties with respect to the precise activities to be performed by the LTC. It will be recalled that the LTC only meets twice a year, which could render extensive supervision by the LTC impractical. In any event, no 'staff of inspectors' exists at present and no inspections of exploration activities are carried out. For that to change, the ISA's institutional capacity would need to accommodate inspectors, as further discussed in Section 8.4.2 below.

In summary, the current institutional framework of the ISA facilitates some aspects relevant to the implementation of the precautionary principle but not others. In line with the precautionary principle, a central role is afforded to scientific advice, institutionalised through the LTC and supported by semi-structured engagement with the scientific community in the form of regular workshops and consultant studies. However, little institutional oversight of the LTC is provided for. This is problematic given the high levels of uncertainty regarding the environmental

[25] *Antarctic Treaty* (adopted 1 December 1959, entered into force 23 June 1961) 402 UNTS 72, article 7.

[26] LOSC, articles 62(4)(g), 73(1); *FAO Code of Conduct for Responsible Fisheries* (adopted 31 October 1995), article 7.7.3.

[27] Mary Ann E Palma, Martin Tsamenyi, and William R Edeson, *Promoting Sustainable Fisheries: The International Legal and Policy Framework to Combat Illegal, Unreported and Unregulated Fishing* (Martinus Nijhoff Publishers, 2010), pages 222-226.

[28] LOSC, articles 136, 137, 140, 153(1).

[29] LOSC, articles 162(2)(l), 162(2)(z), annex III article 17(b)(viii).

[30] LOSC, article 165(2)(m).

[31] LOSC, article 165(2)(c).

implications of seabed mining. As concluded in Chapter 2.4.2, precautionary decision-making requires a distinction to be made between scientific advice, uncertainties, and value considerations. The current institutional framework does not provide for such distinction. Furthermore, as discussed in Chapter 7.4.3, it lacks an institutional integration of public participation, be it through surveys or an Ombudsperson within the Secretariat. In addition, the ISA institutional framework does not provide for the mechanisms necessary to ensure compliance by contractors with their obligations under exploration contracts.

8.3 Current Institutional Limitations

The previous discussion has clearly illustrated the central role of both the LTC and the ISA Secretariat in carrying out the assessments and measures required in implementing a precautionary approach. In this respect, the capacity and limitations of each of these organs warrant some discussion.

8.3.1 Capacity and Limitations of the Legal and Technical Commission

As discussed above, the LTC is the central organ responsible for carrying out most of the tasks associated with the implementation of a precautionary approach. Whilst the Council bears the decision-making responsibility, and contractors and external scientists provide environmental advice and expertise, the LTC presides over all technical considerations and assessments relating to the ISA's environmental obligations,[32] although, its environmental work makes up only a percentage of the LTC's extensive mandate. This presents two challenges: First, the LTC requires detailed expertise in environmental impact assessment and environmental management. Second, the LTC requires the time to be able to carry out its extensive mandate. As the following paragraphs demonstrate, neither of these is currently ensured.

The expertise currently represented in the LTC does not reflect the Commission's far-ranging environmental management competencies. Indeed, at time of writing, only two of the 24 LTC members are environmental scientists with expertise in marine ecology.[33] Without diverse expertise in environmental management and related disciplines, it is difficult to see how the LTC can effectively perform its tasks to assess environmental impacts, recommend protective measures, and respond to environmental emergencies. This lack of environmental management expertise could become particularly problematic in the context of emergency orders, where the

[32] Chapter 3.4.4.

[33] For a list of the current members of the LTC, see <http://isa.org.jm/authority/legal-and-technical-commission>; brief CVs of new LTC members are published by the ISA when the member is elected by the Council.

LTC must recommend an immediate course of action to prevent serious environmental harm.[34] At the risk of stating the obvious, the ISA can only discharge its extensive environmental management obligations if its relevant organs, in most cases the LTC, have the capacity and expertise to do so.

This thesis has identified several measures through which the ISA could better align its decision-making with a precautionary approach, including through: integrating SEAs;[35] providing detailed guidance regarding the requirements for and content of EIAs;[36] and establishing criteria to evaluate whether an application for an exploration contract provides for 'effective protection and preservation of the marine environment including, but not restricted to, the impact on biodiversity.'[37] In order for these measures, and indeed existing measures, to be based on best scientific advice, the expertise represented in the LTC may need to be expanded. Given that ensuring the prevention of serious environmental harm accounts for half of the ISA's mandate, it is arguable that the expertise represented by LTC members should reflect this importance.

In addition to a lack of detailed and comprehensive environmental management expertise, the LTC faces time constraints and an unmanageable workload. The LTC only meets two to four weeks per year for which its members take time out of their professional appointments to serve on the LTC in an honorary capacity. As such, the LTC is not in a position to carry out tasks that require work at any given time, such as emergency orders.

Moreover, facing a significant and increasing workload, the LTC is responsible for: assessing new applications; evaluating environmental impact assessments; developing the Mining Code for the exploitation stage; developing recommendations for diverse topics, including training programmes and the assessment of exploration expenditure; performing the initial functions of the Economic Planning Commission;[38] overseeing the operation of the EMP-CCZ and the contractors' monitoring programmes; and recommending adjustments to the Mining Code including regarding environmental standards. With the rise in exploration contracts over the last years, the LTC's workload with respect to evaluating the contractors' annual reports has also increased substantially. As a result, the LTC has been holding two meetings annually since 2013.[39] Nevertheless, the Commission is faced with an 'overwhelming workload and inadequate

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[34] LOSC, article 165(2)(k); *Nodules Exploration Regulations*, regulation 33; *Sulphides* and *Crusts Exploration Regulations*, regulation 35.

[35] Chapter 7.2.1.

[36] Chapters 7.2.3, 7.2.4.

[37] *Nodules Exploration Regulations*, regulation 21(4)(b); *Sulphides* and *Crusts Exploration Regulations*, regulation 23(4)(b); Chapter 7.2.2.

[38] Chapter 3.4.6.

