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Towards a Contemporary Vision for the Global Seafloor

Implementing the Common Heritage of Mankind

By Sabine Christiansen, Duncan Currie, Kate Houghton, Alexander Müller,
Manuel Rivera, Oscar Schmidt, Prue Taylor and Sebastian Unger

TOWARDS A CONTEMPORARY VISION FOR THE GLOBAL SEAFLOOR

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**Edited by the Heinrich Böll Foundation in cooperation with Institute for Advanced
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PREFACE

When Arvid Pardo, the UN Ambassador of Malta, and other leading international experts in the Law of the Sea, such as Elisabeth Mann-Borgese, pioneered the intriguing idea of a common heritage of mankind around 1970, they had a vision of elaborating a truly «just and equitable international economic order» for governing the ocean space beyond national jurisdiction. Whilst this ambition remains more important than ever, much has changed since the adoption in 1982 of the UN Convention on the Law of the Sea, which comprises the common heritage principle. The Earth system, whose integrity also depends on marine ecosystem functions, is at peril.

The open ocean hosts an inconceivable wealth of marine life. Most of it remains unseen and unknown. Whilst human activities have concentrated so far on the coastal regions, areas beyond national jurisdiction are now at the centre stage of international ocean governance. The international community has agreed to develop a new legally binding agreement for the conservation and sustainable use of marine biodiversity by 2020. It aims to respond to the global ocean crisis caused by overfishing, pollution with plastics, ocean acidification, climate change, and other stressors from human activities. At the same time, States are also working on the legal framework for deep seabed mining – a considerable contradiction.

The concept of sustainable development – as expressed in the Sustainable Development Goals – articulates a universal interlinkage of people and prosperity, with the planet at the forefront. It has emerged as the guiding concept for safeguarding the ecosystems, resources, and biodiversity that we depend on. It requires us to carefully weigh the scalar and temporal distribution of costs and benefits for every major economic activity – including those concerning the mineral and biological resources of the ocean. Much like the common heritage of mankind principle, sustainable development also requires us to preserve the global commons – ideal examples of which are ocean life and its ecosystem functions.

Before rushing into deep seabed mining, we therefore believe it is our duty to start a global conversation on how we should interpret the common heritage of mankind and how we want to govern the ocean space beyond national jurisdiction. The developments underway in the International Seabed Authority – the institution responsible for managing activities in the Area – and the negotiation of a new high seas agreement should not be taken forward separately. As too little is known about the wealth that could be lost due to harmful impacts from mining activities, humankind should take its time to reflect, develop robust governance systems, and develop the knowledge needed to take informed decisions.

A unique opportunity is now opening up with the 2021–2030 UN Decade of Ocean Science for Sustainable Development. Why not use it to develop a truly contemporary, globally shared understanding of the common heritage of mankind? Before causing possibly irreversible impacts that could worsen our planetary crisis, why do we not reassess the scope of the wealth that is our heritage – in ecological, social, and economic terms? The present study, authored by scientists from different backgrounds, makes the eloquent case for such a pause, reflection, and reassessment. We recommend it to any reader concerned about our oceans' future – and thus with life on Earth.

Berlin/Potsdam, October 2019

Barbara Unmüßig

President of the Heinrich Böll Foundation

Prof. Dr. Patrizia Nanz

Scientific Director of the IASS

SUMMARY

Half of the global ocean floor is legally set aside from State or private ownership as a common heritage whose control and management are vested in mankind as a whole. This so-called Area lies beyond the limits of national jurisdiction, and the common heritage principle determines its international governance. Though rooted in the commons traditions of most regions of the world, it was a revolutionary step to establish the common heritage of mankind as a non-ownership regime in the Area. Neither the space nor the mineral resources of the Area may be occupied or appropriated; access rules enable equal opportunities for all; and particular obligations of States to cooperate exist. The principle encourages the utilisation of the mineral resources, but it also requires the preservation of the Area and its resources for future generations. The existing legal framework sets out the general objectives of the regime, but not the means to achieve them – most importantly, it leaves open the question of how to balance the different objectives. This becomes particularly crucial in view of the deteriorating state of the oceans, where new pressures – such as from the deep seabed mining of minerals – could lead to uncontrollable and unsustainable impacts. A collective effort is needed to renew the vision of the common heritage as a gift to mankind as a whole that has to be valued and managed responsibly and equitably for the benefit of today's and future generations. The existing legal framework provides ample options for meeting the objectives of intra- and intergenerational solidarity, distributive justice, and environmental protection in line with the necessities for achieving contemporary sustainable development. A precautionary approach to dealing with the common heritage would ensure ecosystem integrity for future generations.

The common heritage principle

The United Nations Convention on the Law of the Sea (UNCLOS), in force since 1994, acknowledges the overarching value of the Area and its mineral resources for establishing distributive justice and solidarity between developed and less-developed countries, and for the overall ecological integrity of the oceans by establishing a collective trusteeship in an international body, the International Seabed Authority (ISA), which is composed of all signatories of UNCLOS. Contrary to the freedoms of using the natural resources in the overlaying water column for State or private benefit, any utilisation of the common heritage shall be equitably shared for the benefit of mankind as a whole. Benefits are understood broadly, including immaterial benefits such as new knowledge generation about the Earth system, as well as financial and other economic benefits derived from exploiting the mineral resources of the Area.

Mining interest

In parallel with the development of the regulatory system, which provides for the conditions of exploration and the future exploitation of mineral resources from the Area, interest in these resources has risen, especially in recent years. Almost thirty 15-year contracts have been concluded between the ISA and States as well as State-owned or private entities for exploring the resource potential of manganese nodules, seafloor massive sulphide deposits, or cobalt-rich crusts in exclusively used parts of the Area. Apart from the uncertain ecological effects of commercial-scale mining operations, economic and technical uncertainties prevail concerning the magnitude of the mineral resource base; the technical mineability of the resource and the technology employed; the economic risks associated with each stage of the mining value chain, coupled with the potential for future metal price volatility; and the technical feasibility and cost of a zero-waste concept for mineral processing. In particular, the ecological risks bring into question whether the industry can ever acquire a «social licence to operate» and/or a «sustainable licence to operate». An overarching societal benefit from the exploitation of the common heritage of mankind, also in view of the 2030 Agenda for Sustainable Development, needs to be determined.

Concerns

The common heritage principle requires the preservation of the ecological integrity of the Area for future generations, i.a. as a precondition for exploitation. The habitats hosting the mineral concretions have evolved over millions of years, and biocenoses depend on the substrate. Deep seabed mining on a commercial scale would significantly expand the human footprint to the hitherto least-impacted depths, destroying the sites being mined and degrading large swaths of ocean floor and unknown volumes of water column fauna. The loss of biodiversity would be inevitable, though its scale would likely remain unknown. These pressures have to be seen as cumulative and synergistic to already existing ones, including those from global warming. The effects of the latter are expected to be severe, also for the deep ocean, as its fauna is adapted to relatively stable environmental conditions; global warming could, in turn, be reinforced by disturbances in the adaptive capacities of the deep sea.

There is potential for conflict, should deep seabed mining in the Area occur. This concerns possible spatial conflicts with other legitimate users of the sea, impacts on coastal communities from lost fishing opportunities, the transboundary effects of activities ranging into adjacent nationally legislated waters, conflicting interests with other international organisations, and objectives of other international agreements, such as to protect biodiversity and natural heritage. In order to take account of all possible interests and values of mankind, the decisions taken about the fate of the common heritage of mankind need the broadest possible transparency, and participation has to be enabled, including that of indigenous peoples and local coastal populations, in particular.

An excursus: The stories being told

Except in academic literature, the story of the common heritage is told today as the potential exploitation of seabed riches, primarily for remaining at the forefront of technology development and for securing the transition to renewable energy production. Even opponents indirectly and involuntarily strengthen these narratives when they simply oppose them instead of accounting for a positive dynamic vision. The common heritage principle and its inherent claim for intra- and intergenerational justice are still not exploited in narrative terms.

Supporting the 2030 Agenda

As such, the legal framework set out in UNCLOS for the common heritage of mankind aims at intra- and intergenerational justice by providing equal opportunities for States to participate in the administration and utilisation of the Area, by diminishing the technology and science gaps to some extent, and by sharing the benefits of the common heritage equitably, and with particular regard for the needs of developing States. This aspect of solidarity and care for the disadvantaged today and generations of tomorrow is mutually supportive with the globally agreed 2030 Agenda and its normative core that «no one will be left behind».

All four of the thematic focus areas of the 2030 Agenda and its Sustainable Development Goals (SDGs) and the provisions of the common heritage of mankind interact.

- *First of all*, in taking the ambitions seriously, the expected impacts on the health of the marine environment requires putting limits on potential activities. In particular, Sustainable Development Goal 14 (conserve and sustainably use the oceans, seas and marine resources for sustainable development), but also SDG 13 (combat climate change) and 15.5 (halt the loss of biodiversity) aim to maintain or restore ecological integrity. Likewise, in the Area, the application of the highest standards of protection is required, and the precautionary approach shall guide the regulatory regime for deep seabed mining. This requires reducing uncertainties as to the environmental effects of mining, setting precautionary thresholds for these effects, preventing pollution, and creating a corresponding procedural framework for control and enforcement.
- *Second*: Access and benefit-sharing shall be enabled within and sharing enabled across generations by supporting SDGs 1 (no poverty), 2 (no hunger), 3 (health, well-being), 5 (gender equality), 10 (reduce inequality within and among countries), and 16 (peace and justice). Whereas the common heritage principle supports the notion of reducing inequalities and exclusive peaceful use, seabed mining may eventually negatively impact fishing opportunities and landings through loss of income, and indirectly impact tourism.

- *Third:* The inspiration of social equity – such as through SDGs 4 (education and lifelong learning), 9 (innovation, knowledge), and 17 (partnerships) – is at the heart of the common heritage principle, although more could be done if the current training programmes were reorganised and augmented to deliver quality education. Longer-term partnerships between Sponsoring States and developing States could lead to more systematic exchange and capacity-building. More independent (especially environmental) scientific research programmes are required to establish regional environmental baselines, investigate gaps in contractor research, and understand the effects of deep seabed mining activities.
- *Fourth:* Many of the SDGs support the achievement of sustainable livelihoods, namely SDGs 7 (energy), 8 (inclusive and sustainable economic growth), 9 (infrastructure), 11 (cities, communities), 12 (consumption); SDGs 14.4, 14.7, and 14B (fishing opportunities) rely on the availability of minerals, in particular in view of the expected growth of the world population. In order to satisfy the legitimate demands of a growing world population for a decent standard of living, the consumption and production patterns prevalent in the industrialised world have to be revisited to address the limits of planetary resource availability for this and future generations. Investing in the development of resource efficiency, the substitution of critical metals, and recycling instead of investment in mining technology could provide solutions in line with SDG 8.4, which may make deep seabed mineral exploitation redundant.

Both the common heritage of mankind principle and the 2030 Agenda are forward-looking and inspirational frameworks for the design of a future on planet Earth. Yet, in order to develop the full potential of the two frameworks, the design of superseding, integral mechanisms are paramount. In the case of the common heritage of mankind principle, this could be the commitment to a commonly agreed contemporary vision for what shall be achieved, over which time periods, and how different values and interests ought to be prioritised and balanced.

A contemporary vision

Although operational since 1994, there is still no commonly agreed definition of what the common heritage principle entails. The process of developing the ISA regulations for the exploitation of minerals from the Area, ongoing since 2015, has revealed a fundamentally different understanding of the common heritage principle by States and stakeholders in different regions of the world. There has only been limited debate and no particular forum in the ISA or elsewhere that aims to bring together the different expectations of States and stakeholders, the different ethical concepts, and the related reflections on the principle within the regulatory framework under development.

As the common heritage of mankind has its roots in the civil governance of the commons in terms of, for example, peaceful use, inclusiveness, equity of participation, as well as access and benefit-sharing, it is suggested here that the member

States of the International Seabed Authority initiate a collaborative process towards an agreement of a contemporary vision for the implementation of the common heritage principle, ideally preceding the elaboration of the details of the Mining Code. It would provide an opportunity for all States and stakeholders to learn about the diversity of aspirations and wishes that are tied to the concept and principle, and to reconsider the presumed benefits from deep seabed minerals mining in light of the global sustainability agenda, planetary boundaries, and the obligation for intergenerational justice.

With the process being as important as the resulting common vision, more strength could be given to some key elements of the common heritage provisions in the UN Convention on the Law of the Sea of 1982, namely solidarity, sustainability, and collective governance in the context of today's ocean governance regime. This could include:

- developing a vision for the common heritage, which will maximise the benefits to mankind as a whole in the long term, including its contributions towards achieving the 2030 Agenda and the SDGs. This requires a change of focus from national priorities to an Earth systems view;
- ensuring transparency and inclusive participation;
- establishing mechanisms for independent expert advice to be taken into consideration;
- institutionalising the interests of future generations by appointing a trustee;
- reconsidering the benefits and costs to mankind from the exploitation of minerals;
- developing a long-term environmental vision, strategy, and action plan for the common heritage and establishing environmental goals as a gatekeeper against eventual exploitation contracts;
- investing in knowledge and capacity-development, especially during the UN Decade of Ocean Science for Sustainable Development (2021–2030);
- enabling systematic resource assessment and analysis for better planning of the transition towards circular economic paths by establishing a global resource governance mechanism;
- anchoring the values of the common heritage of mankind in the public conscience as a gift that implies an ethic of caring and responsibility – today and for future generations.

1. Introduction

What will the Earth and its oceans look like when we, the present generations, bequeath them to our children and grandchildren? Will the condition of the natural environment also allow people in the Global South to enjoy the living standards and quality of life we in the developed world take for granted today? Are we treating the oceans in a way that shows we truly value all that they are to us? Do we appreciate the great potential of the oceans in helping us solve the profound issues of our planet and its growing population? Are we taking decisions in such a way that the Earth's life-supporting functions are maintained also for generations to come?

These questions require answers not only with regard to coastal waters, but also the deep seabed far out in the Atlantic, Pacific, and Indian oceans and beyond the limits of national jurisdiction. These regions, called the «Area», were given the unique legal status of the «common heritage of mankind» in the 1982 United Nations Convention on the Law of the Sea (UNCLOS) and comprise the deep seabed, its subsoils, and the non-living mineral resources found there. This common heritage, therefore, has been entrusted to all of mankind,¹ today and in the future, to be administered collectively for the benefit of mankind by the States Parties to the Convention (UNCLOS, Dec. 10, 1982). There is no consensus yet, however, on how the concept of «heritage» should be understood. An increasing interest in exploiting the mineral resources found in the Area contrasts with an increasing scientific understanding of the vital ecosystem functions of the deep ocean and our growing global commitment to achieving sustainable development. Based on the new scientific knowledge, the need arises to reconsider whether the pursuit of deep seabed mining would threaten the ecological foundation that will support the lives of future generations. It is widely accepted that the principle of the common heritage of mankind encompasses both intra- and intergenerational equity, which places a huge burden on today's decision-makers to ensure that any activities in the Area or uses of its resources truly produce benefits for all of humanity.

The idea that the oceans harbour immeasurable treasures that can be recovered without substantial environmental impacts has been pervasive since the earliest days of scientific exploration of the deep sea. These attitudes are still widespread today, based on the assumption that technical innovations would make it possible to conduct deep seabed mining operations in compliance with appropriately set environmental thresholds. The part of the Convention dedicated to deep seabed mining reflects this perspective. At the time UNCLOS was negotiated, the biological

¹ This study uses the term «mankind» throughout the text in the sense of humankind. «Mankind» is the terminology employed by the UN Convention on the Law of the Sea (UNCLOS).

significance of the Area and its interconnections with the water column were poorly understood. Hydrothermal vents, with their chemosynthetic ecosystems, had only just been discovered. Yet, States individually and collectively have the duty to protect the marine environment from likely harm, and prevent pollution and damage to the flora and fauna. Many regulatory gaps and deficits concerning deep seabed mining are only just beginning to be addressed – in particular, the legal disconnection between the water column and the seafloor, and the lack of environmental protection measures to address the unique biodiversity and biological interconnections between these two zones. Nonetheless, the designation of the Area as the common heritage of mankind was pathbreaking and demonstrated that the States Parties to UNCLOS acknowledged the unique characteristics of the Area and determined it worthy of special attention.

For this reason, we consider the concept of «common heritage» to be a valuable approach to transforming attitudes about the importance of the deep ocean and its resources. The legal status of the Area as the common heritage of mankind offers an ideal basis for developing participatory mechanisms, cooperation mechanisms, and a strategic global dialogue on the best options for future development of the Area and its resources. Such a dialogue could result in a contemporary vision for the common heritage in the 21st century and beyond that is in accordance with another important international agreement. In 2015, a vision of a sustainable future was formulated in the 2030 Agenda for Sustainable Development «Transforming our World» with its Sustainable Development Goals (SDGs) adopted by the United Nations General Assembly. These 17 global goals and their 189 targets were developed through an all-inclusive participative process involving not just States but also representatives of civil society and business, making them the closest reflection of a collective vision for sustainable development currently in existence. In contrast to the earlier Millennium Development Goals, the 2030 Agenda reflects the needs and priorities of both developed and developing countries with a view towards building inclusive and prospering societies² and the need for more equitable resource use.³

Furthermore, for the first time, the oceans are integrated prominently in the global sustainable development agenda with a dedicated oceans goal: SDG 14 calls on States to «conserve and sustainably use the oceans, seas and marine resources for sustainable development», including to «prevent and significantly reduce marine pollution of all kinds» (SDG 14.1), and to «to avoid significant adverse impacts [...] in order to achieve healthy and productive oceans» (SDG 14.2). In this context of globally agreed action towards sustainable development and the increasing likelihood that deep seabed mining will occur despite considerable uncertainties and conflicts, it is an ideal moment to revisit the principle of the common heritage. Global values, scientific understanding, and policies have changed dramatically since the principle was first established. This should prompt us to reconsider the goals to be achieved by the common heritage for the benefit of mankind that determine administrative

² SDGs 1–9, 11, and 16.

³ SDGs 10, 12, 14, and 15.

actions both today and tomorrow. The SDGs provide important guidance and an aspirational framework for considering issues such as participation in decision-making over the common heritage, determining how it could contribute to achieving sustainable development – whether through conservation or use – and whether there are alternatives to deep seabed mining that would be more compatible with our global vision of sustainable development.

In order to achieve this vision of sustainable development, we must engage in an urgent discussion about the facts and fictions surrounding deep seabed mining and its potential risks and benefits. Times have changed considerably since the 1970s, when the resources of the deep seabed were thought to be the panacea for addressing the issues facing developing countries and the post-colonial responsibilities of industrialised countries. The idea of endless riches and lucrative revenues derived from commercial exploitation – pervading both the discussion surrounding the development of the industry and the evolution of the institutions and legal regime intended to manage it – has long been challenged, not only due to concerns about the environmental effects, but also due to uncertainties concerning the demands and viability of the industry. Today, the supply of special minerals to enable the transition to renewable energy production is a central argument of proponents, while opponents of deep seabed mining emphasise that new mineral resources from the deep sea might prevent a fast transition to overall sustainable development paths. So far, the status of the Area as the common heritage of mankind – with the associated special responsibility to generate benefits for today's and future generations – has not played a role in the arguments.