[39] ISA, ISBA/18/C/20 (20 July 2012), paragraph 27.

time.'[40] This trend can be expected to worsen in light of the preparations for the exploitation phase. Indeed, the Secretary-General noted that with respect to the draft framework for the future regulation of mineral exploitation, 'the capacity of the Authority to deliver the outcomes expected by the Commission, within current operational constraints, is limited.'[41]

As a result of its overburdened agenda, the LTC has already failed to carry out vital tasks entrusted to it, such as the obligation to 'develop and implement procedures for determining […] whether proposed exploration activities in the Area would have serious harmful effects on vulnerable marine ecosystems […] and ensure that, if it is determined that certain proposed exploration activities would have serious harmful effects on vulnerable marine ecosystems, those activities are managed to prevent such effects or not authorized to proceed.'[42] Although this obligation was established in 2010, as discussed in Chapter 6.4, the LTC has not yet taken up the issue.

In addition, the LTC has not yet been able to address several other important environmentally related matters including developing guidelines on how to operationalise the precautionary approach and best environmental practices[43] as well as developing risk assessment and risk management standards.[44] Similar challenges exist with respect to the review and adaption of protective measures. By way of example, the LTC is required to keep the EMP-CCZ under review and 'lead the development of environmental standards that will inform the decision and rules to be made if mining activities are seen to affect areas of particular environmental interest.'[45] Precisely how this will be achieved is unclear. Be that as it may, it is clear that developing these standards will only add to the LTC's workload. Consequently, the LTC is already faced with an unmanageable workload, even though test mining and mineral exploitation has not yet commenced.

In short, although affording scientific advice a central role, the current institutional framework neither provides sufficient time for LTC members to exercise this role, nor adequately represents detailed environmental management expertise. Consequently, the current institutional framework is inadequate to secure the full implementation of a precautionary approach to seabed mining. Institutional capacity will therefore need to be increased, in particular in light of

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40 ISA, ISBA/19/C/18 (24 July 2013), paragraph 9.

41 ISA, ISBA/21/A/4 (8 June 2015), paragraph 11.

42 *Nodules Exploration Regulations*, regulation 31(4); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(4).

43 *Nodules Exploration Regulations*, regulation 31(3); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(3).

44 ISA, ISBA/Cons/2015/1 (March 2015), page 42.

45 EMP-CCZ (n 7), paragraphs 42, 43(g), 46.

the transition to the mineral exploitation phase.[46]

8.3.2 Capacity and Limitations of the ISA Secretariat

Since the precautionary approach requires integration into administrative processes and structures, the ISA Secretariat plays an important role in implementing precaution. The Secretariat performs a range of tasks relevant to the implementation of precaution, including developing a Geographic Information System database for the Clarion-Clipperton Zone that integrates contractors' data;[47] administering the contracts; conducting stakeholder surveys; preparing annual meetings of the parties including providing background notes; and organising scientific workshops and consultant expert studies.[48]

However, at present the capacity of the ISA Secretariat is very limited with a mere four natural scientists and four legal experts supporting the work of the ISA on a permanent basis. One may wonder whether this limited capacity might explain, at least in part, the absence of a framework to systematically increase regional environmental baseline data through commissioning and conducting marine scientific research by the ISA itself. As examined in Chapter 6.2, although the ISA has collaborated in some external research projects, much research remains to be done, and the ISA could have already commissioned or indeed conducted this work, if it had the resources to do so.

Demands on the Secretariat will likely grow in the context of rapidly increasing numbers of exploration contracts and the transitioning to the exploitation phase. The *Draft Regulatory Framework for Mineral Exploitation in the Area* identifies a range of issues regarding which the Secretariat should prepare information and reports, including the definition of the rights of contractors and the obligations of the ISA, as well as a review of best practice with respect to emergency orders.[49] Moreover, throughout this thesis, other measures have been identified that could better align the ISA's regulatory framework with the requirements of a precautionary approach. Several of these require additional tasks to be performed by the ISA Secretariat, such as:

- coordinate and commission strategic scientific studies to increase the quality, quantity, and verifiability of environmental baseline data;[50]
- organize public participation measures, such as establishing an Ombudsperson for present

[46] See also the discussion of ISA member states in this regard: ISA, Press Release, SB-20-7 (17 July 2014).
[47] ISA, ISBA/19/A/2 (22 May 2013), paragraph 82.
[48] Chapter 3.4.3.
[49] ISBA/Cons/2015/1 (n 44), pages 20, 29.
[50] Chapters 6.2, 7.2.4.

and future generations and coordinating further stakeholder surveys;[51]

- coordinate measures to increase transparency in the ISA's decision-making process, such as the publication of minutes or meeting summaries, the accreditation of observers, and any potential video-streaming of ISA meetings.[52]

Moreover, if the ISA opted to conduct the contractors' environmental studies through a centrally coordinated consortium of actors, as discussed above,[53] this would also have to be coordinated by the Secretariat and potentially supervised by an Environmental Commission, as explored in the following section. In order to perform these tasks and facilitate precautionary decision-making, the capacity of the ISA Secretariat will need to be increased. The following sections discuss some specific options for institutional changes to better accommodate precautionary decision-making.

8.4 Options for Institutional Innovation for the ISA

In light of the limited institutional capacities of the ISA to facilitate the implementation of the precautionary approach, illustrated throughout this chapter, the following sections discuss some options for institutional development. It will be recalled that the focus of this thesis is the question whether and in what manner the ISA is currently implementing the precautionary approach, rather than how it could be implementing it. To that end, an exhaustive discussion of institutional innovations is beyond the scope of this thesis. Nevertheless, two options can be briefly discussed: (1) establishing an Environmental Commission; and (2) establishing a Mining Inspectorate. It is important to note that the establishment of these bodies would not require an amendment of the LOSC, as such evolutionary institutional development is provided for under the Convention.[54]

8.4.1 An Environmental Commission

Given the challenges facing the LTC with regard to workload and expertise its capacities will likely have to be expanded to meet the increasing workload associated with transitioning to the mineral exploitation phase. However, it is questionable whether that will be sufficient, particularly in light of the current lack of transparency, public participation, and availability outside of formal meetings times, which makes it difficult to carry out supervision of activities

[51] Chapter 7.4.3.

[52] Chapter 7.4.3.

[53] Chapters 7.2.4, 7.6.1.

[54] LOSC, articles 158(3); 160(2)(b); 162(2)(d); 166(1), 167(1).

in the Area and respond to environmental emergencies. One option could be to allocate some of the LTC's responsibilities to a different, permanent ISA organ. Indeed, the aforementioned ISA Technical Study makes the case for a permanent body:

> The ISA should form a permanent committee to address the clear and urgent need to rationalize and incorporate past and present environmental rules, regulations and requirements with, and within, the evolving exploitation frameworks for [polymentallic nodules] and other metal resources within the Area.[55]

The Study stresses the need to move beyond *ad hoc* activities to establish 'a 'competent' body providing continuity across differing resources.' It also argues 'that it would benefit the ISA if industry recognizes that there is a formal, continuing and identified group monitoring their activities.'[56]

An Environmental Commission could institutionalise these recommendations. This Commission could consist of independent experts possessing extensive relevant expertise including in marine conservation and ecology, environmental management, environmental impact assessment, adaptive management, and environmental law. In contrast to the LTC, at least some of the members of the Environmental Commission could be permanent staff. This would allow the Commission to respond immediately if an emergency order is warranted and advise the Secretary-General on which immediate measures would be necessary.[57] It would also enable the Commission to supervise environmental baseline studies and monitoring programmes by contractors on a continual basis and provide a dedicated point of contact for contractors with respect to environmental management of the contractors' activities.

An Environmental Commission could also be tasked to develop and ensure the implementation of the environmental measures and principles set out in the Mining Code. To this end, the Commission would be responsible for ensuring that measures to protect vulnerable marine ecosystems are developed without delay and that additional regional environmental management plans are established, as has been requested by the Council.[58] Similarly, the Commission could develop and recommend to the Council a strategy for the implementation of a precautionary approach, as required by the Mining Code.[59] The Commission could also conduct SEAs to enable ecosystem-based regional and global environmental management.[60]

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[55] Clark, Cook Clark, and Pintz (n 6), page 79.
[56] Ibid.
[57] Chapters 5.4.4, 6.6; *Nodules Exploration Regulations*, regulation 33; *Sulphides* and *Crusts Exploration Regulations*, regulation 35.
[58] Chapter 6.3; ISA, ISBA/20/C/L.10 (21 July 2014), paragraph 9
[59] *Nodules Exploration Regulations*, regulation 31(3); *Sulphides* and *Crusts Exploration Regulations*, regulation 33(3).
[60] Chapter 7.2.1.

The EMP-CCZ envisages adaptive management,[61] which the Environmental Commission could coordinate through the conduct of frequent re-assessments of environmental factors and protective measures. In light of these assessments, the Commission could be tasked to develop and update the regulatory framework with respect to environmental protection, in coordination with the LTC.

In this context, an important question is how the Commission's decisions would be incorporated into the procedural framework. The danger is that if environmental tasks are 'outsourced' to a separate body but its decisions do not carry the same weight as those of the LTC, environmental considerations might be marginalised. Yet the ISA's extensive environmental obligations, set out in Chapters 4 and 5, require environmental considerations to assume a central role in the decision-making framework. As such, recommendations by the Environmental Commission regarding the aforementioned tasks but also amendments to the Mining Code should carry the same weight as those of the LTC.

This leads to one of the most crucial tasks the Environmental Commission could perform, that is the assessment of whether an application for a plan of work provides for effective environmental protection, which is a prerequisite to the LTC recommending approval of an application.[62] In doing so, the Environmental Commission could address the transparency concerns examined in Chapter 7.4. Whilst the LTC could continue to assess the technological and financial capabilities of an applicant in closed session, the Environmental Commission could hold open meetings, manage the process of evaluating EIAs and coordinating an independent review of the EIA,[63] and publish both SEA and EIA reports, all of which would contribute to the transparency of the basis on which an application is approved, modified, or rejected. This would also ensure that risk assessment and environmental management procedures are afforded adequate time and attention, something that may prove an insurmountable challenge if conducted solely by the LTC, particularly given the increasing range of other assessments needed to be conducted by the LTC relating to new applications. What becomes clear is that this Commission would assume a range of time-consuming tasks, which at present rest with the LTC.

The proposed Environmental Commission could be established as a subsidiary body to the Council, alongside the LTC, pursuant to LOSC Articles 158 and 162(2)(d). It should closely cooperate with and complement the LTC's work, especially in relation to assessing new applications, reviewing the contractors' annual reports, and developing the Mining Code.

[61] EMP-CCZ (n 7), paragraphs 30-31.

[62] *Nodules Exploration Regulations*, regulation 21(4)(b); *Sulphides* and *Crusts Exploration Regulations*, regulation 23(4)(b); Chapter 3.5.2.

[63] Chapter 7.2.3.

Although compartmentalising these tasks into environmental, financial, and technical consideration inevitably leads to overlap, the LTC routinely separates into working groups to streamline their tasks.[64] In fact, recognising the importance of its environmental mandate, the LTC previously set up a working group 'to consider environmental issues in a broader context within the scope of its mandate.'[65] As such, allocating its environmental work to a specific commission could prove relatively uncomplicated. Nonetheless, overlap could be expected in the context of assessing future applications for commercial-scale mining, with respect to an applicant's feasibility study, closure plan, and indeed financial plan indicating the allocation of financial resources to particular activities. This could be addressed through clear guidelines regarding the responsibility of each ISA organ as well as close collaboration between the LTC and the Environmental Commission.

With these parameters in mind, an Environmental Commission would be an important institutional innovation to ensure that the ISA's extensive mandate for environmental conservation can be adequately implemented.

8.4.2 A Mining Inspectorate

While an Environmental Commission could address some of the institutional limitations of the LTC, it will be readily apparent from the foregoing discussion that the capacity and structure of the ISA Secretariat will also have to be revisited in the context of the transition to test mining and mineral exploitation. In particular, changes to the structure of the Secretariat will likely be required to enable the ISA to effectively carry out its extensive mandate to ensure contractors comply with their obligations.[66]

As discussed in Section 8.2.2 above, monitoring compliance using satellite data, video footage, or other technology would require teams of technical experts within the Secretariat to oversee the implementation of the technology and evaluate the data. What is more, giving effect to the ISA's competence to inspect installations in the Area exceeds the current capacity of the ISA.