The International Seabed Authority (ISA) – the institution established under UNCLOS to manage activities in the Area on behalf of all mankind – is currently developing regulations for commercial mineral exploitation,⁴ which it intends to finalise by 2020. There has been substantial criticism that the draft regulations do not sufficiently reflect the common heritage of mankind and its benefit-sharing obligation as the guiding principle. Also, the environmental protection mandate has not been adequately translated into legal structures, environmental strategies, goals, and participation mechanisms to enable an effective control over mining activities. Likewise, the benefit-sharing promise of the common heritage still requires a corresponding mechanism that fully accounts for the environmental costs of deep seabed mining and also includes non-monetary and intrinsic benefits of maintaining the ecological integrity of the deep sea, such as for research, education, and as a resource reserve for future generations. With the common heritage of mankind as a guiding principle, the payment mechanism currently under discussion in the ISA's work would need to change the emphasis on the individual interests of contractors and institutional financing to the consideration of whether the financial contributions to ISA can be considered a benefit to mankind.

⁴ See *e.g.* www.isa.org.jm/legal-instruments/ongoing-development-regulations-exploitation-mineral-resources-area

With this report, we hope to encourage new thinking about what the common heritage of mankind delivers to this and future generations – particularly in light of today's social and environmental commitments – and ask the fundamental question of whether deep seabed mining would ultimately be beneficial for present and future generations. This question cannot be answered without also considering broader aspects of resource governance, including consumption patterns, industrial development, and innovation, which are integral to sustainable development. Weighing the benefits also requires the recognition that the deep seabed and its associated ecosystem functions support humanity, its intrinsic importance for both scientific discovery and enhanced environmental protection, and the preservation of its resources and vital ecosystem functions. Sustainability is one of the roots of the common heritage concept, next to solidarity and equity, and the Area has much to offer apart from the commercialisation of its mineral resources. A broad range of stakeholders as well as the public should participate in the potentially far-reaching decision-making regarding the future use of the deep seabed.

The development of a new, contemporary understanding and vision for the implementation of the common heritage of mankind could be instrumental in changing the perspective on what the common heritage means to us and what it can deliver. This could best be achieved in an all-inclusive, transparent process on the global level with the goal of developing a contemporary vision. Eventually, the vision will support efforts to respect planetary boundaries and the rights of all people to a fair share of mankind's resources while keeping the natural environment in such a state as to provide sufficient opportunities for future generations (Taylor, 2014, 2018b). Although the regulations for the exploitation of minerals from the seafloor of the Area are already under discussion, there may still be a window of opportunity for changing our perspectives on the outstanding value of the common heritage.

The following study aims to guide the reader from the basics of what the legal framework of the common heritage of mankind principle entails, its original vision, and its current implementation (chapter 2); a description of the interests in minerals mining today (chapter 3); to an account of the risks to the environment – as far as this can be predicted today – and the possible governance conflicts that might accompany the uptake of exploitation (chapter 4). An inserted essay analyses the narratives of contemporary documents – from academia, civil society, politics, business, and media – that set the reallife starting point for the change envisioned in chapters 6 (tracing the roots of the common heritage of mankind as a commons idea and linking it with the 2030 Agenda) and 7 (calling for the development of a common vision for a contemporary implementation of the common heritage of mankind in the Area, and eventually beyond).

2. The common heritage of mankind principle

The 1982 United Nations Convention on the Law of the Sea provides that the «Area and its resources are the common heritage of mankind». It dedicates Part XI exclusively to substantiating how the principle shall be implemented in practice, that is, by creating a regulating authority that manages access to the Area, resource use, and benefit-sharing among mankind.

The Area

The Area is defined in Art. 1 (1) of the 1982 United Nations Convention on the Law of the Sea (UNCLOS) as the «seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction»; the exact extent of the Area, however, can first be agreed when all coastal States have established the outer limits of their continental shelves in accordance with Art. 76 (see below).

This zoning has to be understood in the context of the overall system of maritime zones in UNCLOS, which sets the corresponding rights and responsibilities for all States in those zones in order to ensure stability in the Law of the Sea. These rights and responsibilities range all the way from one extreme (sovereignty and exclusive rights of the coastal States in the near-shore territorial seas) to the other (absolute non-appropriation in the Area) (UNCLOS Art. 136). The system of zones set out in UNCLOS both codifies long-standing customary international Law and creates new law to adapt to new legal challenges, such as that concerning the Area, the exclusive economic zone, and the outer continental shelf. It is a notable consequence of this so-called zonal approach that the seabed can be subject to different legal rules than its superjacent water column (Treves, 2010).

Since UNCLOS came into force in 1994, most of the coastal States, including some non-parties, have designated ocean zones in line with the legal framework. In recent years, this also concerned the delimitation of an extended continental shelf zone beyond the 200 nautic mile exclusive economic zone, where coastal States have rights to exploit the mineral resources; however, they must share the benefits with the International Seabed Authority, that is, these are also contributions to the benefit of mankind (UNCLOS Art. 82).

Translated to the global map, it appears that, despite the increasing coverage by coastal States of the continental shelves, the Area will comprise about half of the global ocean floor. The map in Fig. 2 illustrates clearly that the Area is to be found

in the Atlantic south of Iceland, in the Pacific, and in the Indian Ocean along the mid-ocean ridges where continental plates meet. It is therefore far out in the oceans, difficult to reach, and expensive to explore and exploit.

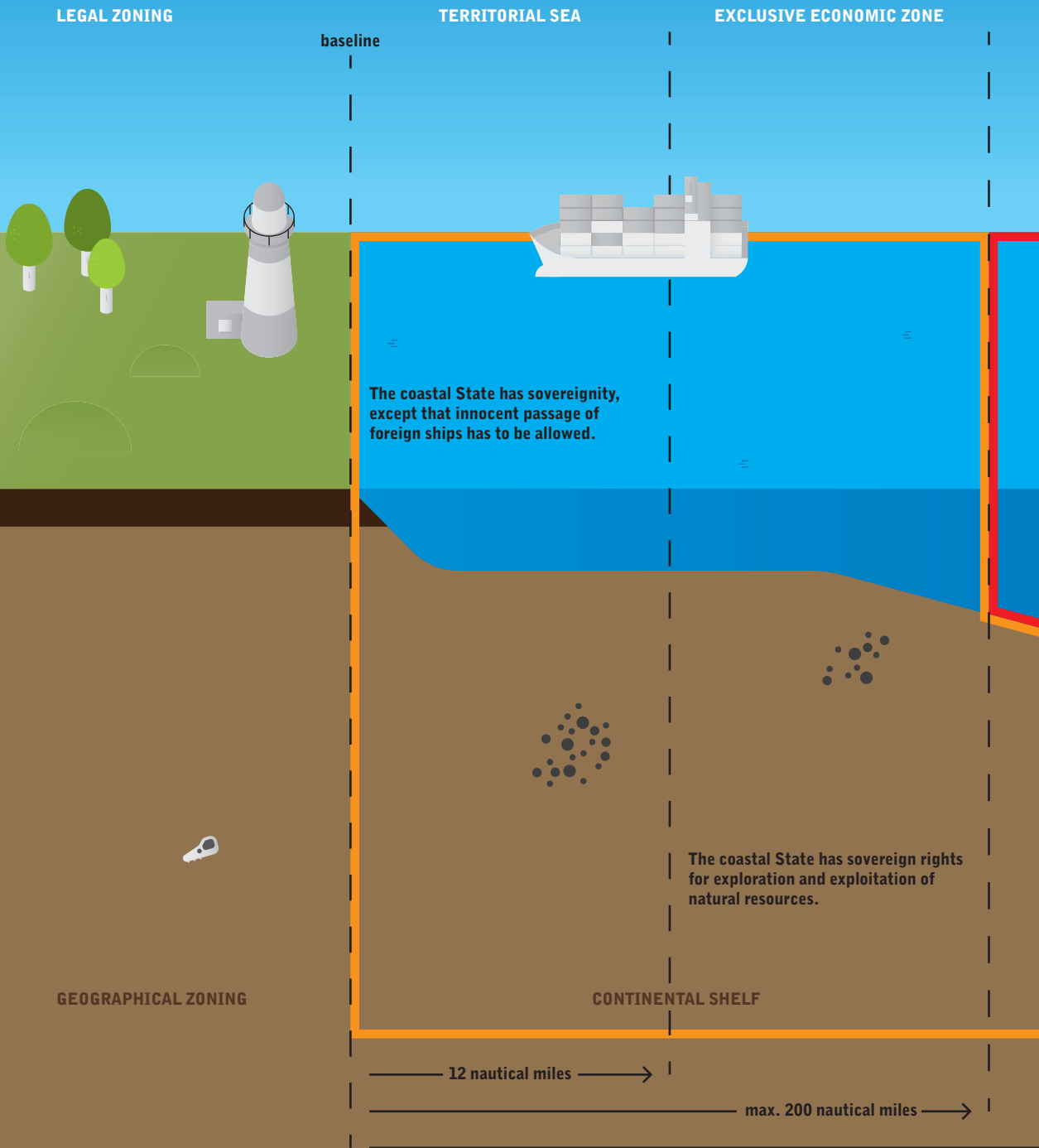
What makes this ocean zonation complicated is the fact that the jurisdiction of coastal States extends to the seafloor and the overlying water column in territorial seas and the exclusive economic zone, but not to the water column above the extended continental shelf (the orange areas in Fig. 1, see also Fig. 2 above). These waters and the waters overlying the Area are so-called high seas and have a special legal and regulatory regime. Here, all natural resources on the seafloor and in the water column – be it fish, whales, or bacteria – can be used free for all so far unless regulated by a sectoral international organisation. Here, a general obligation on all States to protect the environment (UNCLOS Art. 192) applies, especially the protection from harm arising from activities in the Area, which are to be warranted by ISA (UNCLOS Art. 145).

The common heritage of mankind – then and now

First of all, the common heritage principle (Wolfrum, 1983) defines legal status and access conditions to the seabed beyond national jurisdiction. In addition, it aims to provide for the equitable sharing of non-monetary as well as financial and other economic benefits, should any be derived, including considerations of inter- and intragenerational opportunities and environmental protection.

The common heritage principle was codified during a special historic period. After the Second World War, the wish for continued peace was a strong incentive for establishing a multilateral global governance system, the United Nations. By the end of the 1940s, a dedicated group (including G. A. Borgese and E. Mann-Borgese) presented an idealistic then-and-now draft of a World Constitution, which considered that all four elements of life – water, earth, air, and fire – have to be commonly owned by all of mankind in order to achieve social justice, a precondition for peace (Taylor, 2014, 2018b; Turlington, 2017). Decades later, when the UN Convention on the Law of the Sea entered into force, part of this vision became reality.

Fig. 1: Maritime zones of ocean use according to the United Nations Convention on the Law of the Sea, UNCLOS
All States individually and jointly have the obligation to protect and preserve the marine environment.



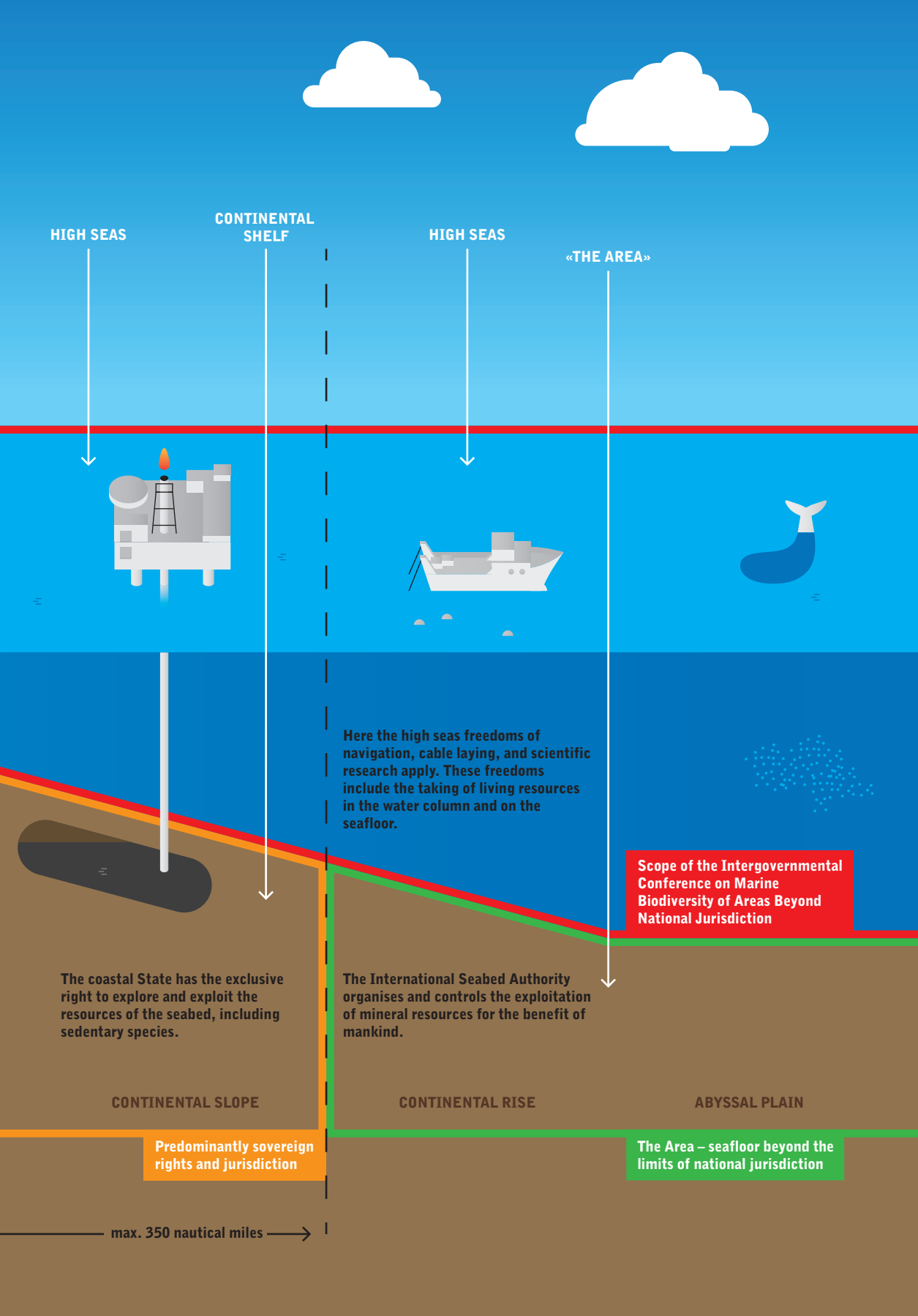
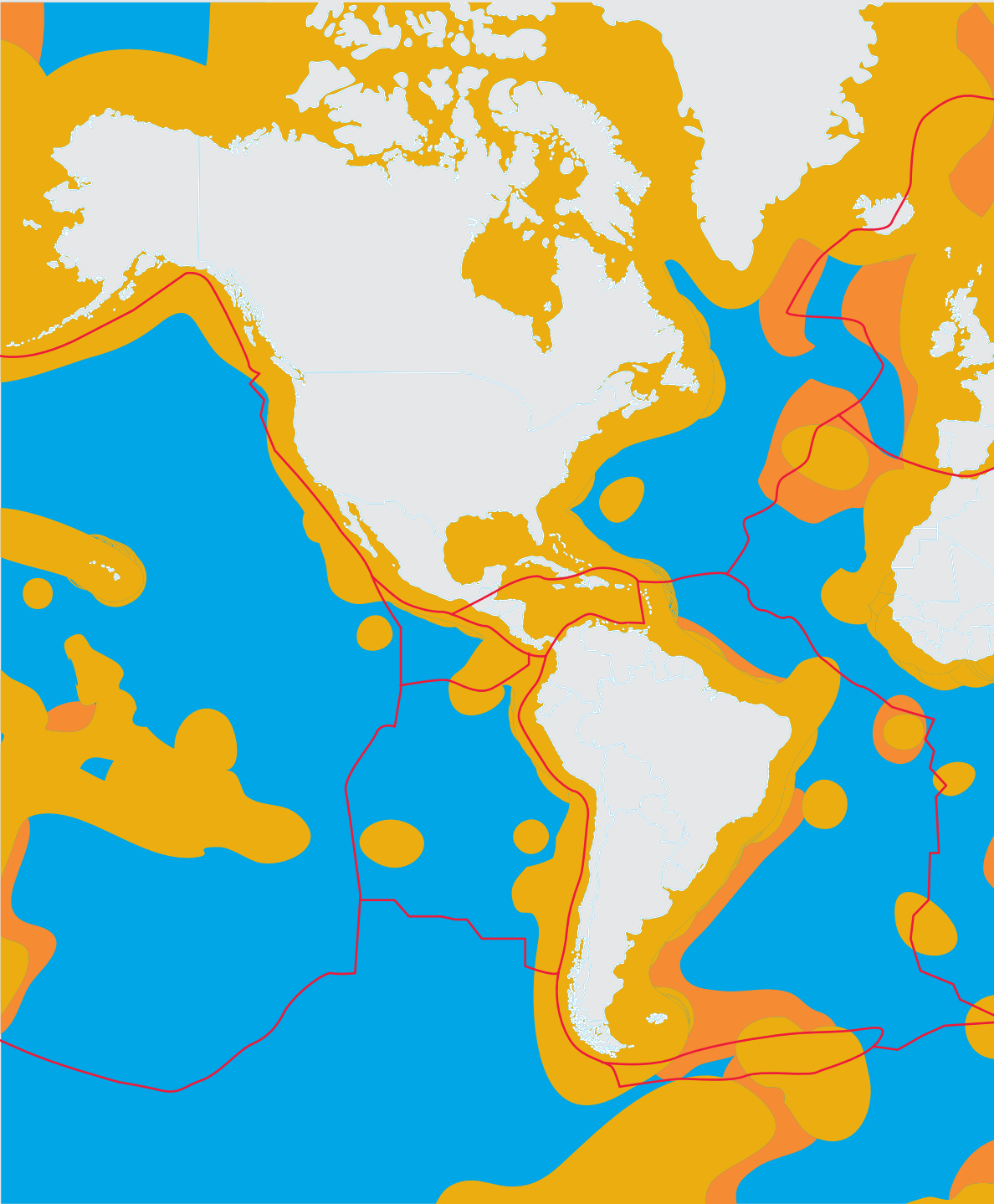


Fig. 2: The Area – almost 50 per cent of the global ocean floor is designated as the common heritage of mankind and has to be managed to the benefit of mankind today and in the future

The Area, the ocean floor beyond the limits of national jurisdiction, here mapped in blue, covers some 43 per cent of the world's oceans; 57 per cent of the oceans are subject to national jurisdiction and/or international access, such as for shipping



- Exclusive economic zone
- Preliminary limits to extend continental shelves of coastal States
- Boundaries of continental plates
- The Area – the common heritage of mankind



Source: Heinrich Böll Stiftung et al., 2017, p. 33; datasource: www.unclosuk.org/submissions-currently-united-nations; own chart.

Box 1: The common heritage of mankind – what it was meant to be

«Traditionally, international law has been essentially concerned with the regulation of relations between States. In ocean space, however, the time has come to recognize as a basic principle of international law the overriding common interest of mankind in the preservation of the quality of the marine environment and in the rational and equitable development of resources lying beyond national jurisdiction. This does not imply disregard of the interest of individual States, but rather the recognition of the fact that in the long term these interests can be protected only within the framework of a stable international regime of close cooperation between States.»

Arvid Pardo (1975, Statement before the Parliamentary Assembly of the Council of Europe)

«The common heritage of mankind is neither a concept of private ownership nor one of state or world state ownership. It is a concept of non-ownership under which natural or legal persons have user rights and management prerogatives, but not ownership rights in the Roman Law sense. The Common Heritage principle has a fundamental ethical component: for both user rights and management prerogatives must be exercised with due consideration of the common good, which includes the rights of poor countries and poor people (intra-generational equity) as well as the rights of future generations with which it must be shared and for which it must be conserved (inter-generational equity). It has an economic development dimension, it has an environmental dimension, and it has a peace-building dimension [...].»