Against this background, the ISA Technical Study No 11 recommends the establishment of a permanent Mining Inspectorate that could give effect to the ISA's mandate to monitor compliance of contractors, including carrying out inspections. This new Mining Inspectorate could comprise a Mining Registry, a Compliance Office, a Data and Archive Center and an Inspector General's Office.[67] A Compliance Office could carry out the aforementioned tasks of

[64] See for example ISA, ISBA/17/C/13 (13 July 2011), paragraph 5.
[65] ISA, ISBA/11/C/8 (19 August 2005), paragraph 31.
[66] Chapters 3.6.1.
[67] Clark, Cook Clark, and Pintz (n 6), page 78.

utilising technological tools to monitor compliance by contractors.

Precedents for inspectorates can be found in international organisations working in the field of disarmament, such as the Organisation for the Prohibition of Chemical Weapons (OPCW) and the International Atomic Energy Agency (IAEA). The latter has a staff of inspectors within its Secretariat who can perform inspections to ensure a state's nuclear facilities 'are not used in such a way as to further any military purpose.'[68] In addition to using satellite images, the IAEA has performed over 2700 in-field inspections in 2014.[69] Any cases of non-compliance are reported the Director-General of the IAEA who transmits the information to the Board of Directors, which then reports non-compliance to the UN and can impose sanctions.[70] The Board of Directors is broadly comparable to the ISA Council, as it is the executive organ of the IAEA that comprises representatives from 35 member states, who meet several times per year.

A similar regime of compulsory inspections has been established for the OPCW, in order to achieve the elimination of chemical weapons.[71] The OPCW uses a form of self-reporting by the member states as well as inspections to verify the information reported.[72] In addition to routine inspections, and those carried out in case of alleged use of chemical weapons, the OPCW can carry out *challenge inspections* 'of any facility or location in the territory or in any other place under the jurisdiction or control of any other state Party for the sole purpose of clarifying and resolving any questions concerning possible non-compliance with the provisions of this Convention.'[73] The OPCW Inspectorate forms part of the organisation's 'Technical Secretariat'[74] and comprises around 200 inspectors, who are all independent experts.[75]

Similar to the OPCW, an inspection system by the ISA would likely utilise self-reporting by the contractors together with inspections to verify the reported information. It is important that inspection of a contractor's activities would not depend on direct financial support by that contractor. Rather, a Mining Inspectorate would need to be either cross-funded by all contractors or ISA member states. In the case of the latter, the problem discussed in Chapter 3.7 could persist, whereby all member states finance the mining activities of some operators and

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68 *Statute of the International Atomic Energy Agency* (adopted 23 October 1956, entered into force 29 July 1957, amended 23 February 1989) 276 UNTS 3, article III(A)(5).

69 See the figures published by IAEA <https://www.iaea.org/safeguards/basics-of-iaea-safeguards/safeguards-facts-and-figures>.

70 *Statute of the International Atomic Energy Agency*, article XII(C).

71 *Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction* (adopted 3 September 1992, entered into force 29 April 1997) 1974 UNTS 45, preamble.

72 Ibid, articles IV(7), V(9), VI(8), 'verification annex.'

73 Ibid, article IX(8).

74 Ibid, part D.

75 Henry G Schermers and Niels M Blokker, *International Institutional Law* (Martinus Nijhoff Publishers, 2011), page 893.

state parties. Whether states consent to such a funding mechanism could largely depend on the existence of adequate benefit-sharing mechanisms, envisaged in the LOSC,[76] to ensure at least some of the benefits are reaped by mankind.

Furthermore, should the Enterprise be able to conduct mining operations in the future, as envisaged by the LOSC,[77] this could create a conflict of interest whereby the ISA Inspectors would have to monitor compliance of another ISA organ, the Enterprise. The IAEA faces a comparable problem, as its inspectors who report to the Director-General of the organisation, are also tasked to inspect all operations by the Agency itself, to ensure inter alia that 'the Agency is taking adequate measures to prevent the source and special fissionable materials in its custody or used or produced in its own operations from being used in furtherance of any military purpose.'[78] However, as Schermers and Blokker observe: 'as the responsibility of the Director-General for the operations of the organization is limited, undue pressure on the inspectors seems unlikely. The advantages in their forming part of an established secretariat outweigh the drawbacks of their partial dependence on the Director-General.'[79] The same might be true for the ISA. An Inspectorate would likely report to the Council, which is tasked to 'exercise control over activities in the Area',[80] including directing and supervising inspections.[81] Member states would thus have an opportunity to scrutinise the work of the Mining Inspectorate. Moreover, transparency over non-proprietary information, such as compliance by contractors with environmental obligations, would further limit potential conflicts. What remains unclear is the extent to which the LTC will be able to be supervise activities in the Area, as discussed in Section 8.2.2, and potentially also inspectors, given its already high workload. However, the reallocation of some of the LTC's tasks to an Environmental Commission might enable the LTC to find time to carry out its supervisory role, if requested by the Council to do so.

As has become clear, giving effect to the ISA's mandate to monitor compliance by contractors including through on-vessel inspections will likely be an operational challenge requiring significant resources and capacity. Establishing an Inspectorate within the ISA Secretariat would both provide capacity and expertise to develop the ISA's inspection mandate.

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[76] LOSC, articles 82(4), 140(2), 151(10), 160(2)g), 173(2); IA, annex section 7.
[77] LOSC, articles 170(1), annex IV article 1; Chapter 3.4.7.
[78] *Statute of the International Atomic Energy Agency*, article XII(B).
[79] Schermers and Blokker (n 75), page 891.
[80] LOSC, article 162(2)(l).
[81] LOSC, article 162(2)(z).

8.5 Conclusion

This chapter has examined the ISA's institutional structure and capacity against the need to implement a precautionary approach to seabed mining. As highlighted at the outset, institutional capacity is crucial to facilitate precautionary decision-making and implement and enforce environmental standards and protective measures.

As the chapter has demonstrated, in line with the precautionary approach, the current institutional framework provides a central role for scientific advice, through the LTC and supported by semi-structured engagement with the scientific community. However, in addition to privileging scientific advice, precautionary decision-making also requires the identification of uncertainties, particularly in the context of selecting protective measures and indeed strategic environmental objectives. These must be informed by subjective judgments as to the value placed by the public on deep ocean minerals, ecosystems, and biodiversity.[82] Contrary to these requirements, the ISA's current structure provides for little institutional oversight of the LTC and lacks an institutional integration of public participation, be it through surveys or an Ombudsperson within the Secretariat. In addition, the ISA institutional framework does not provide for the mechanisms to ensure compliance by contractors with their obligations under exploration contracts. Neither the LTC, nor the Secretariat, currently has the capacity to monitor compliance.

As this illustrates, the most important institutional shortcomings relate to the LTC and the ISA Secretariat. In particular, the LTC already faces an unmanageable workload and insufficient time during its two short annual meetings. Moreover, with only two of its 24 members being experts in environmental science and marine ecology, the LTC fails to represent the detailed and comprehensive expertise that would be necessary to discharge its numerous environmental tasks. The Secretariat faces similar shortcomings of very limited capacity with a mere four natural scientists and four legal experts supporting the work of the ISA on a permanent basis. As the ISA Technical Study No 11 highlights, the ISA will need to transition from an international organisation that provides meeting services for its states parties, to an administrative agency that organises, carries out, and controls seabed mining activities in the Area.[83]

Consequently, the current institutional framework is inadequate to secure the full implementation of a precautionary approach to seabed mining. To return to the initial questions posed in the introduction to this chapter, it is clear that although the ISA' institutional structure facilitates elements of the precautionary approach, such as the integration of scientific advice into the decision-making process, several shortcomings remain. Some of the substantive and

[82] Chapter 2.4.2.

[83] Clark, Cook Clark, and Pintz (n 6), pages 78-79; LOSC, article 153(1).

procedural challenges to implementing a precautionary approach, identified in Chapters 6 and 7, can, indeed, be explained by reference to the ISA's institutional capacity. For example, although foreseen in the Mining Code, the protection of vulnerable marine ecosystems from mineral exploration work has not yet been addressed owing to the LTC's unmanageable workload and the absence of any other entity tasked with carrying out this work. One can only speculate as to whether other aspects of the ISA's work, including cooperation on multi-purpose marine protected areas, further regional environmental management plans, emergency orders, best environmental practices, adaptive management, transparency, and SEAs and EIAs, would be further advanced if it was not for the ISA's institutional limitations. Against this background, it is inevitable that adoption and implementation of further environmental obligations will fall behind once the test mining and exploitation phase commences, unless the ISA's institutional capacity is increased.

Leaving aside the practical and real world constraints imposed by finances and politics, this chapter has discussed two possible institutional changes that might be adopted as a means of improving the performance of the ISA and better institutionalising its ability to effectively implement a precautionary approach. First, it has been proposed that an Environmental Commission could carry out the ISA's environmental obligations and thereby unburden the LTC. The objective would be for this Commission to rectify the shortcomings identified in relation to the LTC, such as having a more permanent presence and representing wide-ranging expertise relevant to environmental impact assessments and management. Second, a permanent Mining Inspectorate within the Secretariat, as suggested in the ISA Technical Study No 11, will likely be required to carry out the ISA's mandate with regard to ensuring that contractors comply with all obligations.

Chapter 9: Conclusion

9.1 The Complexities of Implementing the Precautionary Principle

‘If the oceans are indeed man’s last frontier on this old earth of scarcity and competition to which we have reduced our common heritage, the law of the seas is the advance post on the long march toward a new world of science and technology, of abundance and cooperation, which we have set out to achieve.’[1]

With technological advances and changing economic realities and global imperatives, it is becoming increasingly likely that commercial mining of the deep seabed for minerals will commence in the near future. However, seabed mining poses significant uncertainties and risks for ecosystems and biodiversity in the deep oceans. Given the ISA’s exclusive mandate to regulate and control seabed mining in the Area and its obligation to balance the development of seafloor minerals with the protection and conservation of the marine environment, the ISA must assume a leadership role ‘on behalf of mankind as a whole.’[2] In light of the risks presented by seabed mining, the ISA is required to apply a precautionary approach to seabed mining now, *before* commercial-scale exploitation of minerals commences, and indeed during any mining phase. The current window of opportunity is what makes the application of the precautionary approach so important and by extension provides the *raison d’être* for this thesis.

This thesis has demonstrated that the precautionary principle, or *approach* if different semantics are preferred,[3] is a widely accepted and crucially important legal tool to address the risks associated with seabed mining. The UN General Assembly has called upon the ISA to apply precaution,[4] while the Seabed Disputes Chamber has provided solid support for a precautionary approach to seabed mining. [5] As Chapter 4.4 illustrates, there is a strong case to be made for interpreting the LOSC in accordance with the precautionary principle. Lastly, the Mining Code adopted by the ISA specifically requires the application of a precautionary approach. The Environmental Management Plan for the Clarion-Clipperton Zone (EMP-CCZ), is the first measure taken by the ISA that was expressly adopted to give effect to the precautionary approach[6] However, as the discussion in Chapter 2 demonstrates, adopting individual protective measures is part of, but does not of itself amount to, the implementation of the precautionary principle. Rather, protective measures must be embedded in decision-making procedures and

[1] Elisabeth Mann Borgese, ‘A Constitution for the Oceans’, in Elisabeth Mann Borgese and David Krieger (eds), *The Tides of Change: Peace, Pollution, and Potential of the Oceans* (Mason/Charter, 1975) 340-352, page 352.

[2] LOSC, article 153(1).

[3] Chapter 1.4.

[4] UNGA, UN Doc A/RES/58/240 (23 December 2003), paragraph 52.

[5] *SDC Advisory Opinion*, paragraphs 125-135.