Elisabeth Borgese (1998, ch. 3)

In the meantime, however, the opposite had taken place: More and more coastal states claimed jurisdiction or sovereignty of variable extents of seafloor and waters off their coasts, which led to the first four UN conventions settling the rights and obligations in four different legal ocean zones in 1958. Nevertheless, numerous tensions remained, leading to negotiations on a comprehensive UN Convention on the Law of the Sea that were concluded only in 1982. At the time, more and more States were gaining their independence and struggling for economic and social development, while the cold war was dominating politics and military needs. Only the very

first steps were taken to address sustainable development and environmental pollution (Stockholm Conference on Human Development 1972⁵). States were deeply divided between the industrialised, technologically advanced former colonisers, which were concerned about future resource supply, and the mostly overindebted and underdeveloped «third world» States, many of them reliant on exports from land mining. In particular, due to the sensitivities of African States to an emanating race of technologically advanced States for the resources of the deep seabed and a potential reestablishment of colonial rule by other means (Egede, 2011, Introduction p. xxi), the mid-ocean floor was set apart from national sovereignty, private ownership, and unregulated and non-peaceful use (Ranganathan, 2016).

Building on important historic (Doorn, 2016) and contemporaneous predecessors (Ranganathan, 2016; Tuerk, 2015), the impetus for dedicating the seabed beyond national jurisdiction to mankind as a «common heritage» was spurred by an address in 1967 to the UN General Assembly from the Maltese ambassador to the UN, Arvid Pardo. He not only provided a «captivating account of seabed riches» to be expected (Ranganathan, 2016) but also outlined the main elements of the future principle.⁶ Finally prevailing over far-reaching options for nationally controlled ocean zones, his move against the States sought to preserve the waters and seafloor beyond the limits of national jurisdiction as international commons (Wolfrum, 2009), including the prevention of the monopolisation of its mineral resources by technologically advanced nations (Ranganathan, 2016).⁷

Since 1982, the principle of the «common heritage of mankind» and all related rules are enshrined in Part XI of the UN Convention on the Law of the Sea. As such, it «posed a radical challenge for traditional international law, in particular its centrality of state sovereignty [...] and the prioritisation of national self-interests» (Taylor, 2018a). In order to ensure also the ratification by industrialised States, a subsequent Implementing Agreement (1994) was negotiated, which modified some important procedures of the common heritage principle (Tanaka, 2011; Wolfrum, 2009). UNCLOS and the Implementing Agreement together provide the broad legal basis for the implementation of the common heritage principle by the ISA, which is equipped with broad competences to do so. The founders of UNCLOS considered the common heritage to be so important that they made amendments to the basic principle impossible (Art. 311 (6)).

5 See <https://sustainabledevelopment.un.org/milestones/humanenvironment>

6 See document A/C.1/PV.1515 UN General Assembly First Committee 1515th Meeting official records, <http://undocs.org/A/C.1/PV.1515>

7 However, he also proposed to split the seabed beyond national jurisdiction from the water column and to make the Authority overlooking the «common heritage» independent of UN General Assembly rulings, which in the end prevented comprehensive and effective oversight (Ranganathan, 2016).

Box 2: The common heritage principle as codified in the UN Convention on the Law of the Sea, UNCLOS, Part XI, in brief

- Subject of the common heritage of mankind principle is the seabed beyond national jurisdiction, the «Area» and its [mineral] resources *in situ* at or below the seabed (Arts. 136/133).
- All rights in the resources are vested in Mankind as a Whole, on whose behalf the [International Seabed] Authority shall act (Art. 137).
- Activities in the Area shall be carried out for the benefit of mankind as a whole (Art. 140) and with due regard for other activities (Art. 147).
- The Area has to be used exclusively for peaceful purposes (Art. 141).
- No State can declare sovereignty (Art. 137), no appropriation is allowed.
- States have to cooperate with each other and with the ISA to govern the Area collectively (Arts. 137 II, 157ff.).
- Non-monetary but in particular the financial and other economic benefits arising from activities in the Area are to be equitably shared with particular consideration of the needs of developing countries (Art. 140).
- Marine scientific research shall be promoted by the ISA and States (Art. 143).
- The marine environment has to be protected (Art. 192), in particular against harmful effects arising from activities in the Area (Arts. 145, 192).
- Dispute resolution and advice is provided by the Seabed Chamber of the International Tribunal (Art. 186ff.).

At the core of the principle stands the trusteeship conferred to States and the International Seabed Authority (ISA) to act for mankind as a whole, holding them responsible for implementing the spirit of the law (Kiss, 1985; Wolfrum, 2009). Access to the Area is organised via bilateral contracts between the ISA and a contractor, and regulated by mineral-specific binding regulations. Activities in the Area can only be carried out by States Parties, State enterprises, or natural or juridical persons, who are effectively controlled by their so-called Sponsoring State in order to ensure that activities are carried out following the rules, regulations, and procedures of the ISA. Under these conditions, all States shall be enabled to participate in the activities in the Area (Art. 148), yet environmental standards to be kept are the same for developed and developing States, independent of their capacities (ITLOS, 2011). The Seabed Chamber, in its Advisory Opinion to the ISA (ITLOS, 2011), emphasises that Sponsoring States must take all possible measures to ensure that contractors under their sponsorship comply with all rules, regulations, and procedures applicable. The precautionary principle must be applied, and state-of-the-art environmental impact assessments have to be carried out prior to an activity likely to impact the environment.

The implementation of Art. 145 of UNCLOS has crucial importance for the regulation of the exploitation conditions. In fact, the protection of the environment can be considered a precondition that the ISA must ensure before it can fulfil its mandate to develop the resources of the Area (Jaeckel, 2015, 2017b; Jaeckel *et al.*, 2017), in line with Wolfrum (2009), who clearly states that «the principle embraces the obligation to preserve the area and resources in question for future generations, which includes the concept of sustainable development». This view supports the position that the Area has to be understood as the seafloor beyond the limits of national jurisdiction, including its mineral resources and all related ecosystems *in situ*.⁸ Exploitation should therefore only proceed if activities do not undermine the opportunities of future generations.

This understanding of the common heritage and its benefits is not reflected in the legislation of all States: For example, China has enacted legislation (Zhang and Zheng, 2016) that appears not to include the value of the Area and its natural resources on the seafloor.⁹ Accordingly, the benefits to mankind would accrue exclusively from mining the mineral resources of the Area.

Overall, many aspects of the implementation of the common heritage principle remain undefined or lack a commonly agreed understanding, which may allow for it to be seen as a label for a general concept (Wolfrum, 2009), and thus for adaptation over time (Bailey, 2018), in context with evolving environmental commitments, standards, and management techniques.

A collective management of the Area

«Activities in the Area» refers to all activities of exploration and exploitation of the resources of the Area (UNCLOS Art. 1 (3)). The International Seabed Authority is the organisation established in accordance with Art. 157 of UNCLOS through which States organise and control activities in the Area. Collectively, in the organs of the

⁸ *In situ* means down in the water, here, that the Area includes not only minerals but the environment as a whole.

⁹ This would appear to not implement the common heritage principle as conceived in UNCLOS (in the academic literature quoted above). Following Art. 136, which sets out that the Area and its resources are the common heritage of mankind, and Art. 133 (a), which defines resources in terms of their presence in the Area, the ISA's obligation to protect and conserve the natural resources of the Area set out in Art. 145 must clearly emphasise the preservation of those resources' *in situ* status. This can be further supported by the conditions set out in Art. 150 (b) that activities in the Area shall be carried out in a manner to ensure the «orderly, safe and rational management of the resources of the Area».

ISA, States are required to act on behalf of «mankind as a whole»^{10,11} to ensure that activities in the Area are carried out for the «benefit of mankind as a whole»,¹² as well as to ensure that financial and other economic benefits derived from activities in the Area be shared through an equitable and non-discriminatory mechanism.¹³ Taken together, this strongly indicates that in the ISA organs, States should act collectively in the interest of mankind, rather than be guided by national priorities. They are accountable to mankind, such as being represented, for example, by civil society organisations. At present, there is a strong tendency in the ISA to facilitate mining in the near future, owing to pressure from potential developers for security in planning investments, and a consequent wish to develop the respective exploitation rules to ensure an orderly transition from an exploration regime to an exploitation regime. The latter might also set standards for national legislation under development.

Although Part XI of UNCLOS sets out complex rules for how activities in the Area are to be conducted, it is not stated that the only purpose of the ISA is to facilitate exploitation. The Authority is to «ensure» effective protection for the marine environment from harmful effects that may arise from activities (UNCLOS Art. 145), which are defined as all activities of exploration for – and exploitation of – the resources of the Area (UNCLOS Art. 1 (3)). Activities in the area are to be carried out with a view to ensuring development of the common heritage for the benefit of mankind as a whole (UNCLOS Art. 150 (j)). The Authority is mandated to «organize and control activities in the Area, particularly with a view to administering the resources of the Area» (UNCLOS Art. 157 (1)).

UNCLOS thus sets out clear conditions for exploitation in the event that this path of administration is chosen. These conditions include both regulating and ensuring the effective protection of the marine environment from harmful effects of activities in the Area and facilitating benefit-sharing. Therefore, the ISA is required to determine the conditions for access to the Area by adopting rules, regulations and procedures which define the terms for exploration and eventual exploitation of minerals. The development of a comprehensive Mining Code to regulate all phases of activities in the Area has been underway for a number of years. While regulations for the exploration of the three categories of mineral resources have already been formally adopted and, in part, revised, exploitation regulations are currently only under discussion in preliminary draft form.¹⁴

¹⁰ Art. 137 (2) UNCLOS.

¹¹ The ISA has a very slim Secretariat of fewer than 40 people (all included) and a General Secretary. Observer states and organisations are admitted to the Assembly and the Council and can provide oral comments. The technical work is done by the 35-person Legal and Technical Commission (LTC), which submits recommendations to the Council for consideration and approval, which has a weighed representation of 168 member States. Decisions of the Council have to be approved by the Assembly, where all member States are represented by one vote, theoretically the supreme organ. In practice, neither the Council nor the Assembly can easily overturn recommendations coming from the LTC.

¹² Art. 140 (1) UNCLOS.

¹³ Art. 140 (2).

¹⁴ Based on ISBA/24/LTC/WP.1/Rev.1.

These regulations shall determine the requirements and conditions for the approval of exploitation contracts, including prerequisites, documentation, and the terms of the expected payment regime. Although the payment regime – the fees and royalties to be paid to the ISA by future contractors – is already under development, requests for determining the terms for benefit-sharing have only come up recently. It is currently unclear when – and at what magnitude – funds would be available for sharing, who the beneficiary would be, and through which mechanism the benefit would be distributed. It must also be highlighted in this context that the proposed mechanism for payments to the ISA currently under discussion does not consider the loss of biodiversity and the related loss of ecosystem function and services to be factors in the assessment of a potential net benefit or loss to mankind.¹⁵

In terms of developing a comprehensive framework for regulating the effective protection of the marine environment from harmful effects arising from deep seabed mining activity regulations, as required by UNCLOS (Art. 145), the draft exploitation regulations¹⁶ merely set the broadest standards: Some environmental principles are established as well as basic requirements to be met by contractors when applying for exploitation contracts. A prior approved environmental impact assessment and an environmental management plan are needed for permission of activities. However, the current draft neither foresees effective procedural mechanisms for the initial periodic review and assessment of individual and cumulative environmental impacts, nor prescriptive environmental standards, thresholds, or environmental goals and objectives.

In 2018, the ISA adopted a Strategic Plan for the period 2019–2023¹⁷ that shall guide ISA policies for the upcoming years.¹⁸ The mission statement requires «ensuring the effective protection of the marine environment in accordance with sound principles of conservation and contributing to agreed international objectives and principles, including the Sustainable Development Goals», and reinforces that «the Area and its resources are the common heritage of mankind».

The group of 47 African States, however, as well as further States in South America, Oceania, Asia, and other non-contracting parties have voiced their concerns that the draft regulations fail to reflect the common heritage principle as it was originally intended.¹⁹ This must be considered in light of Art. 311 (6) of UNCLOS, which provides that «States Parties agree that there shall be no amendments to the basic

¹⁵ See Lodge, M.W., 2012. The Common Heritage of Mankind. *The International Journal of Marine and Coastal Law* 27, 733–742.

¹⁶ Refers to ISBA/24/LTC/WP.1/Rev.1 of 26 July 2018.

¹⁷ ISBA/24/A/10.

¹⁸ A high-level action plan (ISBA/25/A/15) guides the implementation.

¹⁹ ISBA/24/C/20 and statements in Council debate as well as two non-papers submitted to ISA, *Request for Consideration by the Council of the African Group's Proposal for the Operationalization of the «Enterprise»* (6 July 2018, www.isa.org.jm/sites/default/files/files/documents/alg-oboag-entp.pdf); *Request for Consideration by the Council of the African Group's Proposal on the Economic Model/Payment Regime and Other Financial Matters in the Draft Exploitation Regulations under Review* (9 July 2018, www.isa.org.jm/sites/default/files/files/documents/nv.pdf).

principle relating to the common heritage of mankind set forth in article 136 and that they shall not be party to any agreement in derogation thereof.» The 2018 draft regulations then for the first time included the common heritage principle, that is, the benefit to mankind, as a criterion to assess when deciding on an application for an exploitation contract for an individual mining operation.²⁰

What are the intended benefits?

An important component of the common heritage relates to equity of opportunities to exploit the resources of the Area, and related distributive mechanisms to reduce the gaps in non-monetary development and the financial and economic conditions between industrialised and developing countries. Therefore, apart from an «equitable sharing of financial and other economic benefits derived from activities in the Area» as laid down in Art. 140 (2), UNCLOS obliges all States and ISA to cooperate in marine scientific research, capacity-building, and technology transfer for the benefit of developing countries.

An equitable financial benefit-sharing mechanism

On the basis that the rights for mineral resources in the Area are vested in mankind, compensation for the use of these non-renewable mineral resources is logically due. Likewise, UNCLOS provides that the ISA is entitled to reimbursement for its necessary administrative costs. As of 2019, the ISA has neither agreed on a payment regime for mineral exploitation, nor on the principles and criteria for a benefit-sharing mechanism. It is therefore uncertain how eventual revenues generated by mining would flow back to the ISA and what portion of those revenues would be available for distribution through the benefit-sharing mechanism, which is to be developed after the ISA has covered its administrative costs and contractors have recouped their investments, as foreseen in UNCLOS.

At one stage it was expected that unprecedented quantities of metals could be extracted from manganese nodules,²¹ ready to be efficiently exploited by industry, which would generate a fortune for miners and any international administrator (Mero, 1965). This encouraged the development of the seabed mining regime (Part XI) of UNCLOS as a regime apart from all others (Ranganathan, 2016). In the 1970s, seabed mining was presented as an industry of the greatest importance, and it was estimated that the proposed agency would receive massive revenues from its licences, enabling it to spend \$5 billion annually. These estimations were already being questioned at the time. Yet, as Ranganathan (2016) puts it «the persistence of belief in a seabed bonanza [...] explains why seabed mining received far more attention than it deserved during UNCLOS III negotiations». More recently, there was significant cautioning against high expectations, also in view of the associated environmental impacts and the social licence required (Hannington *et al.*, 2010; Petersen

²⁰ Refers to ISBA/24/LTC/WP.1/Rev.1 of 26 July 2018.

²¹ Nodules: polymetallic nodules, ferromanganese nodules.

et al., 2016; Rozemeijer *et al.*, 2018). Today some actors – in particular the opponents of deep seabed mining – are calling for taking time to reconsider the whole endeavour in light of the existing pressures and changes of ocean ecosystems and the transition of resource use needed to live up to the commitments of the global sustainability agenda (see also Excursus on current narratives between chapters 4 and 5, and scientists' and environmental non-governmental organisations' submissions to the ISA²²).

Until today, the idea of fantastic riches to be gathered from the sea²³ – together with the urge to secure national mineral supplies and curiosity-driven research and technology innovation – continues to spur political actors to fund exploration and research (Hunter *et al.*, 2018). Therefore, the financial and other economic benefits to be shared among mankind are expected to derive from profits made from selling the recovered minerals on the world market. The ISA, as a trustee for mankind, participates through royalty and/or profit tax payments, while Sponsoring States levy national taxes on the mining enterprise. This is the approach taken in the developing payment regime for potential contractors.

This approach is in line with what Lobo and Jacques (2017) call the prevailing «invisible, non-codified economic regime governing the World Ocean that is guided by the norms of sheer volume production», which degrades the loss of environmental, social, or aesthetic values to externalities of minor importance. Yet, the framework set out in UNCLOS for governing the Area can also be interpreted another way. As Lobo and Jacques (2017) reference from Borgese (1998), UNCLOS can also be viewed as a «watershed for humanity because it institutionalised the tools for inclusive international-regional decision-making, interdependencies, and substantive conservation to combat materialistic mining of the ocean for simple commodities». Already at the time, the non-quantifiable contributions of the oceans to the human life-support system, today called «ecosystem functions and services», have been recognised as a major factor next to the resource value, for example of minerals (Borgese, 1998). Since the Millennium Ecosystem Assessment (2005), which for the first time explicitly emphasised the crucial link between ecosystem services and human well-being, the economic value of ecosystem services provided by the deep sea has been reviewed (Folkersen *et al.*, 2018b). The various types of «services» provided by the habitats of interest to deep seabed miners have been described, and their incorporation into the environmental management of deep seabed mining has been proposed (Le *et al.*, 2017). It has been suggested that the ISA should best

22 See <https://ran-s3.s3.amazonaws.com/isa.org.jm/s3fs-public/documents/EN/Regs/2017/ENgo/SeasAtRisk.pdf>; <https://ran-s3.s3.amazonaws.com/isa.org.jm/s3fs-public/documents/EN/Regs/2018/Comments/DSCC.pdf>; see also e.g. Position Paper of Forum Umwelt und Entwicklung, www.forumue.de/wp-content/uploads/2018/05/Positionspapier-Tiefseebergbau-25042018.pdf, and BUND, www.bund.net/service/publikationen/detail/publication/tiefseebergbau

23 E.g. in 2013, the prime minister of the United Kingdom expected minerals from the seafloor to deliver 40 billion pounds to the UK economy over the next 30 years, www.ft.com/cms/s/0/52cdac0e-8bbe-11e2-8ee0-00144feabdc0.html#axzz35BoSmXfG

adopt a broader understanding of what the benefits to mankind entail (Kim, 2017): «[B]enefits» should mean «total economic value», which encompasses «the direct and indirect values of [natural] resources as used by others or for their intrinsic and ecosystem services values». Preferably, an even broader understanding of benefits would value international cooperation for maintaining/achieving a habitable planet in the long term, and prioritise the social advancement of people in developing States.

Box 3: Benefits to mankind

All rights in the mineral resources of the Area are vested in mankind as a whole, and seabed mining activities shall only take place if these activities generate a (unquantified, yet it can be assumed considerable) benefit for mankind (Art. 140.1), which in turn shall be shared equitably among all States/mankind (Art. 140.2).

So, the most important task of ISA prior to closing contracts for exploitation is to assess whether the exploitation activity is really in the interest of humanity today (Kim, 2017), that is, whether it will generate sufficient benefits to mankind to be permissible in accordance with UNCLOS.