[6] ISA, ISBA/17/LTC/7 (13 July 2011).

supported by institutional arrangements that facilitate risk assessment and risk management in line with the precautionary principle. In other words, implementing precaution involves three dimensions: the adoption of protective measures that are *effective* in and *proportionate* to meeting a desired outcome; a procedural framework that provides for risk assessment and risk management; and institutional structures to facilitate the above. Detailed steps to operationalise these aspects of the precautionary approach in a given institutional context, illustrated in the form of an implementation cycle, were articulated in Chapter 2.5.

At this point it is appropriate to return to the main purpose of this thesis, which is to analyse critically whether, and to what extent, the ISA is implementing the precautionary principle in the deep seabed mining context. To answer this question, the thesis examined not only the integration of the precautionary principle into the Mining Code but also its implementation by the ISA in practice. Utilising the aforementioned implementation cycle as an assessment framework, the thesis has analysed the measures adopted by the ISA to limit environmental harm from seabed mining as well as other measures that have been discussed in the seabed mining context. This provides an assessment of the existing practice with respect to environmental protection measures. From there, the thesis has examined whether the current decision-making structures and institutional capacities of the ISA allow for risk assessment and risk management through protective measures and procedural safeguards, in line with the precautionary principle. It has identified a number of strengths but also several shortcomings in the current regulatory and institutional framework of the ISA. These results are summarised in the following Section.

9.2 The Strengths and Weaknesses of the ISA's Current Approach to Precaution

9.2.1 Absence of a Conservation Objective

Although the ISA has specifically incorporated the obligation to apply a precautionary approach into its *Exploration Regulations*, the *Regulations* do not articulate a conservation objective. The absence of this objective in the ISA context means that it is impossible to assess whether a protective measure, even if adopted specifically to give effect to the precautionary principle, is effective in and proportionate to precautionary management aims. This in turn has institutional implications. At present, the LTC is required to determine whether an application for an exploration contract provides for 'effective protection and preservation of the marine environment including, but not restricted to, the impact on biodiversity.'[7] In the absence of a conservation objective, the LTC has no guidance as to what *effective protection* means.

9.2.2 Lack of Obligation to Identify Uncertainties

The lack of a conservation objective is closely linked with a further important shortcoming which is that the ISA's regulatory framework includes neither a substantive nor procedural obligation to identify the uncertainties of particular mining activities. As discussed in Chapter 2.4.2, precautionary decision-making comprises three considerations: scientific knowledge *(what are the known facts?)*; uncertainties *(where is the limit of our knowledge, can it be extended, and which assumptions are made?)*; and value considerations *(how safe do we want to play?)*. These considerations sit on a continuum of objectivity (the former) to subjectivity (the latter). In the context of the ISA, these considerations are not distinguished, which creates several challenges. First, applicants are not required to identify the uncertainties inherent in their project design and risk assessments or to demonstrate how these are addressed in their plans of work. Similarly, the Legal and Technical Commission (LTC) is not required to communicate any uncertainties to the Council when issuing its recommendations as to whether or not to approve an application. Second, the decision-making process is at risk of granting undue influence to the subjective opinions of experts as to uncertainties and value considerations, instead of consulting them only for technical and scientific advice, in line with their respective expertise. As discussed in Chapters 3.5 and 8.3.1, the 24 LTC members play a central role in both developing the Mining Code and assessing applications for new exploration contracts. Without a requirement to identify uncertainties, it is left to the LTC to address uncertainties implicitly, despite the significant subjective component of such a decision. Precautionary decision-making would require the identification of scientific knowledge and remaining uncertainties in a transparent manner, so as to enable the selection of protective measures that can meet conservation objectives, and which reflect public opinion about the acceptability of risk as well as the values placed on seafloor minerals, marine biodiversity, and deep ocean ecosystems. At present, as examined in Chapter 7.4, this process is undermined, not only by an absence of a conservation objective and requirement to identify uncertainties, but also by a lack of transparency and public participation with respect to decision-making by the ISA.

[7] *Nodules Exploration Regulations*, regulation 21(4)(b); *Sulphides* and *Crusts Exploration Regulations*, regulation 23(4)(b).

9.2.3 Strength derived from Affording Scientific Information a Central Role

Despite this critical note regarding the role of the LTC in relation to the uncertainties and subjective elements of decision-making, the LTC does represent an important precautionary method: the LTC institutionalises a central role for scientific information. This ensures that decisions are based on scientific advice, in line with the first element of precautionary decision-making. However, as discussed in Chapter 8.3.1, the LTC currently faces an unmanageable workload and the expertise it represents would need to be enlarged to incorporate comprehensive and detailed expertise over environmental impact assessments and environmental management. This leads to a further important aspect regarding environmental impact assessments and adaptive management.

9.2.4 Procedural Challenges Associated with Environmental Impact Assessments and Adaptive Management

As discussed in Chapter 7.2, although the regulatory framework incorporates a substantive obligation to carry out environmental impact assessments (EIAs), significant procedural challenges remain. The procedural framework does not provide for independent review of EIA reports, stakeholder involvement in the assessment, comparison of alternative protective measures to address environmental risks, or consequences that must be taken if an EIA identifies risks of unacceptable levels of harm. Again, this relates to the absence of conservation objectives for the purpose of determining what level of environmental damage is deemed acceptable. Moreover, the regulatory framework lacks procedural safeguards to ensure environmental baseline data is adequately supplied. At present, there is a considerable risk that the EIAs will be considered a mere administrative formality rather than a crucial step in identifying the risks and uncertainties of seabed mining in order to ensure their minimisation in accordance with the ISA's mandate.

Perhaps most importantly, the efficacy of EIAs is uncertain in the current procedural framework. Full EIAs are only required *during* the course of exploration work, in other words, once the ISA has already granted a 15-year exploration contract. In order for EIAs to have a practical effect, the ISA would need to be able to require contractors to adjust their operations based on new information, such as those generated by EIAs. However, as Chapter 7.3 revealed, the procedural framework fails to provide an effective mechanism through which the ISA can amend environmental standards during the lifetime of an exploration contract. Although the ISA can set environmental standards through its law-making powers, and decide over the granting of exploration contracts based on a number of factors including environmental ones, the current procedural framework subverts the competences of the ISA to set environmental standards and to ‘organiz[e], carr[y] out and contro[l]’ activities in the Area, once an exploration contract has been granted.[8] This undermines not only the role of EIAs but also any chance to apply adaptive management.

This goes to the heart of the challenge with respect to the ISA’s implementation of the precautionary principle. The ISA develops its environmental standards incrementally. As more information becomes available from marine scientific research and environmental baseline studies, the ISA could, and to some degree has,[9] adjusted the environmental parameters of seabed mining. However, as noted above, the procedural framework is not designed to facilitate such adjustments once an exploration contract has been granted.

9.2.5 Lack of Strategic Vision

The above discussion leads to a key conclusion of this thesis, namely that the ISA lacks strategic vision regarding the environmental management of seabed mining. At present, all protective measures are adopted on an *ad hoc* basis and environmental standards are set incrementally, making them vulnerable to being disregarded particularly if commercial pressure to commence the exploitation phase increases. However, under Article 145 LOSC as well as the IA, the effective protection of the marine environment is a core obligation of, and indeed a priority task for, the ISA. Despite this mandate, the ISA has not yet adopted an environmental management strategy.[10] Similarly, the regulatory framework does not provide for the ISA to conduct strategic environmental assessments (SEAs). SEAs can be procedural tools to scale up environmental assessments to a regional level and integrate cumulative effects. However, although both the *EIA Recommendations* and the EMP-CCZ foreshadow the assessment of regional and cumulative impacts,[11] these assessments are not integrated into the current procedural framework.

9.2.6 Successes and Challenges with Respect to Timely Action

A further conclusion relates to the timing of protective measures. It will be recalled that the precautionary principle requires action at an *early* stage, in spite of remaining uncertainties. The lack of an environmental management strategy, coupled with an incremental approach to standard setting, makes it difficult for the ISA to meet this temporal requirement. As Chapter 6

[8] LOSC, article 153(1).
[9] Chapter 5.3.
[10] Aline Jaeckel, ‘An Environmental Management Strategy for the International Seabed Authority? The Legal Basis’ (2015) 30 *The International Journal of Marine and Coastal Law* 93-119.
[11] ISA, ISBA/19/LTC/8 (1 March 2013), paragraph 16; EMP-CCZ (n 6), paragraphs 34, 37, 40(b), 43, 51.

demonstrated, significant challenges exist in attempting to enact protective measures, in particular measures to protect vulnerable marine ecosystems, in a timely manner.

Nonetheless, the ISA has adopted one crucial measure, perhaps its single most important step, namely the EMP-CCZ. In line with best environmental practices, the EMP-CCZ establishes nine protected areas to support regional, ecosystem-scale management for the Clarion-Clipperton Zone. However, the experience of the EMP-CCZ also demonstrates that the effectiveness of spatial management, and thus also its value in serving as a precautionary measure, is reduced when it is applied only *after* substantial parts of the region have been allocated to exploration contracts. This was the case with the EMP-CCZ, which resulted in changes to the location of the protected areas to avoid overlap with exploration sites. This finding is important because the geographical location of exploration sites will determine where mineral exploitation will take place in the future.

9.2.7 Successes and Challenges with Respect to the Role of the ISA in Marine Scientific Research

To complete this summary of conclusions of this thesis, two interesting observations must be added regarding the ISA's role in marine scientific research, which is an integral element of the precautionary principle. First, although the Mining Code imposes obligations on contractors to gather environmental baseline data, the Code is silent with respect to the ISA's role in conducting targeted research projects, including establishing regional environmental baselines. The Mining Code does not develop the ISA's mandate to coordinate, promote, and even carry out marine scientific research in the Area.[12] Nonetheless, the ISA has assumed a notably active role with regard to supporting contractors to use standardized taxonomy for faunal species they discover.[13] Second, as Chapter 6.2 demonstrates, although the ISA has collaborated in a number of scientific projects to generate new data about deep ocean biodiversity, these were not necessarily driven by the Authority itself. Examples are the ISA's collaboration with the Census of Marine Life and its contribution to the Kaplan project, which resulted in the recommendation to establish protected areas in the Clarion-Clipperton Zone. Collaborations must be welcomed to maximize efficiency and source detailed expertise from the scientific community. However, the lack of a strategic research agenda can lead to the ISA relying, to a degree, on the scientific research community carrying out projects relevant to the seabed mining.

[12] LOSC, article 143, Chapter 5.4.1.3.
[13] Chapter 7.2.3.1.

9.2.8 Conclusion

In conclusion, although the ISA has certainly been active with respect to some aspects of its comprehensive environmental mandate, its application of the precautionary principle is limited at present. The Authority has implemented elements of the precautionary principle, notably the dedication of a central role for scientific advice in the decision-making process and the integration of substantive obligations to apply precaution and assess environmental risks of specific activities. However, several challenges remain in particular with respect to establishing a procedural framework that enables effective risk assessment and adjustment of risk management measures as well as a timely implementation of protective measures. This thesis has demonstrated that some of these challenges can be explained by a shortage of resources and institutional capacity within the ISA. However, more crucially, these challenges can be explained by the lack of a strategic vision for environmental management on the part of the ISA organs and its state parties, a lack which is manifestly reflected in the current Mining Code. This is particularly noteworthy given that the need for a strategic vision was identified as early as 1990, when the Preparatory Commission noted:

> In this regard, some delegations were of the view that since the start-up of deep sea-bed mining would be delayed, this would provide ample time for <u>careful</u> research aimed at protecting the marine environment. Some views stressed the potentially serious problems that could be posed by deep sea-bed mining. It was held that since deep sea-bed mining might not occur for many years to come, the Preparatory Commission should <u>map out a strategy for preserving the sea-bed environment and not merely establish a set of formal procedures</u>. This view also called for the mobilization of <u>public opinion</u> and governmental <u>awareness</u> and suggested that an ad hoc group of experts be set up to make recommendations in that connection.[14]

In light of this quote and the analysis conducted in this thesis, one may query how much progress has really been made over the last 25 years.