The common heritage of mankind shall not only generate benefits for present generations, but it implies that resources are equitably shared with future generations, or an alternative regime has to be developed that would ensure the conservation of natural resources for use by future generations (Das, 2009). But this equity, as a principle and a concept, needs further definition (Bourrel *et al.*, 2016; Das, 2009). Aiming to operationalise a benefit-sharing mechanism, Lodge *et al.* (2017) distinguish two main concepts behind the aspirations of benefit-sharing: The first is what is called the shared «ownership» of resources; the second is the desire to weigh economic returns based on some measure of need. However, Das (2009) considers that, instead of compensating developing countries on a basis of need, as might be favoured by developing countries, or as a relative share proportional to investment, as might be favoured by developed countries, a compensation regime that fully internalises the cost for lost opportunities intra- and intergenerationally would be adequate. Such a regime would ultimately lead to more resources being left for future decision-making.

The shared «ownership» (better trusteeship) concept is realised by UNCLOS for the *in situ* minerals in the Area. Problems start once the natural resource is sold to become financial capital: Who shall have which share in the benefits? In which form (direct payments, certain types of funds)? What would be fair and equitable, in particular, if priority is given to the needs of developing States? When (today or in the future), and in which form (financial, material, or ecological), would benefits

be most beneficial? And how could benefits for future generations be secured when the exploitation of non-renewable mineral resources comes with undetermined and presumably long-lasting environmental degradation? How to prevent the short- and long-term costs of environmental degradation and its effects on other legitimate uses of the sea from outweighing the shared benefits for mankind? What is the consequence if properly estimated costs to future generations, including environmental costs, exceed commercial revenues?

A further facet of the common heritage regime is the obligation to compensate land-based mineral producers – in particular developing countries dependent on mineral exports – in the event of economic losses due to minerals from the Area entering the global market. In this case, UNCLOS foresees a financial compensation mechanism, which shall be organised by an «Economic Planning Commission» that is to be installed once the first exploitation contract has been signed, at the latest. Compensation will be paid from an economic assistance fund, which is to be filled from payments made by exploitation contractors to the ISA. The amount set aside for that purpose will be determined by the Council upon the recommendations of the Finance Committee. Up to now none of the necessary mechanisms have been put in place and no compensation strategy has been designed.

An equitable non-monetary benefit-sharing mechanism?

As no exploitation of mineral resources from the Area has taken place over the first 25 years of ISA's existence, the common heritage principle so far has been realised through providing equal opportunities to all States to participate in exploration as a Sponsoring State, capacity-building, and cooperation in marine scientific research (i.e. the non-monetary aspects of benefit-sharing).

Each party to UNCLOS, no matter the financial and economic capacities, can become a Sponsoring State for an exploration or exploitation venture in the Area. In its role as a Sponsoring State according to Art. 139 of UNCLOS, the State assumes responsibility to ensure the compliance of any mining venture it has sponsored with the ISA's rules, regulations, and procedures as well as the terms of its contract with the ISA. The Sponsoring State is likely to receive benefits from economically successful operations through domestic taxation and sponsorship fees outside the ISA's purview. The extent to which the Sponsoring State would assume liability for damage caused by such operations is unclear, however, and would be determined based on its fulfilment of the legal obligations contained in the duty of due diligence.

In particular, the site-banking system²⁴ improved the opportunities of developing States to sponsor exploration activities in reserved areas. Exploration contractors from developed countries are required to periodically return portions of their contract areas to ISA. In the case of manganese nodules, the returned portions are to be of equal commercial value to the retained portions. These pre-explored areas – referred to as reserved areas – can be applied for through the «Enterprise» (see below) or developing States enterprises for further exploration under favourable

²⁴ See www.isa.org.jm/contractors/reserved-areas

conditions, which represents a substantial economic benefit transfer to developing countries.

The Enterprise, which was intended by the drafters of UNCLOS to become an autonomous, collective mining entity for all of mankind (UNCLOS Art. 170 and Annex IV), was modified by the 1994 Implementing Agreement, which rules that the Enterprise can only conduct its operations in a joint venture with another entity, be it private or State-owned, and in accordance with «sound commercial principles» (Agreement, Section 2). Even today, the Enterprise is seen as «the only mechanism by which the vast majority of developing States can participate in activities in the Area».²⁵ The matter received renewed interest in July 2018, when Poland made a suggestion for a joint-venture operation with the Enterprise.²⁶ The matter will be further discussed in summer 2019 and may initialise further actions to operationalise the Enterprise.

As a contractor/Sponsoring State, a further option is to declare equity interest in a future joint-venture arrangement with the Enterprise: Contractors for the exploration of polymetallic nodules, polymetallic sulphides, and cobalt crusts²⁷ can either provide a reserved area or engage in a joint-venture arrangement. The latter option has been chosen by 11 contractors so far.²⁸ The benefits of such joint-venture arrangements will therefore be realised through profits made by the Enterprise from commercial exploitation. It is unclear what contributions the Enterprise would make to exploitation expenditures.

The original aspirations of UNCLOS contained in Art. 144 – namely to foster the transfer of technology and scientific knowledge for the benefit of all States Parties – were overhauled in the 1994 Implementing Agreement in the interests of technology developers so that deep seabed mining technology is now to be acquired either on the open market or via joint-venture arrangements. The originally foreseen mandatory transfer arrangements were considered to be disadvantageous to those States and to contractors who had made considerable investments.

However, a number of non-mandatory transfer mechanisms remain, including in marine scientific research and capacity development, in the benefits to be had as a Sponsoring State, through an eventual financial transfer mechanism to States, and through the Enterprise, should it be established one day. As of August 2018, a special envoy was appointed to represent the interests of the developing Enterprise in a possible joint venture with Poland in relation to an exploration area on the northern Mid-Atlantic Ridge.²⁹

25 Statement by the African Group in the ISA Council 2018, www.isa.org.jm/sites/default/files/files/documents/alg-oboag-entp.pdf

26 ISBA/24/C/12.

27 Cobalt-rich ferromanganese crust.

28 Statement by the African Group in the ISA Council 2018, www.isa.org.jm/sites/default/files/files/documents/alg-oboag-entp.pdf

29 Acc. ISBA/25/C/7, letter dated 17 December 2018 from the Special Representative of the Secretary-General of the International Seabed Authority for the Enterprise addressed to the Secretary-General of the International Seabed Authority.

Box 4: In brief

- The principle of the common heritage of mankind applies to the seabed beyond the limits of national jurisdiction (the Area) and its mineral resources *in situ*.
- Mineral resources and the natural environment cannot be separated. For example, the density of manganese nodule fields directly relates to the diversity and species communities of that part of the abyssal plain.
- Exploitation of resources will directly and indirectly affect the biodiversity of benthic and pelagic communities as well as ecosystem functions and services, which therefore constitutes considerable external costs and losses of exploitation activities.
- Effective protection of the marine environment is required.
- Long-term protection of the natural environment and the mineral resources of the Area for future generations and the concept of sustainable development are fundamental aspects of the common heritage principle.

Reflections on current practice

At present, the implementation of the common heritage of mankind principle, in the way the ISA administers the Area and its resources, is only a shadow of what was once intended when institutionalising the concept. Although the legal framework is being maintained, the translation of its ideas into reality seems to have been relegated to an afterthought. Following the changes made by the Implementing Agreement in 1994, the impetus of generating a collective benefit has been overtaken by a more individualistic idea of what benefits are entailed.

The original motive – to establish distributive justice and counter the imbalance of opportunities in different parts of the world – has been overtaken by the drive of a few Sponsoring States to make seabed mining a commercial reality, and the position of developing States in ISA has been weakened, among other things, through the institutional changes made. The lack of the operationalisation of the Enterprise has exacerbated this and, in addition, the planned systematic advancement of developing States with regard to science and technology has become an unmanaged training programme for individuals from developing countries.

So far, there is no discernible common direction or vision of States acting in the ISA organs. Rather, States are acting – as in all other international fora – primarily in their national interest. The common heritage of mankind principle has been reduced to merely another instance of commonly managed access to a resource, in which no one State offends another, and therefore all applications are likely to go through, whether or not they benefit the common heritage. Protection of the deep sea – now

increasingly understood as a common imperative – is imperilled, whereby scientific literature now finds that the loss of biodiversity is inevitable if deep seabed mining takes place.

Public participation goes hand in hand with common heritage, and transparency is an essential aspect of good governance (Convention on Biological Diversity, 2012, paras. 10, 75, 76, 77, 228). Yet, substantial documents and information, such as contracts, are not available, workshops are often held without transparency or invitation to civil society or all States, and the meetings of the LTC are still closed, disregarding a Decision from the Assembly, the supreme organ (ISBA/23/A/13, 2017, G4.). No scientific advisory forum exists that could represent mankind in the technical deliberations. Public participation in its three pillars (Aarhus Convention, 1998) requires access to information, public participation, and access to justice. This, together with the status of the Area as the common heritage of mankind, requires mainstreaming public participation into all decision-making concerning deep seabed mining. We return to this matter in chapter 5.

3. Present mining interest

State of play

Current mining interest is focussed on three types of mineral concretions in the Area: manganese nodule fields in some regions of the abyssal plains, seafloor massive sulphide concretions created by hydrothermal vents, and cobalt-rich crusts on the flanks and summits of some types of seamounts (see Fig. 3). The mining of these minerals will be conducted either as large-scale nodule excavations with an estimated footprint of at least 4,000 km² for a 20-year operation (Kuhn *et al.*, 2011), or as deep-reaching excavations of hydrothermal precipitate, either at multiple smaller deposits or at a couple of larger ones, influencing an entire region over time. Techniques for separating cobalt-rich crusts from the basaltic underground have not yet been developed. However, it is likely that the commercial viability of one mine will require crust removal from several seamounts (Hein *et al.*, 2009).

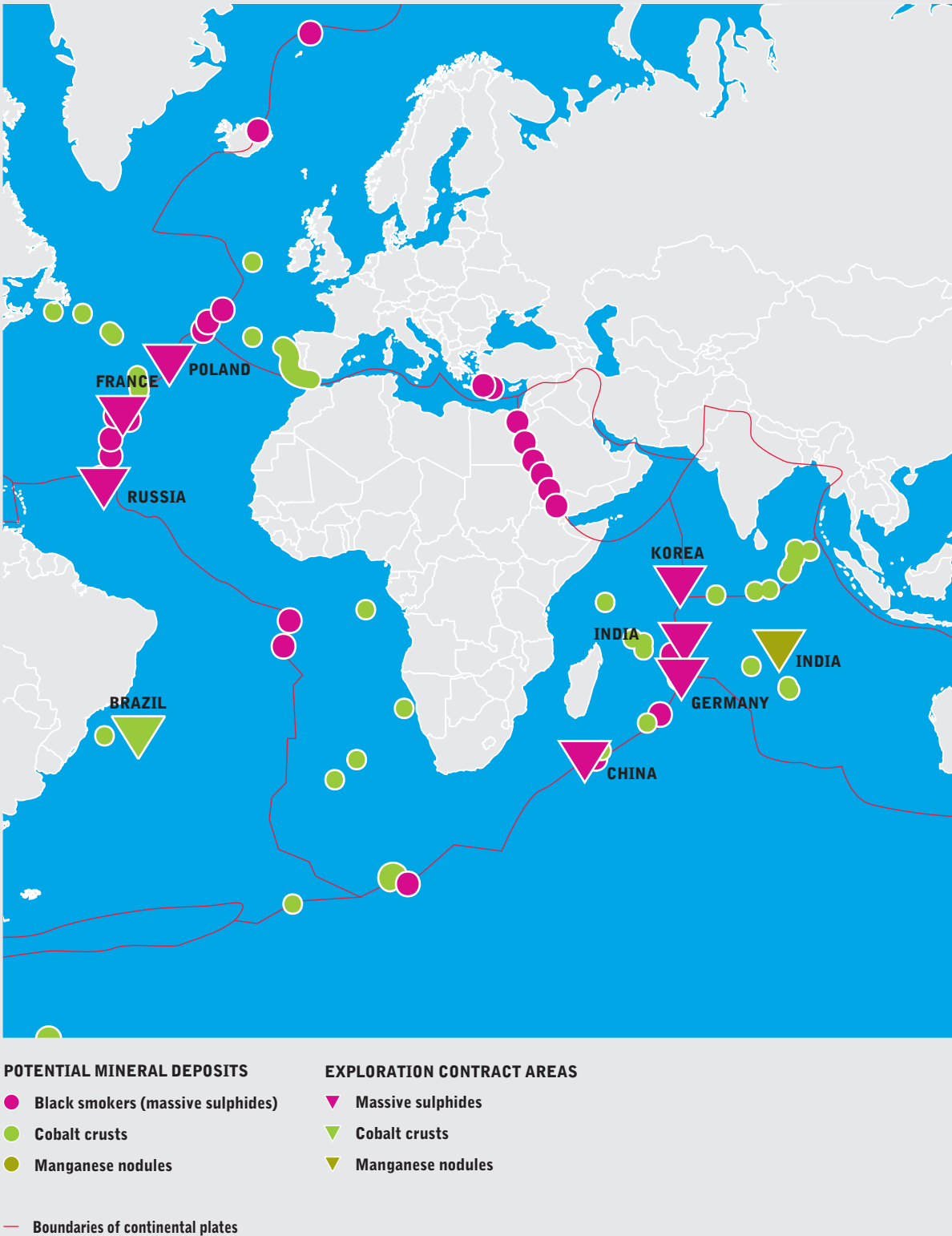
Access to the mineral resources of the Area is controlled by the ISA and is subject to a variety of procedural obligations and environmental restrictions (see chapter 2). Any State, State-owned entity, or private enterprise that is «sponsored» by a host State can apply for one or several contracts with the ISA that allow for the exclusive exploration of a specific mineral type in a contractually specified part of the Area. The Sponsoring State is responsible for ensuring that its sponsored contractors comply with all rules, regulations, and procedures of the ISA.

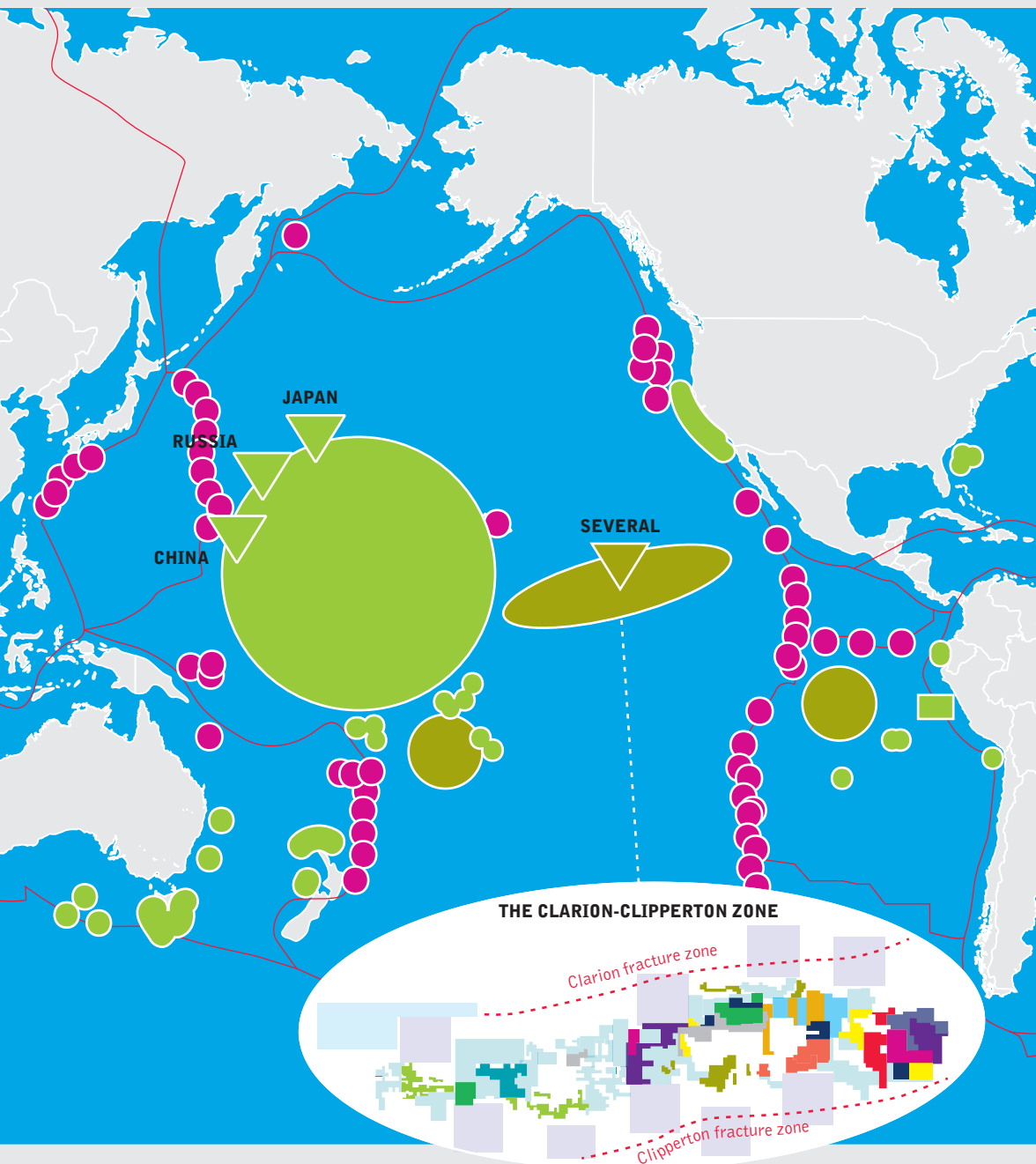
As of December 2018, the ISA has concluded 29 exploration contracts with contractors, of which 17 contracts are concluded for the exploration of polymetallic nodules (also manganese nodules or nodules), seven for polymetallic sulphides, and five for cobalt-rich ferromanganese crusts.³⁰ Contractors are national governments or government bodies from eight countries, one consortium, and nine private or government-related companies with a Sponsoring State. So far, private companies have concluded only exploration contracts for polymetallic nodules; the other resources are being sought by government-affiliated institutions.

The sizes of the contract areas vary by mineral, with the largest being an initial 15,000 km² for manganese nodules, which must be halved over the course of the contract term. As indicated in Fig. 3, the contract areas are found on the Mid-Atlantic Ridge, the Indian Ocean Ridge, seamounts in the West Pacific and South Atlantic, and a zone rich in manganese nodules between Mexico and Hawaii between the Clarion-Clipperton Fracture Zone (CCZ).

30 Acc. ISBA/24/LTC/2, status of contracts for exploration in the Area. Report of the Secretary-General, 11 January 2019.

Fig. 3: ISA exploration contracts
Location of global seabed mineral resources and ISA contract areas in the Area as of 2017





SPONSORING STATES IN THE CLARION-CLIPPERTON ZONE

Belgium	IOM (Eastern European consortium)	Russia	Protected areas
China	Japan	Singapore	Reserved area
Cook Islands	Kiribati	Tonga	
France	Korea	United Kingdom	
Germany	Nauru		

Source: Redrawn from Heinrich-Böll-Stiftung et al., 2017, updated based on Koschinsky et al., 2018.

Exploration contracts are initially concluded for a period of 15 years, with an option for renewal for another five years, and they also include obligations to investigate and report on the mineral and ecological conditions in the contract area. Despite notable weaknesses, these exploration rules have led to a significant increase in scientific research in the deep sea in recent years and have expanded our knowledge base.