9.3 Strengthening the Implementation of the Precautionary Principle by the ISA: Suggestions for a Way Forward

In light of the current challenges with respect to the implementation of a precautionary approach by the ISA, this thesis has identified several measures that could better align the ISA’s regulatory framework with the requirements of a precautionary approach. The following is a summary table (Table 9-1) of these suggestions with reference to the sections of this study in which they are discussed. These measures could support the development of a strategic

[14] Preparatory Commission for the ISA and ITLOS, LOS/PCN/L.79 (28 March 1990), paragraph 14 (emphasis added).

environmental management framework for the ISA, in order to move beyond *ad hoc* measures for environmental protection and give effect to the environmental mandate of the ISA.

Potential Measures to Strengthen the Implementation of Precaution	**Reference to Chapter**
Protective Measures	
Commission strategic marine scientific research studies to increase the quality, quantity, and verifiability of environmental baseline data	6.2 and 7.2.4
Ensure environmental management plans and marine protected areas are established before exploration sites are allocated within a region	6.3.1 and 6.3.2
Ensure measures for the protection of vulnerable marine ecosystems are adopted before exploration work is authorized which may harm them	6.4
Procedural Measures	
Determine conservation objectives in line with best scientific advice and public opinion regarding the values placed on seafloor minerals, marine biodiversity, and deep ocean ecosystems	2.4.2 and 7.2.1
Require the LTC and Council to specify which scientific, technical, and value considerations as well as uncertainties inform a particular decision	7.4.3
Establish criteria to evaluate whether an application for an exploration contract provides for 'effective protection and preservation of the marine environment including, but not restricted to, the impact on biodiversity'[15]	7.2.2
Provide detailed guidance regarding the requirements for and content of preliminary EIAs and EIAs required prior to specific exploration work	7.2.3 and 7.2.4
Establish procedural safeguards to ensure environmental baseline and monitoring data is supplied	7.2.3.1
Set out steps to follow if EIAs indicate the risk of failing to meet the conservation objectives	7.2.3.2
Ensure the ISA retains the power to amend environmental requirements placed on contractors once a contract is in force, not least to enable adaptive management	7.3
Adopt a staged approach to mineral exploitation to retain such control[16]	7.3.5
Incorporate regional environmental management plans into the *Exploration Regulations* to clarify their binding nature, for example by making their establishment a compulsory prerequisite to granting mining contracts in a particular area, as has been suggested[17]	7.2.1 and 7.3.5
Increase transparency by publishing environmental baseline and monitoring data, EIA and SEA reports, meeting reports and/or minutes	7.4.3
Improve public participation for example through access to meetings for observers, an Ombudsperson for present and future generations, further stakeholder surveys, and utilizing external surveys that capture public opinions regarding the acceptability of risks and the values placed on minerals, biodiversity, and ecosystem services	7.4.3

[15] *Nodules Exploration Regulations*, regulation 21(4)(b); *Sulphides* and *Crusts Exploration Regulations*, regulation 23(4)(b).

[16] Allen L Clark, Jennifer Cook Clark, and Sam Pintz, *Towards the Development of a Regulatory Framework for Polymetallic Nodule Exploitation in the Area (Technical Study: No. 11)* (ISA, 2013).

[17] ISA, ISBA/20/C/13 (3 June 2014).

Conduct the contractors' environmental studies through a centrally coordinated consortium or consultant scientists, financed by the contractors	7.2.4 and 7.6.1
Institutional Measures	
Ensure the institutional capacity to assess and manage environmental risks and monitor compliance, for example through establishing an Environmental Commission that represents detailed expertise in environmental management, as well as a Mining Inspectorate within the ISA Secretariat	8.4

Table 9-1: Summary table of potential measures to better implement the precautionary principle by the ISA.

These measures present options which the ISA could adopt, bearing in mind the important role of member states. Ultimately, the adoption of any such measures will depend on political will amongst the member states and the financial resources available to the ISA.

A promising sign is the inclusion of some of the points raised throughout this thesis in the draft framework for the *Development of a Regulatory Framework for Deep Sea Mineral Exploitation in the Area*, issued by the ISA in July 2015. The draft framework foresees 'a precautionary-risk management framework' and strategic environmental assessments.[18] Moreover, the ISA Council endorsed[19] the priority deliverables of this draft framework, which include the development of an adaptive management approach as well as 'a strategy for strategic (regional) environmental management plans, building on its experience with the establishment of an environmental management plan for the Clarion-Clipperton Zone.'[20]

While these developments are certainly encouraging, the question remains whether the future regulatory framework will fully provide for the translation of these ambitions into practice. As this thesis has demonstrated, incorporating the precautionary principle – or indeed tools such as EIAs and adaptive management - into the Mining Code, has little meaning unless the ISA's procedural and institutional frameworks are designed to facilitate the implementation of these principles and tools.

This thesis has provided an in-depth analysis of the ISA's environmental mandate and the manner and extent to which the ISA is implementing the precautionary principle in its current regulatory framework. The discussion has focused on the exploration phase for seabed minerals and has both highlighted the strengths of the current framework and has identified and examined several lacunae, in particular with respect to the ISA's decision-making procedures.

[18] ISA, *Developing a Regulatory Framework for Deep Sea Mineral Exploitation in the Area: Draft Framework, High Level Issues and Action Plan, Version II*, (15 July 2015) <https://www.isa.org.jm/files/documents/EN/OffDocs/Rev_RegFramework_ActionPlan_14072015.pdf>.

[19] ISA, ISBA/21/C/20 (21 July 2015).

[20] ISA, ISBA/21/C/16 (15 July 2015), annex III.

Addressing these shortcomings is critical in light of the impending commencement of the first exploitation of minerals on the deep seabed. To inform the development by the ISA of the regulatory and institutional framework for commercial-scale seabed mining, this thesis has identified several protective measures as well as procedural and institutional arrangements which the ISA could adopt. These can help to ensure that the ISA fulfils its environmental mandate and lives up to its stewardship responsibility to ensure a precautionary approach to mining on the deep seabed beyond areas of national jurisdiction, our common heritage of humankind. In the words of the ISA Secretary-General, commenting in the context of the transition towards mineral exploitation, 'it is imperative to ensure that adequate measures are in place for the protection of the marine environment.'[21]

[21] ISA, ISBA/21/A/4 (8 June 2015), paragraph 10.

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