Uncertainties

Despite decades of research and exploration, a large number of uncertainties suggest a cautionary approach for developing the current interest in mining into commercial exploitation. Apart from the current lack of a legal framework, there are some major impediments due to uncertainties such as:

- the magnitude of the mineral resource base, that is, the distribution, tonnage, and grade of seafloor massive sulphide deposits (Petersen *et al.*, 2016), and precise distributions and metal concentrations of Fe-Mn crusts at regional and local scales (Lusty *et al.*, 2018; Lusty and Murton, 2018);
- the technical mineability of the resource and the technology employed (Rademakers *et al.*, 2015);
- the economic risks associated with each stage of the mining value chain, coupled with the potential for future metal price volatility (Lusty and Murton, 2018);
- the technical feasibility and cost of a zero-waste concept for mineral processing;
- the nature and scale of environmental impacts, including risks of possible state changes affecting deep seabed and water column ecosystem functions (on abyssal plains, mid-ocean ridges, or underwater mountains), and therefore benefits to mankind (Jones *et al.*, 2018a; Kaikkonen *et al.*, 2018);
- an agreement as to the nature of the benefits the Area generates for mankind, and how these should be shared;
- the ability of the industry to acquire a «social licence to operate» (Koschinsky *et al.*, 2018) and a «sustainable licence to operate» (Pedro *et al.*, 2017).

Even if those uncertainties (see also chapter 4) could be lowered to acceptable levels, it still needs to be determined whether a societal benefit can be expected from this activity: Could seabed mines deliver the minerals, as required by the market, in time and in sufficient quantities and qualities? Is this the only way to transform the economic systems globally to renewable energies and circular material flow? Who would benefit, and who bears the cost?

As Lusty and Murton (2018) summarise, «we have sufficient metal resources on land for decades to come». Of course, which State has those resources is a key driver of interest in deep seabed mining for some States. A mix of factors include geopolitical considerations, the challenge of yet another technological frontier (Koschinsky *et al.*, 2018), the availability of risk capital, prestige, and the simple profit potential over the very long term. So far, there is no indication that mechanisms will be

Box 5: The current engagement of Germany in the Area³¹

Building on early prospecting and scientific research in the 1970s to the 1990s, Germany is now the Sponsoring State for two exploration licences in the Area – one in the Pacific, one in the Indian Ocean – under the legal regime of UNCLOS.

The Federal Institute for Geosciences and Natural Resources (BGR) is the contractor with the ISA on behalf of the Federal Ministry for Economic Affairs and Energy (BMWi).

The contract covering the exploration of polymetallic nodules in the Central North-Eastern Pacific was signed in 2006 and ends 2021. The exploration area encompasses in total 75,000 km² and is 4,000 to 6,000 m deep. The BGR estimates that the German licence area comprises nodules of ca. 600 million tons dry weight.³² Eight exploration cruises took place up to 2016 (plus another two until 2018), with most of these having a strong international cooperation and biodiversity focus. Funding from the German Federal Ministry of Education and Research (BMBF) was instrumental in setting up the EU JPI-Oceans collaborative project «MiningImpact», which investigates the ecological effects of minerals mining.³³ A Belgian contractor to ISA will carry out a collector vehicle test in the German licence area in 2019, which will be monitored by the «MiningImpact» project.

The contract covering the exploration of marine polymetallic sulphides (seafloor massive sulphides, SMS) in the Southwestern Indian Ocean was signed in 2014 and ends 2030. Deposits are being sought within a total area of 10,000 km². These deposits are formed at former discharge zones of hot hydro-thermal fluids on the ocean floor and are now inactive and more or less covered by sediments. Up until 2019, no larger SMS deposits had been found.³⁴ Biological baseline studies are integral to the programme.³⁵

31 More information on BGR activities in relation to mineral exploration can be found here: www.bgr.bund.de/DE/Gemeinsames/Produkte/Downloads/Marine_Rohstoffe_Newsletter/Rohstoffwirtschaft/marine_mineralische_rohstoffe_2018.pdf?__blob=publicationFile&v=2 and www.bgr.bund.de/DE/Gemeinsames/Produkte/Downloads/Marine_Rohstoffe_Newsletter/Rohstoffwirtschaft/marine_mineralische_rohstoffe_2016.pdf?__blob=publicationFile&v=6

32 See www.bgr.bund.de/EN/Themen/MarineRohstoffforschung/Projekte/Mineralische-Rohstoffe/Laufend/manganknollen-exploration_en.html?nn=1548282

33 See <https://miningimpact.geomar.de/de>

34 See www.bgr.bund.de/DE/Gemeinsames/Nachrichten/Aktuelles/2019/2019-01-18_bgr-entdeckt-im-indischen-ozean-grosse-vorkommen-an-metallerzen.html?jsessionid=4853166D16B2B00DC0B0373838C51F3A.2_cid284?nn=1542388

35 See www.bgr.bund.de/EN/Themen/Min_rohstoffe/Projekte/Meeresforschung-Projekte-laufend_en/Index2011-2013_en.html?nn=1548282

developed which would ensure that mining the seabed will replace – as opposed to supplement – the most socially and environmentally unacceptable land mines. So an often claimed difference in the environmental and social footprints of land and deep seabed mines is not relevant, even if it could be justified. The environmental impacts from processing the ore will be again on land, where processing is cheapest (Markus and Singh, 2016). There is a high risk that deep seabed mining just opens up a new economic frontier for the industries in the North, with the usually Southern land-based producers having to lower prices to keep their customers. The burden is then again on people in the South.

Box 6: The tensions

- As addressed by the 2030 Agenda, strong inequalities in opportunities for social development persist within and between countries. In a business-as-usual world, it is argued that, at least temporally, more resources would be required for securing decent lifestyles for a growing world population and for «greening economies», that is, to provide a sufficient stock of minerals to drive a future circular economy.
- Yet, there is only one planet Earth, and future generations also have to have opportunities for making their livings that are as good as the ones that today's generations have. This requires an absolute reduction in resource consumption globally, in addition to addressing the prevailing inequalities in resource consumption.
- Over the last 50 years, the imbalances of global resource distribution have not been solved – raw materials flowing from the South to the North for generating value and employment. Despite exporting minerals for decades, most exporters did not only bear the environmental costs of mining but also did not benefit socially. The effects of minerals from the deep sea on the world market is unclear.
- No long-term projection of mineral demand is currently possible, because new technologies and policies influence the demand patterns.
- The transition to circular economies requires new economic priorities and logics and will reduce new resource needs and costs. Investment in long-term deep seabed mining may impair the transition.
- The transition to renewable energy systems can be secured based on land reserves (Teske *et al.*, 2016).

Box 7a: Seafloor massive sulphide mining in brief

- Seafloor massive sulphides (SMS) occur where the mineral-laden hot water from hydrothermal vents precipitates when cooling down in the ambient seawater. Very slowly diverging mid-ocean ridges, as in the Indian and Atlantic oceans, have the most stable venting areas with the largest SMS deposits, usually away from the hot venting sites.
- Each hydrothermal vent field has unique properties, and longer-lasting vent fields have their own vent community, including eventually endemic species, unlike anywhere else; active vents are protected from deepwater bottom fishing and should be protected from mineral exploitation (Van Dover *et al.*, 2018b).
- SMS mining will involve the removal of overburden sediments, the excavation down to 100 m or more of the deposit, the crushing of rocks, sediment combustion into the water column, transport to the vessel on the surface, and the discharge of surplus sediment back into the water at some depth, together with 24/7 noise and light pollution.
- Direct physical effects are the flattening of venting sites and the reshaping of the submarine landscape, a removal of the hard substrate, including associated fauna, an increase in sediment load near the seabed and in the water column, and increased toxicity.
- Direct biological effects are the loss of all fauna on and related to the active vents, as well as in the surroundings. The effects on the benthopelagic and pelagic fauna are unknown. All organisms with a filtering feeding mode will be impacted by a longer term increase in sediment load.
- The permanence and biological impact of SMS mining depends on the spatial scale, duration, and location of the mining. The recovery potential also depends on the natural disturbance patterns and regional characteristics.

Box 7b: Cobalt-rich crust mining in brief

- Cobalt-rich crusts are mineral precipitates of the water column making up an eventually more or less thick coating on seamounts, in particular ocean regions at depths where the current flow is maximal.
- The crusts provide a particular porous surface structure with associated benthic communities of sessile megabenthos; seamounts are hotspots of pelagic biodiversity, including of open ocean pelagic fish, such as tuna.
- The mining of crusts will require separating the crust from the host rock *in situ* by presumably large crawler type vehicles, the removal of large volumes of waste rock, the crushing of the ore, sediment discharge into the water column, transport to the vessel on the surface, and discharge of surplus sediment back into the water at some depth, together with 24/7 noise and light pollution.
- Direct physical effects are the destruction of the seamount surface, including removal of associated fauna, an increase in sediment load in the current lee of the excavation site, and increased toxicity; the footprint of sedimentation depends on the current pattern.
- Direct biological effects are the loss of all fauna of the mined area as well as the surroundings. The effects on the benthopelagic and pelagic fauna are unknown.
- Seamount fauna is usually long-lived and slow-growing. Recovery is unlikely, as was shown for the impacts of deepwater trawling on benthic seamount fauna.

Box 7c: Manganese nodule mining in brief

- The fields of iron- and manganese-rich nodules of commercial interest occur in variable densities as a single layer on the sediment-covered seafloor of abyssal plains at 4,000–6,000 m depth in some parts of the subtropical ocean. However, similar concretions exist also, for example in the Baltic Sea and on seamounts and banks in western Galicia.
- Nodules grow at average rates of 10–20 mm per million years and provide an ocean climate archive with growth rings. They are porous and provide a habitat to fauna inside and outside.
- Nodule mining will involve the grabbing/pumping of nodules together with more or less of the sediment by heavy weight machines, the reworking of the ground, sediment combustion into the water column, transport to the vessel on the surface, and discharge of surplus sediment back into the water at some depth, together with 24/7 noise and light pollution.
- Direct physical effects are changes of the sediment structure, oxygen and biochemical properties, a removal of the hard substrate, including associated fauna, an increase in sediment load near the seabed and in the water column, and eventually increased toxicity.
- Direct biological effects are the loss of all fauna on and related to manganese nodules as well as in the sediments of the nodule field. Even small-scale disturbances lead to permanent devastation. The effects on the benthopelagic and pelagic fauna are unknown. All organisms with a filtering feeding mode will be impacted by even the slightest increase in sediment load.
- Species and community recovery will be prevented by permanent changes in the bottom habitat.
- Ecosystem changes will likely go unnoticed, as the true biodiversity is near to unknown from the start due to a majority of unknown organisms and barely understood functional relationships.

4. What is at stake?

The environment

The ongoing disaster

The global oceans are facing enormous and ever-increasing pressure due to human activities. In addition to resource exploitation and industrial development, the influence of land-based human activities has reached the deepest parts of the oceans in areas more than 1,000 km from the mainlands (Chiba *et al.*, 2018).

Particularly in the past century, the condition and health of the oceans has changed enormously. Whaling has depleted the oceans of mammals (Rocha *et al.*, 2015), and overfishing has led to ever-dwindling catches of fishes and invertebrates, of smaller sizes and lower in the food web (Watson and Pauly, 2013; Watson and Tidd, 2018). Fleets of illegal, unreported, and unregulated fishing vessels are continuing to «rob people and oceans» (Environmental Justice Foundation, 2005) of both essential sources of food and important foundations for ecological stability and health. Deepwater bottom trawling has led to the loss of biogenic habitats, including cold-water coral reefs, from potentially large areas (Clark *et al.*, 2016). Plastics – ubiquitous in our everyday lives for more than half a century – are now found along with other forms of marine pollution in all areas of the oceans and in the foods we derive from the oceans, with threatening implications for our health (Chiba *et al.*, 2018; Courtene-Jones *et al.*, 2019). Exponential increases in maritime traffic are also contributing significantly to atmospheric and ocean pollution, as well as intensifying the effects of climate change on the oceans (Hassellöv *et al.*, 2013). Global warming not only changes the biogeographic distribution patterns of species and organic flux through temperature change, but also intensifies acidification of previously well-buffered ocean water, depletes oxygen in vast areas through the reduced mixing of water layers, and may even cause the eventual release of greenhouse gases from the oceans, further contributing to climate change (Levin and Le Bris, 2015; Sweetman *et al.*, 2017). These inner-ocean changes are likely to cause large-scale changes in ocean circulation, salinity, and heat distribution, which would, in turn, have important consequences for the frequency and extent of weather extremes and the functional capacities of the oceans to absorb heat and carbon dioxide from the atmosphere (Stocker, 2015).

None of the above developments has been halted or reversed during the last decades. Changes that are predicated on climate change and ocean acidification are expected to worsen. Human impact has reached a dimension large enough to influence the Earth's natural systems on a global scale, making mankind the most important factor in determining the future physical and biological state of the Earth and its

oceans (Crutzen and Stoermer, 2000).³⁶ Even more, «human activity is putting such strain on the natural functions of the Earth that the ability of the planet's ecosystems to sustain further generations can no longer be taken for granted» (Millennium Ecosystem Assessment, 2005). The report concludes that «protecting and improving our future well-being requires wiser and less destructive use of natural assets. This in turn involves major changes in the way we make and implement decisions.»

Earth systems thinking was initiated by the report to the Club of Rome (Meadows *et al.*, 1972), which drew the attention of the world to the «limits of growth» due to the finite nature of the five basic factors that determine and limit growth on this planet: population, agricultural production, natural resources, industrial production, and pollution. Building on this early thinking, increasingly, new tools for decision-making are being developed. Earth systems thinking provides integrated frameworks that incorporate ecosystem functions, environmental footprints, planetary boundaries, and human-nature connections. This helps to increase understanding of the socio-economic and environmental interdependencies and to create sustainability solutions (Liu *et al.*, 2015). The planetary boundaries concept (Rockström *et al.*, 2009a; Rockström *et al.*, 2009b; Steffen *et al.*, 2015) illustrates particularly clearly the limits of the «safe operating space for humanity», that is, the limits of human interference with the biophysical setting of the Earth system, beyond which abrupt global environmental change is likely to occur. Although the definition of thresholds on a global scale is a critical issue, the proposed boundaries indicate where the relative stability of the Earth system – as observed throughout the Holocene – is expected to come to an end, and serve as a warning to not continue with «business as usual». Two core boundaries were identified, climate change and biosphere integrity, which both could drive the Earth system into a new state – and both have been transgressed significantly already (Steffen *et al.*, 2015).

Globally, governments have agreed that biodiversity is the underlying agent for human and economic development when committing to the Aichi Targets under the Strategic Plan for Biodiversity 2011–2020 of the Convention on Biological Diversity (CBD). Mainstreaming biodiversity conservation has been identified as one of the core problems to be solved nationally and internationally, and the above-mentioned planetary boundaries illustrate clearly that only within limits do we have the liberty to pursue long-term social and economic development (Rockström *et al.*, 2009a; Rockström *et al.*, 2009b).

Uncharted depths

Mankind is collectively responsible for at least maintaining the natural values of a remote area of the oceans – the Area – for future generations. This ocean stretch, comprising about half of the global ocean floor, is dark, nearly freezing, and up to several thousand metres deep. So far, the deep sea has been less frequently targeted by human activities and contributes substantially to the remaining 13 per cent of

36 Crutzen and Stoermer (2000) declared that by now the holocene has been superseded by the «Anthropocene».

ocean wilderness areas (Jones *et al.*, 2018b). Most of all, it is an ocean region where species from all taxonomic groups have diversified over millions of years of evolution, creating extraordinarily high levels of biological diversity, although there are only relatively few specimens of each type compared to coastal areas. Life, as we know it, may have its origins in the hydrothermally active venting sites, where the oceans and the Earth's interior meet (Dodd *et al.*, 2017).

Already beginning with the first expeditions in the late 19th century, every single scientific expedition to explore the deep sea has brought back to land new discoveries of species, habitats, even entire functional mechanisms, such as organic production in lightless depths at deep sea vents, or the methane-consuming bacteria of cold seeps, which help reduce the effects of greenhouse gases. Even today, new species of whales have been identified, and new discoveries have been made about their diving behaviour to greater depths than ever anticipated (Marsh *et al.*, 2018). The oceans – and even the regions of interest for mineral exploitation – are certainly too large to be well investigated and they are three-dimensional and without boundaries. Ocean waters and their pelagic inhabitants are in constant movement with vertical and horizontal interconnections, often over large distances, and are subject to long-term periodic changes that are coupled with the global climate system. It is therefore likely that even local disturbances may have an enormous effect on the marine environment.

The habitats and ecosystems associated with the three types of deep seabed minerals are very different from each other. Polymetallic (manganese) nodule fields occur in all oceans, however the nodule fields in the deepest, remotest, and naturally largely undisturbed regions of the Pacific are of highest attraction to miners. Here, organic flux from the surface is minimal, for example in the Clarion Clipperton Zone it is less than one centimetre in a thousand years (Mewes *et al.*, 2014). Temporal and spatial variations of oceanographic drivers take place over long and large scales, although the variability of seafloor communities is surprisingly high and small-scale. The faunal communities inhabiting bathyal and abyssal depths and associated with nodules are near to unknown in their composition (modern genetic tools may only provide indications of diversity) and extremely diverse (Kaiser, Smith, Arbizu, 2017). Their distribution, range, lifecycles, and potential for recovery are more or less unknown (Gollner *et al.*, 2017), and this basic but very relevant information is unlikely to be established in the near future to sufficiently predict the large-scale response of the deep-sea ecosystem to decades of mining (Boetius and Haeckel, 2018; Kaiser *et al.*, 2017).

Active hydrothermal vents are rare (globally less than 50 km² or <0.00001 per cent of the global seafloor), and sometimes dynamic ecosystems which arise in very small patches along the mid-ocean ridges and other tectonic volcanic sites (Van Dover *et al.*, 2018). The faunal composition of active vents is site-specific and depends on depth, host rock, fluid flow, and other local factors. This explains why virtually no two vent fields have the same faunal composition and makes it impossible to «replace» a destroyed vent system. The associated fauna comprise a few very abundant, specially adapted species and about 95 per cent rare and currently

unknown species, with very few species occurring on all vent sites of a region (Van Dover *et al.*, 2018). In addition, the largest mineral deposits accumulate at the least dynamic vent sites, such as on the Mid-Atlantic Ridge, where faunal communities have evolved over at least thousands of years (Cherkashov *et al.*, 2010; Desbruyères *et al.*, 2001; German *et al.*, 2015b). Scientists urgently plea for sparing these very heterogeneous and often unique ecosystems from mining (Mullineaux *et al.*, 1998; Van Dover *et al.*, 2018).

Seamounts with cobalt-rich ferromanganese crust occur in all oceans, yet the thickest crust is known from South Pacific seamounts, many of which are also targeted by fisheries (see below in this chapter). Fauna living on the crusts of seamounts appear to be different from non-crust fauna (Schlacher *et al.*, 2013), and the dominant, filter-feeding, and habitat-forming corals and other epifauna not only grow very old but are also unlikely to recover from destruction (Althaus *et al.*, 2009; Clark *et al.*, 2019). Beyond the direct local ecological impacts of deep seabed mining on the seafloor, the true scale of ecological impacts – the temporal, spatial, and functional extent of direct and indirect effects – can be assumed to be much larger (Levin *et al.*, 2016a; Rogers, 2018).

Box 8: Towards scientific consensus

Despite huge knowledge gaps concerning the deep sea,

- It is now understood that the species living in the deep sea are particularly ill-adapted to cope with environmental changes of long duration (Ramirez-Llodra *et al.*, 2010; Robison, 2009; Smith *et al.*, 2008).
- The impacts caused by deepwater fishing and mineral mining are irreversible on a human timescale (Jones *et al.*, 2017; Niner *et al.*, 2018; Van Dover *et al.*, 2017).
- The loss of biodiversity causes ecosystems to become less complex and less productive (Worm *et al.*, 2006; Cardinale *et al.*, 2012).
- It is impossible to predict the responses of the target ecosystems to commercial-scale mining activities locally and regionally (Boetius and Haeckel, 2018; Van Dover *et al.*, 2018).

Considered together, impacts on the deep sea are likely to lead to the loss of ecosystem services such as food provision and carbon cycling, and to a loss of future opportunities such as the possible discovery of novel biotechnologies (Le *et al.*, 2017).

Crossing the last frontier?

Mining of deep seabed minerals would not just represent a new maritime industry. Much more, it would demonstrate that the last frontier in industrialising the oceans has been crossed. Because the technology development is in its infancy and very limited testing has taken place in the Area (Rademaekers *et al.*, 2015; Rozemeijer *et al.*, 2018), it would confirm that environmental degradation can be acceptable without a reliable and comprehensive *à priori* assessment of its potential scale and implications, as well as its long-term environmental, social, and economic consequences.

As pointed out above, inevitably, mining activities will be accompanied by irreversible environmental degradation at a scale that cannot yet be quantified (Glover and Smith, 2003; Jones *et al.*, 2017; Niner *et al.*, 2018; Ramirez-Llodra *et al.*, 2010; Van Dover *et al.*, 2017). The temporal and spatial scale of ecological degradation will depend on the minerals being mined, yet the mining of any of the three categories of minerals will intensify the direct human impacts on the ocean zones that either have so far been least affected by direct human interventions (abyssal plains), or are within the reach of pressure from bottom-fishing activities (seamounts and ridges with vents). All of these are subject to pollution, litter, cable-laying, and the indirect effects of climate change in terms of hydrological and chemical alterations. Due to the limited understanding of biological processes in the deep sea, no certainty exists with respect to the scale of potentially amplifying effects of the changing ecological conditions in the deep sea due to climate change (Levin and Le Bris, 2015; Sweetman *et al.*, 2017) on the overall carbon flux and carbon cycling – capacities that are crucial for buffering the emission of greenhouse gases. However, Levin and Le Bris (2015) suggest that – cumulatively and synergistically – the consequences of human activities, such as deep seabed mining, may be augmented in scale because «as climate and human disturbance converge, the accumulation of impacts may alter the state and functions of deep ocean ecosystems and reduce the important benefits they provide».

The ISA's approach to addressing the likely environmental impacts from mining the minerals is to call for minimising impacts through technology development and to downsize the severity of the effects by enlarging the reference frame for evaluating the spatial extent of the seafloor area directly disturbed by one mining operation in relation to the size of an overall region. In the case of nodule mining, the entire CCZ of 4.5 million km² (International Seabed Authority, 2011) is used as a reference (Brown, 2018). Using this approach, it is then found that a single mine would cover less than 0.2 per cent of the CCZ region, with its plume footprint being much larger. Such calculations are, of course, arbitrary. Not only have no minimum critical values been set for disturbance levels known to trigger larger-scale ecological effects, the choice of reference area size is also not supported by ecological knowledge. In the case of the CCZ, this region consists of at least nine large-scale, distinctive biogeographic zones, based on surface productivity (Wedding *et al.*, 2013), and a multitude of sub- to microhabitats, which only appear upon closer observation using the most advanced technology (Peukert *et al.*, 2018). Small-scale habitat and faunal variability is so high here that researchers have not yet found clear environmental baselines,

even for the best-investigated contract areas, and therefore consider it impossible to provide serious projections for the biological impacts of full-scale mining activities (Gollner *et al.*, 2017; Jones *et al.*, 2017).

A sustainable and precautionary approach will require the careful evaluation of all steps towards mining in the full context of scientific advice, ocean conservation, and the enabling or inhibiting potential of mining for achieving the global goals for biodiversity conservation and sustainable development. This includes Goal 14 of the 2030 Agenda, which aims to «sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans». Because none of these interactions can presently be assessed with any certainty, exploitation should not take place until the likely occurrence of significant adverse impacts can be ruled out and the effective protection of the marine environment can be ensured.

Cultural self-determination

Deep seabed mining in the Area is likely to have wide-ranging effects way beyond the respective mining sites. In particular in the Pacific, but also in the Indian Ocean, the effects of environmental change – already evident from climate change – on livelihoods may be further compounded by the direct and indirect impacts of mining-related activities and, in the end, pose a disproportional burden to the coastal communities that depend on ocean resources (Folkersen *et al.*, 2018a; Kaschinski *et al.*, 2018; Markus and Singh, 2016; Popova *et al.*, 2019). For example, the discharge of sediment from mining activities into the water column may impact coastal waters (Thompson *et al.*, 2018) or traditional fishing grounds (see below).

The impacts will concern the specific valuing of the environment, but in particular also the specific understanding of «ownership» and the resulting participatory decision-making on the use of the oceans.³⁷ In the Pacific, the traditional understanding of oceans is that the islands and ocean together form a «liquid» continent without determined borders between the two (Kaschinski *et al.*, 2018). A common understanding is that the ocean – including the seafloor – belongs to all, implying an ethic of care and responsibility. Harm to the ocean is seen by some as harm to «kin» (or to the Mother). Therefore, the utilisation and management of ocean resources is part of the traditional land rights of communities, and subject to participative community practices for decision-making (see also Box 9). For example, in Papua New Guinea, these rights are confirmed by the constitution and not limited in depth or distance from land. The coastal population thus has a right to free, prior, and informed consent (UN General Assembly, 2007; Ward, 2011), which means that indigenous peoples and local communities are free to decide whether they want

37 A range of further benefits and disadvantages are listed in Rademaekers, K., Widerberg, O., Svatikova, K., van der Veen, R., Panella, E., 2015. Technology options for deep-seabed exploitation. Tackling economic, environmental and societal challenges. Study IP/G/STOA/FWC/2013-001/Lot3/C4. European Parliament, EPRS European Parliamentary Research Service, pp. 1–92.

companies or governments to exploit their resources, and that they have the right to make informed decisions through their own culturally relevant processes. It is one of the strongest tools indigenous peoples have for challenging extractive industries and indigenous properties and should also be applicable to deep seabed mining in the area as a case of due diligence (Aguon and Hunter, 2019).

Box 9: Example for a broad understanding for environmental trusteeship

The Cook Island Marae Moana Act 2017* to establish the Cook Island Marine Park comprising the internal waters, territorial sea, and exclusive economic zone and the seabed and subsoil on the extended continental shelf.

The primary purpose of this Act is to **protect and conserve** the ecological, biodiversity, and heritage values of the Cook Islands marine environment (Part 1, Art. 3 (1)). All other uses have to be consistent with the achievement of that primary goal. These are (Art. 3 (2)):

- (a) provide an integrated decision-making and management framework [...]
- (b) allow ecologically sustainable use of the marine environment
- (c) encourage engagement in the protection and management of the marine environment by interested persons and groups
- (d) assist in meeting the Cook Islands' international responsibilities

Ecologically sustainable use is defined as «*conserving, using, enhancing, and developing the resources of the marae moana to enable people to provide for their social, economic, and cultural wellbeing,*» while

- (a) maintaining the potential of those resources to meet the reasonably foreseeable needs of future generations; and
- (b) avoiding, remedying, or mitigating any adverse effects of the use of those resources on the environment of the marae moana.

* www.ecolex.org/details/legislation/marae-moana-act-2017-no-10-of-2017-lex-faoc170527

With Pacific and Indian Ocean islanders being the true trustees of the oceans and the largest group affected by environmental change, and given their understanding of long-term responsibility for the oceans at large, the ISA needs to develop meaningful participation mechanisms, rather than mere consultation, and incorporate the rights of indigenous peoples and coastal States into any seabed mining regime (Dunn *et al.*, 2017; Hunter *et al.*, 2018). In addition, the indigenous peoples and local communities are to be considered as regular stakeholders of the ISA who

have responsibilities and rights due to centuries of ocean travel, and who can provide long-term, in-depth knowledge on the behaviors and characteristics of marine species (e.g., the migratory paths, breeding patterns, and grouping behaviors of turtles, sharks, whales, salmon, eels, and tuna) that migrate between the coastal waters of the indigenous peoples and local communities and areas beyond national jurisdiction (including the Area and the water columns above the Area); as well as with respect to marine ecosystems, features, and creatures in areas beyond national jurisdiction (e.g., spawning sites, fish aggregation sites, migratory paths, ocean current patterns in the water columns above the Area).³⁸

Integrated governance

The issues surrounding deep seabed mining are also symptomatic of the broader governance challenges arising from the cumulative effects that human activities have on the oceans. On the one hand, we see fragmentation in the regulation of other ocean uses, such as shipping and fishing, and a lack of effective cooperation between sectoral institutions towards achieving common environmental management standards or creating area-based conservation measures, such as those agreed in regional or global conventions (Ardron *et al.*, 2014; Freestone *et al.*, 2014; Töpfer *et al.*, 2014). On the other hand, the ISA, like other global management authorities, is equipped with all powers necessary to make the respective activities possible.

Deep seabed mining activities will potentially take place in three different ocean habitats: collecting manganese nodules from deep-sea abyssal plains, excavating seafloor massive sulphide (SMS) from mid-ocean ridges, and scraping crust from subtropical seamounts. Nodule mining is likely to start in the tropical East Pacific in a remote area between the Economic Exclusive Zones of Mexico and the United States. Sulphide mining, however, will to some extent coincide with sites relevant for deepwater bottom-fishing in the Indian and Atlantic oceans. The potential for conflict with fishing is even more relevant, should cobalt crust mining take place. Overall, conflicts can be in the form of direct competition for space – such as with shipping, cable-laying, fishing and research – but also restricted areas for conservation, or indirectly through the deterioration of environmental quality, which impairs the opportunities of other users, for example fishing or prospecting for marine genetic resources. This could impact on coastal communities as well. Therefore, deep seabed mining of minerals in the Area directly affects quite a range of stakeholders. If the potential deterioration of relevant ecosystem functions and services is taken into account, it is the world community that could be affected through, for example, a lessening of the ocean's buffering capacity of climate change effects (Sweetman *et al.*, 2017).

³⁸ See e.g., submission of the Federal States of Micronesia 2018, <https://ran-s3.s3.amazonaws.com/isa.org/jm/s3fs-public/documents/EN/Regs/2018/Comments/FSM.pdf>

Timing and objectives of multiple governance regimes

The potential interaction of seabed mining in the Area with other activities in the high seas already highlights that the ISA will not be able to maintain a fully independent sectoral management of its activities, but rather has the task to collaborate with other sectoral management authorities in the region. Currently, no global mechanism exists to protect the biological diversity of the high seas, apart from measures by such sectoral management organisations. The ISA is only mandated to regulate mining-related activities in the Area and their impacts on seabed and water column biota. Because there are currently no globally binding measures for the protection of biodiversity in the high seas above the Area, the regulation of environmental matters during exploitation does not yet need to ensure its compatibility with area-specific measures of another legal regime.³⁹ Negotiations for concluding a legally binding international agreement under UNCLOS on the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction (hereafter BBNJ Agreement)⁴⁰ are underway.

Should deep seabed mining in the Area be pursued, some major challenges are likely to occur in the governance of oceans beyond the limits of national jurisdiction. The ISA has already concluded exploration contracts over areas of interest for environmental protection. The existence of marine protected areas (MPAs), ecologically or biologically significant areas (EBSAs, as designated by the CBD; see Dunn *et al.* (2014)), and fisheries exclusion zones (see review of Wright *et al.* (2015))⁴¹ was not included in the criteria for reviewing exploration applications until 2018. This situation may finally change after protests against the conclusion of an exploration contract for a region on the Mid-Atlantic Ridge, which had already been designated as an EBSA by the CBD, and also as a candidate UNESCO World Heritage Site (Free-stone *et al.*, 2016) and a site of prime scientific interest. Based on a Netherlands submission (ISBA/24/C/15), a list of all biodiversity-relevant designations shall now be taken into account when scrutinising applications for exploration.

In light of the current negotiations towards a BBNJ Agreement, there is an urgent need to ensure that an effective cooperation mechanism among all those international organisations with the authority to manage activities in the high seas and the Area, including the ISA, is developed. This ensures that deep seabed mining is fully taken into account in relation to other ocean values and *vice versa*. It is particularly important in this regard that the new BBNJ Agreement is concluded and enters into

39 Sites designated by the regional fisheries management organisations to protect vulnerable marine ecosystems, such as hydrothermal vents and seamounts, only bind bottom fisheries, or «Special Areas» designated by the International Maritime Organization, if existent, would only bind shipping.

40 Intergovernmental Conference on an International Legally Binding Instrument under UNCLOS on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction.

41 FAO, 2009. International guidelines for the management of deep-sea fisheries in the high seas Food and Agriculture Organization of the United Nations Rome, pp. 1–73.

force before the ISA completes its work on the exploitation regulations, so that both regimes can be harmonised rather than interfere with the objectives of each other.

Conflicts with high seas freedoms and other legitimate uses of the sea

In the high seas, the water column above the Area, UNCLOS guarantees the freedom of, among other things, navigation, cable-laying, fishing, and research, to be carried out with «due regard» for other activities (UNCLOS Part VII, Art. 87). Where there are no regulations by regional or sectoral management organisations, the use of natural resources is currently unregulated. However, the emerging negotiations on the conservation of biodiversity in areas beyond national jurisdiction (see below) may address this issue. Deep seabed mining in the Area may come into a spatial or resource conflict with these freedoms.

Deep seabed mining will involve relatively stationary vessels on the surface, plus active supply and delivery routes to the next harbour. It is likely that the vessels will be treated like oil platforms and be mapped and secured by safety zones for navigation. However, UNCLOS restricts the placement of permanent installations «where interference may be caused to the use of recognized sea lanes essential to international navigation or in areas of intense fishing activity» (Art. 147 (2) (b)). Both cases need further definition. In addition to a spatial competition, also the pollution-prevention regulations of the International Maritime Organisation and the ISA have to correspond.

At depth – and here, in particular, in the nodule mining areas – the most evident conflict arises with already existing and planned cable connections. The International Cable Protection Committee, representing all cable laying operators, has repeatedly warned to consider existing cable infrastructure as part of the approval process for exploration – and later, exploitation – contracts.⁴²

A conflict with fishing operations is most likely at shallower parts of mid-ocean ridges and seamounts. Here, currently some deepwater bottom trawling⁴³ (Thompson *et al.*, 2016) and intensive pelagic fishing takes place (Morato *et al.*, 2010b), which will likely be displaced by cobalt crust mining activities, as it remains undefined what «areas of intense fishing activities» are. This may not only affect the global tuna fishing industry but also coastal communities, which depend on the fish or income from the industry (Blue Ocean Law and Pacific Network on Globalisation, 2016). For example, the Marshall Islands are dependent on the licensing to foreign fleets, the landing and processing of tuna from its exclusive economic zone, but also from adjacent high seas.⁴⁴ Some tuna species aggregate at seamounts in particular (Morato *et al.*, 2010a, 2010b) and will likely be affected by mining activities.

Almost all the northern and central Indian Ocean Ridge and all of the northern Mid-Atlantic Ridge south of the Azores are covered with exploration contracts.

⁴² See www.isa.org.jm/sites/default/files/documents/icpc-18jul.pdf

⁴³ See www.fao.org/fishery/topic/166309/en

⁴⁴ See www.mimra.com/index.php/2013-12-30-04-15-09/2013-12-30-06-45-35 and https://en.wikipedia.org/wiki/Fishing_industry_in_the_Marshall_Islands

So far, the activity level has been limited to exploration and research cruises. However, once developments move closer to exploitation, many more investigations will be required, eventually limiting opportunities for pelagic and benthopelagic fishing, and in particular for independent research.

There is an unresolved question around the rights and obligations of independent research in ISA contracted areas. States around the world have invested in deep-sea research, including research in the biology and resources of hydrothermal vents, seamounts, and the abyssal plains. It is in the interest of independent knowledge-generation to carry out science-driven rather than exploration-driven research, also in contracted exploration [and exploitation] areas. Yet, the contract reserves the exclusive right to explore for the contractor. The current settling of the potential conflict comes down to research exercising «due regard» in respect to other users of the sea – here the exploration contractors – in notifying them of the type and scale of the research being conducted. But what exactly is to be counted as research compared to exploration? It can be expected that the conflicts will increase once an operator has an exploitation contract.

Another unresolved issue is the loss of future opportunities for exploring – and eventually exploiting – so-called marine genetic resources in the Area once the exploitation of the minerals has led to a destruction of the habitats. This is particularly relevant for hydrothermal vent communities, which often show a very high level of specialisation of the respective living conditions, which may become useful for developing human materials, tools, and cures. Here, the regime of the Area intervenes with the regime of the high seas and, eventually, the upcoming high seas agreement for the conservation of biodiversity in areas beyond national jurisdiction (see below).

Conflicts with adjacent coastal States

Though it seems as if the Area is out of reach and out of mind, exploration areas have already been licensed that border waters under national jurisdiction.⁴⁵ For example, in the Pacific, the Pacific Island Forum alerted the ISA to the adjacency of the waters of the Marshall Islands and Micronesia (but also Japan and the US) to the CCZ, requesting early consultation of the respective coastal States.⁴⁶ For example, sediment discharged in the course of seabed mining may travel to coastal State waters (Thompson *et al.*, 2018), and the UNCLOS prescription for the protection of coastal State interests (UNCLOS Art. 142) may not prevent harm from occurring. A negative perception of environmental quality may have severe impacts on the tourism industry of the Pacific Islands (Folkersen *et al.*, 2018a). In the Atlantic, especially the extended continental shelf of Portugal adjoins an exploration area on the Mid-Atlantic Ridge that is contracted to another State, in this case Poland. The hydrothermal vents explored by Poland are not only long-standing international research sites, but also immediately adjacent to sections of the Mid-Atlantic Ridge, which may become

⁴⁵ On aspects of adjacency, see Dunn *et al.* (2017).

⁴⁶ See www.isa.org.jm/sites/default/files/documents/pacificislandforum.pdf

relevant for future bioprospection (Martins *et al.*, 2013). Also, coastal States' priorities for the marine conservation of habitats, such as hydrothermal vents on the extended continental shelf (Calado *et al.*, 2011; Ribeiro, 2010), can be in conflict with possible farfield environmental impacts from seabed mining once the mining begins. At a minimum, here the principles of the ESPOO Convention on Environmental Impact Assessment in a Transboundary Context (1991) should apply.⁴⁷

Apart from the farfield effects of mining, coastal States and communities may also benefit/suffer from becoming locations for processing plants. Manganese nodules require new processing technologies, and thus new plants. Processing being carried out as near to the mining areas as possible will most likely lead to locations where labour is cheap and environmental regulations are minimal, eventually leading to a «race to the bottom» regarding environmental standards (Markus and Singh, 2016). Coastal populations foreseeably will have to cope with another major polluter.

Conflicts of interest with other international organisations

Coastal States may collaborate in other international organisations, such as the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention). OSPAR has established MPAs on the Mid-Atlantic Ridge in the Area and seeks to cooperate with the ISA, among others, on developing a protection regime in collaboration with the responsible sectoral authorities (O'Leary *et al.*, 2012).⁴⁸ This process was started in 2010. However, no agreement has yet been reached for the ISA to acknowledge the protected areas as «areas of particular environmental interest» (APEIs), which are excluded from exploration. Also, the ISA has not agreed yet to take part in a collective arrangement between OSPAR and the North East Atlantic Fisheries Commission – the responsible regional fisheries management organisation for the north-east Atlantic – for working together on management questions arising, in particular, for areas outside national jurisdiction that fall within their convention areas.⁴⁹

OSPAR has also established an elaborate system of environmental management, implementing the ecosystem approach to the management of human activities by applying the precautionary approach, the «polluter-pays principle», the «best available technology», and the «best environmental practice». It is still open as to whether the environmental management system of ISA – should it be implemented one day in the north-east Atlantic – will supersede the one concerning OSPAR in the Area/high seas, and how different management systems in the Area and the high seas could eventually come to common arrangements. Currently, this scenario has not transpired, as all exploration areas are located in areas where no regional environmental convention exists.

⁴⁷ However, legally, the Convention may not yet be applicable, as deep seabed mining is not mentioned in the annexes. In case of doubt, coastal States could activate the «inquiry procedure» to update the applicability of the Convention.

⁴⁸ See also www.ospar.org/about/international-cooperation/collective-arrangement

⁴⁹ See www.cbd.int/doc/meetings/mar/soiom-2016-01/other/soiom-2016-01-unep-05-en.pdf

Conflicts with the global conservation and climate agenda

Could deep seabed mining and the global effort to «avoid significant adverse impacts, including strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans» (2030 Agenda, SDG 14.2) ever be reconciled? From an environmental point of view, this question has to be answered with «probably not». So far, little is known about the functional relationships in the inner ocean, and nobody can say whether a particular activity – namely decades of deep seabed mining in multiple places – will or will not have substantive effects on the ocean's capacity to absorb heat, store carbon dioxide, and deliver oxygenated food webs. Evidence exists for – and model studies have confirmed – the strong effects of climate change on the deep ocean (Sweetman *et al.*, 2017), suggesting that within the next 84 years, temperatures could be elevated by 1°C in 3,000 to 6,000 m depths. Particulate organic flow to the bottom will decrease in all oceans, most notably in the abyssal and bathyal Indian Ocean, where it is predicted to decrease by 40–55 per cent by the end of the century. Oxygen concentrations will decline most notably in the north-east Pacific and the Southern Ocean. Therefore, the deep-sea ecosystems in the major exploration regions of the ISA in the Indian and Pacific oceans are, and will be, subject to enhanced stress from climate change, to which decades of mineral exploitation might add to an unknown extent through the inhibiting effects of sediment plumes on benthic, benthopelagic, and pelagic fauna, which may further reduce the carbon-cycling capacities in the deep ocean (German *et al.*, 2015a; Nath *et al.*, 2012).

The proponents of mining emphasise the need for greening the energy infrastructure to decarbonise the world (Hein *et al.*, 2013) and the right of all people to have a decent standard of living, which would be enabled by minerals from the deep sea. This argument is challenged from two sides: First, there is no reliable basis yet for determining a need for minerals from the oceans at all (Teske *et al.*, 2016). Second, the people most affected by land or seabed mining (and industrial fishing) may simply wish to not be the provider of raw materials to societies in the Global North anymore. As experienced over the last decades, people in resource-rich countries do not usually profit from the transformation of, for example, seabed minerals into state revenues; instead, poverty increases due to government failure as well as environmental and social problems (Frankel, 2010).

Outlook

Many ocean governance topics that go beyond the realm of oceans have to be addressed. For example, this concerns many aspects of resource governance, including the consequences for prices and revenues of traditional mineral exporters, for land mining, and for incentives for a circular economy when seabed minerals are put on the global market. Given the current lack of a global resource governance institution (Ali *et al.*, 2017), a general steering instrument for minimising resource consumption and long-term planning may be missing, which could help steer policy direction, industrial development, and innovation.

This resource governance has to become an integral part of environmental and social governance, such as required by the 2030 Agenda «Transforming our World» (2015). Linking the ongoing and planned human activities to the ecological degradation of the oceans, with its concurrent reduction in essential ecosystem functions and natural resources for making Earth a habitable planet, should be an eye-opener that initiates a change in perspective about the limits of human pressure on the natural environment. This would necessarily have to be reflected in the way the Area and its resources – the common heritage of mankind – are valued and managed.

Subsequent to this analysis of conflicts and tensions, we tie into the idea of a «reinvented» common heritage principle again in chapters 5 and 6 in order to establish a viable direction and guidelines about where to go and what to strive for. Before we do so, however, the following excursus takes a step back and looks at what is being said today in expert discourse, and more importantly at how it is being said. This will provide a specific background against which to rethink our rhetorical strategies.

How deep seabed mining is currently «narrated»

One of the aims of this study is to enable the further qualification of public opinion about the issues at stake. In order to achieve our goal, it is essential to better understand the obstacles standing in its way. Among those are the implicit structures and lock-ins of current expert discourse. The more we understand about them, the better we may be able to start imagining new, more pertinent, and, above all, more successful ways of communication.

This excursus is about «rhetoric». It summarises the main findings of a narrative analysis conducted for this purpose. We thoroughly assessed 32 publicly available contributions from the last eight years about «deep seabed mining», which we sampled in equal parts from academia, civil society, politics, business, and the media. A further criterion for the selection of the documents was an equal representation of voices from advocates and opponents, as well as of mediating, or «objective», voices. For the purpose of this chapter – which focusses on overall discourse, not on specific actors – we reconstructed dominant storylines within, and possibly across, each of the camps. This means that there will almost always be exceptions to the tendencies we describe here. Nonetheless, although this is «qualitative» content analysis and claims no representativity in a statistical sense, the net of thousands of codings we spanned over the text corpus allows us to observe tendencies that go beyond contingency. This is especially so because we were analysing not the argumentative consistency of those storylines, but their narrative patterns.⁵⁰

From promising wealth to claiming necessity

The idea of reserving the riches of the deep sea for the benefit of all of humanity – and especially for the benefit of developing countries – reverberated in the decision

⁵⁰ For the methodological approach, see Rivera, M., Nanz, P., 2018. Erzählend handeln, vom Handeln erzählen: Fragen an Narrative nachhaltiger Entwicklung. In: Heidel, K., Bertelmann, B. (Eds.), *Leben im Anthropozän: Christliche Perspektiven für eine Kultur der Nachhaltigkeit*. Oekom, München, as well as Rivera, M., Kallenbach, T., upcoming. *Narrativity and Sustainability. Conceptualizing Relations between Value Structure and Rhetorical Form*. Environmental Communication. In the present excursus, we omit scholarly references to research about frame analysis, narrative policy analysis, etc., as this would lead well beyond the scope of the overall study.

to anchor the principle of the common heritage of mankind in UNCLOS (see above, chapter 2). As we see further below, however, in today's broader expert discourse on deep seabed mining, the common heritage and its potential social and economic implications play a rather minor role; it is predominantly referred to in academic and legal documents.

Contemporary arguments in favour of deep seabed mining centre on the promise of an economic development that is no longer framed in terms of international equity, but either as economically benefitting an unspecified «humanity» or as improving location-related economic competitiveness. Especially with regard to the former, costs and benefits of deep seabed mining projects tend to be compared with those of traditional terrestrial mining and the availability of land-based resource stocks. Against this background, deep seabed mining is no longer primarily discussed as a source of novel wealth, but rather as a potential means to securing current standards of production. Its proponents argue that using deepwater resources for economic development is inevitable if humanity is to respond to dwindling land-based resources and to urbanisation, population growth, and modernisation processes that increase the global demand for metals and rare earths (mainly digitalisation and renewable energies). In contrast to the traditional image of the mining industry, deep seabed mining is presented as a significant part – or even a mandatory prerequisite – for sustainable development and associated with a green and modern image that connects both to an audience of potential private and governmental investors, as well as to a concerned global public.

This global «green modernisation» narrative is complemented by a second line of reasoning, which centres on location-related economic competitiveness. Here, the development of a modern green industry is explicitly discussed in light of national and sectoral interests. Very contrary to the original common heritage spirit, the money to be made and the jobs to be created are presented as a domestic opportunity that should not be left to international competitors. This competitiveness narrative appeals to both the hope for economic bloom and to fears of losing touch and coming under political and economic pressure from the outside. For instance, warnings are repeatedly voiced against the German industry being left behind by international competitors, especially by an overly powerful China. In contrast to the «global modernisation» narrative discussed above, addressees of site-specific arguments are specific national publics and, even more importantly, national politicians. Unintentionally, the location competitiveness narrative may be strengthened further by opponents of deep seabed mining when they refer to the ensuing trend of seabed exploration as a «gold rush» or a «scramble for resources». Despite the obvious intention to paint deep seabed mining in a negative light, these metaphors contribute to the image of a rapidly evolving competition between a few pioneering actors who are trying to be first in securing a wealth of openly accessible economic opportunities, thus strengthening the proponents' frame.

German advocates of deep seabed mining offer a particular linkage between global sustainability and the location competitiveness narrative: They portray the country's industry as a guarantor of high environmental standards. A German

commitment is said to be desirable for the environment in view of what is currently alleged to be transpiring – a largely unregulated «scramble for resources». Conversely, deregulation arguments figure in a partial storyline about deep seabed mining governance: Companies could exit the UN process and turn to national waters – should the ISA fail to provide sufficient economic incentives for these companies.

«To mine, or not to mine»

Although opponents to deep seabed mining may be the ones that own the above-cited concerns about planetary sustainability more authentically and would have stories to tell about them, in the debate about deep seabed mining they often see themselves cornered into merely reacting to what mining advocates suggest. On the one hand, they try to weaken pro-mining arguments and promises. Although this is a valid – and necessary – strategy that we employ in the present study as well, it also means that opponents' narratives remain largely tied to those of the advocates.

A possible exception are the contrasting descriptions of the ocean floor. «Miners» tend to paint it as inanimate. Their graphic representations of mining activities typically show machines driving through a grey desert consisting solely of mineral rock. In images such as these, the sea floor appears decoupled from life further up in the water column, on the water surface, and on the coasts due to its remoteness. Deep seabed mining thus takes place at an almost neutral location and, allegedly, without any impacts on humans or the environment. This can be seen as a reaction to opponents' descriptions, though, which portray the seabed as a context of valuable – and at the same time vulnerable – life, much of which is still undiscovered. The critique of mining successfully relates here to an overarching narrative of the extinction of species, as can be found, for example, in the destruction of rainforests. The seabed appears to be systemically – and socially – linked to other living contexts and localities. The effects of the exploitation of mineral resources are by no means local, but rather regional, and possibly even global. In this case, the «miners» not only have the weaker images, but they are also the ones «on the defensive».

The description of the activities associated with deep seabed mining is similarly rich in contrast, but it plays slightly more in favour of those who promote it. Here, technology often appears as an actor (hero or villain). Its humanisation works narratively for mining when the latter is presented as a thoroughly planned as well as politically and socially neutral process. Each of the machines involved is specially designed to accomplish a specific task, and all the activities seem coordinated, as if in a clockwork – a story of perfect pragmatism. Opponents, on the other hand, aim at the effect of presenting technology as being brutal and merciless; its efficiency is connoted as being hostile to life. This description is all the stronger when the machine encounters the vulnerable animate victim. Over the course of our entire corpus, however, the role of the protagonist is assigned to technology far more often, and it contributes to stronger narrative dynamics.

Opponents also evoke socially and environmentally friendly alternatives to deep seabed mining, for example a radical reduction in resource consumption in industrial societies and the establishment of a circular economy based on improved recycling. However, while these proposals may better fit the original intentions of the common heritage of mankind principle, the underlying promise does not become as graphic and tangible as the stories presented by those who favour deep seabed mining, at least not in the context of the current debate, which, as said above, remains largely tied – positively or negatively – to the notion of mining. Critical voices, in this context, seldom illustrate their idea of global sustainable development by acts of expansion or innovation, but rather by «negative acts». There is a tendency to narrate the desirable as a protection against deep seabed mining, or as abstaining from any activity altogether (whereas the innovative aspects of, for example, a circular economy are almost never narrated in detail). This ultimately passive framing⁵¹ is sometimes transcended by the reference to «goods», in the sense of ecosystem services, such as genetic resources or the role of oceans as regulators of the climate. But while the respective benefits may be convincingly argued for, there is hardly a concrete narrative articulation of how to relate to them. Acts like «explore» or «research» remain vague or timid compared to – (or they might even be considered conducive to) – «extract», «harvest», or «build».

Justice and common heritage: At the margins

Deep seabed mining is primarily a scenario of the future. Most arguments put forward tend to appeal to hopes or fears while resting on a rather weak foundation of lived experience. Different interpretations of future uses of the seafloor are therefore particularly dependent on the effects of narrative plausibility and imageability. For this very reason, cross-references to other environmental and economic policy discourses play a critical role, as they allow the narrator to fill the «black box» of the deep seabed with images and experiences from other contexts. Mostly, though, these references still work to the advantage of mining advocates, as in the case of the neoliberal competitiveness narrative or the comparisons to land-based mining. Although critics may refer to former experiences of environmental pollution or degradation, and thus successfully appeal to notions of danger prevention, they do not yet tap fully into experiences associated with resource and other conflicts and ensuing injustice (such as «food or fuel» or, in the case of the high seas, several of the conflicts we addressed in chapter 4 of this study). This highlights the necessity, but also the difficulty, of countering the propagated mining interests with multidisciplinary

51 The term «negative acts» does not refer here to value judgements in the sense of an act being depicted as «bad». It rather refers to situations where actors are shown to restrain themselves or others from doing something. These negative acts can, of course, occur towards the end of a «positively» framed purpose, such as environmental protection. From a narrative standpoint, however, «doing nothing» or «restraining somebody's actions» may be argued to possess much less of an appeal than «taking action». Hence the notion of passivity or – more conventionally expressed – a *lack of narrativity*.

informed, contextually rich, and politically meaningful alternative scenarios that are more than a mere rejection of miners' narratives.

This brings us again to the role of the common heritage of mankind. Our narrative analysis indicates that references to the common heritage of mankind principle are rather marginal in contemporary expert and media discourse on the future of the Area. Most of the rather few references to the principle are made in academic publications from the field of environmental governance and law. These texts are characterised by a considerable depth in reflection on the concept's legal and practical implications. Documents published by or in the context of the ISA, on the other hand, use the common heritage merely as an abstract legal reference, and even fewer and shallower are the references in media articles as well as business and civil society documents. The differentiated discussion that occurs in the context of academia does not infiltrate broader expert or public discourse. Neither advocates nor opponents of deep seabed mining use the principle as an important argumentative resource.

This omission is consistent with our aforementioned finding that «miners» have shifted from narratives of promise towards narratives of necessity. But critics of current developments have not yet made a very pronounced use of the common heritage idea or its references to global justice either. On the one hand, the critique that the International Seabed Authority fails to deliver on the pro-poor idea of the common heritage of mankind, and that deep seabed mining will benefit only businesses and governments in the rich industrial States, is not spelt out as (or attached to) a positive vision of what a fair use or treatment of the deep sea could actually look like. Using the common heritage principle to oppose mining, on the other hand, currently only works as a kind of supplementary legal backing to a rather conservationist narrative put forward by environmental conservationists that is anchored ostensibly not in the value of justice, but in that of protection. Up to now, however, this narrative has not evoked concrete, tangible contexts; positive and dynamic acts; nor the possible heroism of «fighters» for the common heritage of mankind who would bring a greater good into humanity's reach. The rhetorical challenge contained in the common heritage of mankind and sustainability principles – to find global stories about the oceans that would palpably integrate motives of justice, protection, and innovative dynamics – still needs to be accepted.

5. Shaping a future discourse on the common heritage

A commons perspective

To develop a vision for the future, it is important to first take stock of the past and present. When contemplating a global issue such as the common heritage of mankind, there is no single past, present, or likely future, as different regions of the world develop at different paces and in different directions. A range of normative perspectives need to be considered, and different understandings of ownership need to be scrutinised. The Western world, for example, is built on Roman Law, which determines that the owner of a good has the right to do with it what he/she wants, including destruction, and the value of a commonly owned natural good is understood as having an exploitation value and is something to exploit (Borgese, 1998).⁵² In this sense, the high seas – the waters above the Area – are a free for all, resulting in the «tragedy of the high seas»,⁵³ whereby overexploitation for the benefit of a few is destroying the livelihoods of millions (Dietz *et al.*, 2003). On the contrary, the Area and its resources are subject to a common management system with commonly agreed rules for access, use, and exploitation – an ideal precondition for securing the values of the Area.

In the more traditional understanding, commons management is still practised, for example, in the South Pacific (Kaschinski *et al.*, 2018), but it has also survived in some places in Europe.⁵⁴ Here the «owner», in fact, does not «own» the good, but rather a community of trustees feels collectively responsible for handing out to future generations what was inherited from the ancestors. The implication is that the overall value, including the utilisation value, does not diminish over time, but should at least be maintained or improved through the generations. This is consistent with what is commonly referred to as «strong sustainability». Support for this understanding can also be found in, for example, African customary law, Eastern religious thinking, and the Islamic economic culture (Borgese, 1998; Taylor, 2017), and it extends in particular to the environment, including all waters, the atmosphere, and land being considered a commonly governed good.

⁵² In some legal contexts, including the German *Grundgesetz*, the right of the owner to use and abuse has been restricted by an obligation to not act against the public good (*Eigentum verpflichtet*). Also, some basic goods such as groundwater, air, etc., are usually left in State ownership.

⁵³ Compare Hardin (1994).

⁵⁴ See Grober (2016).

Several design characteristics have been crucial to the success of managing commonly shared goods/ resources in a non-state context (Grober, 2016), and they have been modified from Ostrom (2009), as summarised in Beckenkamp (2012):

- There is no «ownership» by individuals but a commonly administered right to restricted use of a shared good for the benefit of all.⁵⁵
- The legitimate users are clearly determined.
- There is trust between the commoners.
- Each «commoner» participates equally in developing common rules and decision-making, rights, obligations, and benefits (inclusive participative process).
- By necessity, any non-peaceful use will destroy the system, therefore peaceful use is essential.
- The rules are made to realise a common vision for the long-term preservation of local ecological integrity to deliver benefits to the constituents for several generations to come.
- There is strong enforcement and a conflict resolution mechanism.

The relevance of these principles to governing global resource systems was confirmed by Stern (2011), with some refinements to address large-scale conditions. Indeed, the common heritage of mankind principle, as laid down in the UN Convention on the Law of the Sea, entails most of these key elements, but within the context of state-led governance. The modifications to the 1994 Implementing Agreement, however, reduce the collective components and put the common heritage at the brink of an individualistic (State, business), profit-oriented system. The resulting characteristics are:

- Exclusively peaceful use.
- Non-appropriation: The Area and its mineral resources belong to mankind as a whole. The ISA is the gatekeeper that sets the conditions for access. However, once a temporally limited exploration contract is concluded for a particular sub-area of seafloor, the contractor gains a quasi-permanent right to occupy, explore, and later exploit this area, because otherwise all acquired data and knowledge will have to be transferred to the ISA community.
- Common management: All contracting parties to UNCLOS and the Implementing Agreement together are organised in the International Seabed Authority, acting as a trustee for the Area. However, the actual decision-making is not done with one vote per country, but in a group modus, thereby reducing the weight of the many non-industrialised countries.
- Benefits shall be shared equitably, with a particular view on the needs of developing States. However, the current philosophy of benefits to come from the Area

⁵⁵ See also Townsend *et al.* (2018), in which they state that the shared responsibility invokes a strong feeling of inherent personal right and custodianship, while the collective ownership results in high cultural and social importance.

focusses on financial and other economic benefits derived from monetarising material goods, the mineral ore. According to this philosophy, the host environment of the ore has no monetary value because it cannot be sold, cannot be quantified, and therefore no real external costs have to be internalised. Not only will the environmental costs of mining the minerals be paid by mankind, but it is also unlikely that substantial financial benefits will be paid to the ISA/mankind, as minimising the dues is currently being debated to incentivise investment activities.

- Effective environmental protection from the harm arising from mining-related activities in the Area is required. However, progress towards enabling mining proceeds – although no full understanding of ecological impacts exists – and a common vision of the long-term environmental quality of the Area and related waters has not yet been developed by the ISA. No non-State actor has access to the legal means to enforce the environmental protection obligations under UN-CLOS Arts. 145 and 192ff., and the relevant International Tribunal for the Law of the Sea (ITLOS) Seabed Chamber can only provide clarification.
- Effective control of activities: The degree of monitoring of user behaviour and the enforcement of rules is unknown, as no information is available for following up on contractor compliance, and assessments of the relevant organ are not public.
- However, some of the essential design elements, as proposed by Stern (2011), need to be improved urgently to truly qualify the ISA as a trustee for «mankind»: Presently, weak participatory processes and a lack of transparency inhibit the ability of representatives of «mankind» other than the States to argue for strong environmental protection rules and (very important) a comprehensive understanding of «benefit» (see also below). In addition, independent monitoring and assessment of the prevalent environmental baselines and of the resources, as well as institutional adaptation are missing the necessary elements to build up a credible institutional framework that is accountable to mankind.

Due to these characteristics, Tladi (2015) considers the common heritage of mankind principle to be a system of intergenerational solidarity and reminds readers that «the common heritage of mankind principle is not solely about benefit sharing. [It] is just as much about conservation and preservation. The principle is about solidarity; solidarity in the preservation and conservation of a good we all share and therefore should protect. But also solidarity in ensuring that this good, which we all share, is for all our benefit.»⁵⁶

Or, as formulated by Borgese (2000), «the principle of the Common Heritage of Mankind thus is the foundation of sustainable development, not only in the oceans, but globally. In accordance with the cultures of the vast majority of humankind, its application must be extended from the wealth of the oceans to wealth in general,

⁵⁶ Quotation from statements made by South Africa to the UN General Assembly on Oceans and the Law of the Sea in 2009 and 2010.

not to be «owned» by humankind, whether individually or collectively, but to be held in trust, and to be administered on the basis of cooperation between civil society and the institutions of governance, at local, national, regional, and global levels.»

Mankind – raising concern and involvement

International law is the law governing international relations between States. The concept of mankind is far broader, however, than the traditional strictures of international law, encompassing both present and future generations and embodying a collective interest of all humanity rather than merely the interests of individual States. Although States are the primary actors responsible for the implementation of the principle of the common heritage of mankind as parties to UNCLOS and members of the ISA, the content of the principle, by nature, can be interpreted to include further supporting roles for civil society actors, science, and potentially even individuals. Although the term «mankind» was not originally intended to create a new subject of international law (Wolfrum, 1983), a new understanding of the principle has emerged that encompasses humanity in its broadest spatial and temporal sense (Doorn, 2016; Tanaka, 2011).

Both the concepts of intra- and intergenerational equity and sustainable development are considered fundamental to the principle of the common heritage of mankind. While the interests of present generations are to be more immediately addressed through a benefit-sharing mechanism for financial and other economic benefits derived from activities in the Area, the interests of future generations are implicitly understood in relation to the realisation of sustainable development and the protection and preservation of the marine environment (Baslar, 1998; Wolfrum, 2009). Although human rights to development and a clean environment have been proposed in academic discourse, these aspirations are far from the current realities of international law. Nonetheless, it is undeniable that the fields of international environmental protection law and sustainable development have made quantum leaps since the original formulation of the common heritage principle.

Legal obligations for States to ensure access to information and participation (Aarhus Convention, 1998) for civil society actors and individuals as well as obligations to conduct environmental impact assessments for transboundary harm (1991 Espoo Convention) demonstrate that people are increasingly exercising active roles in environmental governance processes. While both agreements do not currently extend into activities in the Area and the governance of the common heritage principle explicitly, it is nonetheless clear that a gradual evolution is occurring in the locus of decision-making, bringing global concerns much closer to the purview and agency of individuals. Civil society participation and transparency in the ISA's activities have vastly increased in recent years in reflection of this transformation, and many States advocate its further expansion in order to uphold their own domestic laws and international commitments.

The urgency of the truly independent participation of non-State actors is recognised by many in light of what is at stake in global decision-making about the

common heritage; however, mechanisms to enable that participation are only beginning to take shape. It has long been observed in international environmental law that the use of non-legally-binding governance approaches is an effective – and sometimes the only – tool for concretising aspirations that are not immediately realisable through traditional international law. The normative contributions of non-binding declarations can be traced back to the 1972 Stockholm Declaration, the 1982 World Charter for Nature, the 2000 Earth Charter, and they have continued with an ever-increasing dynamic in subsequent decades. The current sustainable development agenda – the 2030 Agenda and its accompanying Sustainable Development Goals, as examined below – reflects a profoundly increased level of participation of non-State actors in global governance and demonstrates how an independent voice advocating the interests of humankind is emerging.

The common heritage of mankind and sustainable development

Among the original intentions behind designating the Area and its resources as the common heritage of mankind was to help «level the playing field» for developing countries and support their efforts towards social, scientific, technological, and economic development (see chapter 2). Many countries of the Global North had issues with different aspects of redistribution proposed under the common heritage principle, and it was only with the negotiation of the 1994 Implementing Agreement on Part XI, which revised many of these original ideas, that UNCLOS was able to enter into force. The inequality of opportunities and access to resources facing developing countries has in some fields become even more pronounced in the decades since negotiating UNCLOS; however, some positive momentum has been generated through global development initiatives (UN General Assembly, 2015).

The problems of environmental degradation and lack of opportunities for human development are closely linked. Progressing desertification or the plundering of coastal fish stocks by foreign fleets not only limits sufficient and healthy food provision to the coastal population but also leads to migration to the big cities and abroad.⁵⁷ Should deep seabed mining directly or indirectly contribute to limit the oceans' capacities to absorb heat and greenhouse gases, resulting in accelerated sea level rise, or impact on coastal ecosystems and reduce fishing opportunities, this will aggravate the problems of the most vulnerable parts of the world population.

With human pressures on the oceans increasing, the concept of sustainable development and the global environmental protection agenda have taken shape in parallel and following negotiations on the common heritage in Part XI of UNCLOS, adopted in 1982 (Warner, 2014). Part XII of UNCLOS provides for the basic rules of environmental protection. Already in 1972, the Stockholm Conference on Human Development formulated the basic principles on which today's SDGs rest. The 1992 Rio World Summit on Sustainable Development further called for sustainable development with equal optimisation of growth, social well-being, and ecological stability

⁵⁷ See https://refugeesmigrants.un.org/sites/default/files/final_issue_brief_2.pdf

in line with the three broad objectives of the CBD, i.e. the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising from the utilisation of genetic resources (CBD, 1992, Art. 1).⁵⁸ This commitment was renewed at the Rio+20 conference in 2012, when States decided to take action towards «The Future We Want» (Convention on Biological Diversity, 2012) and related 20 Aichi Biodiversity Targets⁵⁹ to deliver the Strategic Plan for 2011–2020 with five strategic goals (Convention on Biological Diversity, 2010):

- Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.
- Reduce direct pressures on biodiversity and promote sustainable use.
- Improve the status of biodiversity by safeguarding ecosystems, species, and genetic diversity.
- Enhance benefits to all from biodiversity and ecosystem services.
- Enhance participatory planning, knowledge management, and capacity-building.

As such, these strategic goals and targets of the CBD are one of the components that ultimately led to the adoption of the UN 2030 Agenda for Sustainable Development «Transforming our World» (UN General Assembly, 2015) with its 17 SDGs, supported by 169 targets. The Agenda has been adopted by almost all States, which commit to «work tirelessly» to end poverty everywhere, foster peace, safeguard the rights and dignity of all people, and protect the planet over the long term. It is an anthropo-centric agenda for global action that acknowledges rising inequalities within and among countries and recognises that social and economic development depends on the sustainable management of the planet's natural resources, including those of the oceans. All goals and targets shall be followed as an integrated whole on a range of scales (Biermann *et al.*, 2017), although mechanisms to assess and weigh the multitude of positive and negative interactions among and between the SDGs need to be developed (Pradhan *et al.*, 2017; Schmidt *et al.*, 2017).

Sustainable development has traditionally been conceptualised using a three-pillar or triangular approach, balancing social, economic, and environmental perspectives. The SDGs reflect these different perspectives and, through their interactions, give expression to the full complexity of the sustainable development challenge facing humanity. When considered in the broader light of sustainable development, the common heritage principle contains a number of the same values guiding the SDGs. At its core, the common heritage principle is driven by a vision of intra- and inter-generational equity for all people in relation to the Area and its resources. This vision is very much compatible with the normative core of the 2030 Agenda and the SDGs, namely that «no one will be left behind». Although the SDGs and the common heritage principle both have the benefits to humanity at the forefront, they nonetheless

⁵⁸ See www.cbd.int/intro/default.shtml

⁵⁹ See www.cbd.int/sp/targets/default.shtml

fully take into account their essential interconnections with economic sustainability and the protection of the natural resource base.

Because of these interconnections, the principle of the common heritage of mankind – a legally binding obligation with a corresponding institutional structure for its implementation already in place – could make a meaningful contribution to the realisation of the 2030 Agenda and the SDGs, while vice versa, the holistic framework of the SDGs sets out the direction of a desirable management of the common heritage in light of the globally accepted «interests».

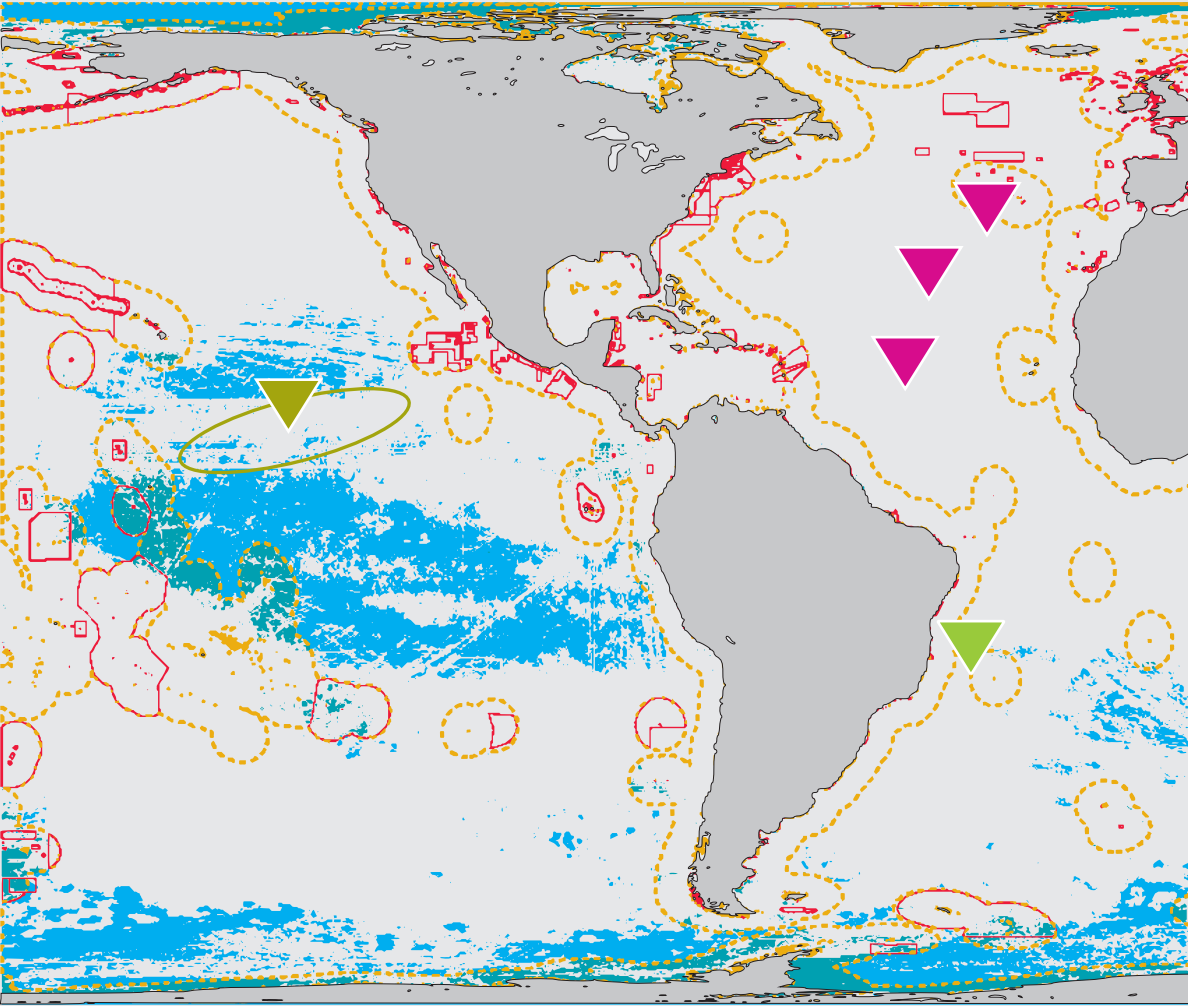
The contributions the common heritage can make

The SDGs can usefully be grouped along their main focus, with the following being of relevance when considering the interaction of the common heritage of mankind and the Area with the 2030 Agenda:

- **Maintain and restore ecological integrity:** SDGs 13 (combat climate change), 14 (protect oceans), 15.5 (halt the loss of biodiversity).
- **Enable access, benefit within and sharing across generations:** SDGs 1 (no poverty), 2 (no hunger), 3 (health, well-being), 5 (gender equality), 10 (reduce inequality within and among countries), 16 (peace and justice).
- **Inspire social equity:** SDGs 4 (science, education, capacity-building), 9 (innovation, knowledge), 17 (partnerships).
- **Support sustainable livelihoods:** SDGs 7 (energy), 8 (inclusive and sustainable economic growth), 9 (infrastructure), 11 (cities, communities), 12 (consumption) and 14.4, 14.7, and 14B (fishing opportunities).

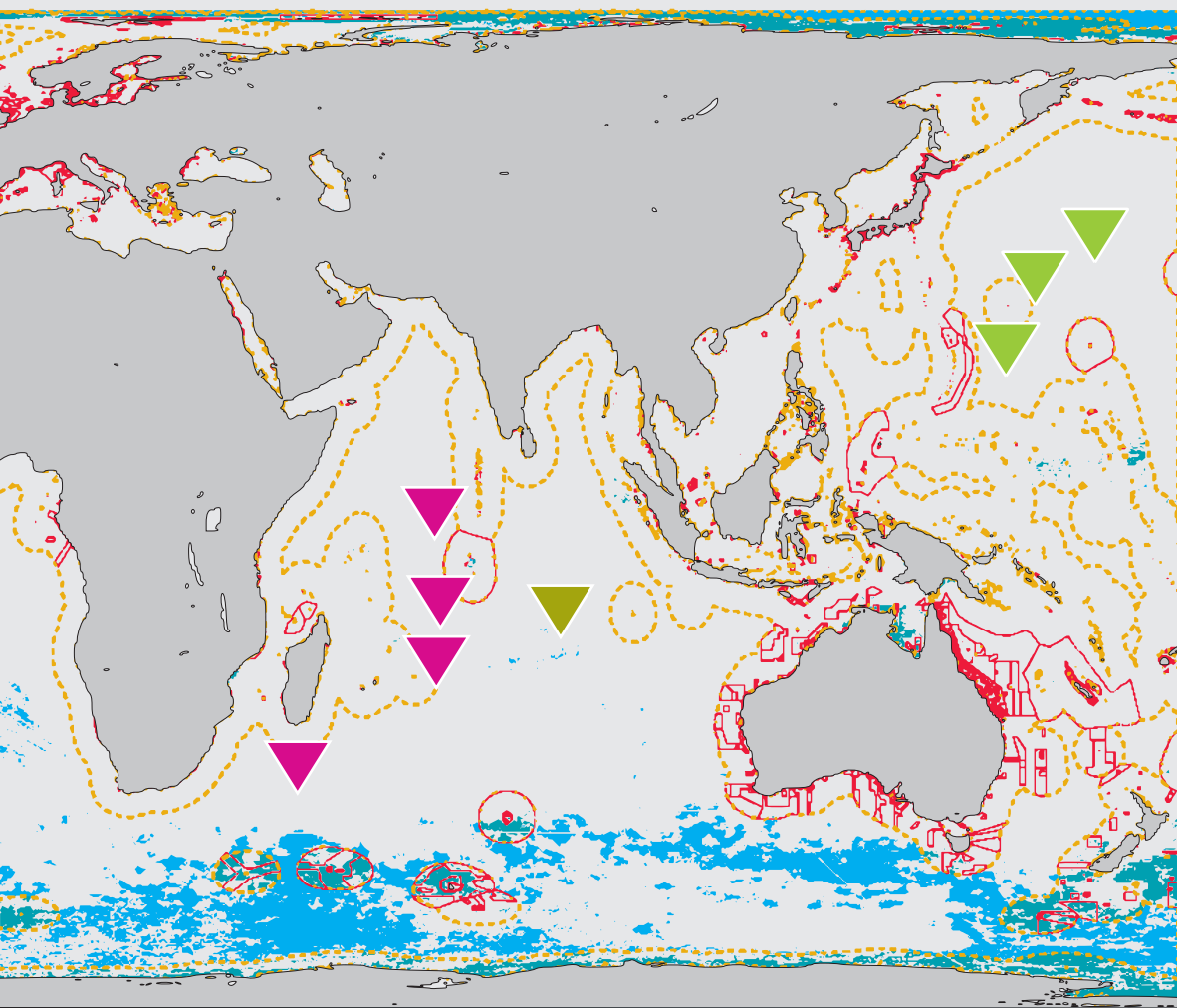
The considerations below will attempt to pull together ideas about what the common heritage of mankind could deliver on the path to collectively achieving the SDGs. Two cases have to be distinguished: the business-as-usual approach currently prevailing in the ISA means that only the resources, when recovered from the seafloor, provide value. The money, if it is in substantial amounts, can then be used to «buy» into some other SDGs. We make a first assessment as to whether this seems possible or likely. Alternatively, the minerals are not exploited but kept as an asset, together with the associated ecosystems in the Area. In this integrated view, the minerals are considered not as immediate resources but as part of the ecosystems, which again are essential to the natural life-support system already under pressure. The potential supporting effects or trade-offs will be indicated – no claim for comprehensiveness is made.

Fig. 4: Some of the regions of interest for deep seabed minerals mining coincide with the last ocean wildernesses on Earth



Exploration contract areas

- | | | |
|---------------------|-----------------------------|--|
| ▼ Massive sulphides | — 2017 MPAs | ■ Wilderness inside the exclusive economic zone |
| ▼ Cobalt crusts | — Clarion-Clipperton Zone | ■ Wilderness outside the exclusive economic zone |
| ▼ Manganese nodules | ... Exclusive economic zone | |



Maintain and restore ecological integrity

SDG 14, the dedicated ocean goal to «[c]onserve and sustainably use the oceans, seas and marine resources for sustainable development», is ideally positioned to guide the management of activities in the Area for the benefit of mankind as a whole, in particular, if the Goal was understood to limit use to such an extent as necessary to preserve the overall ocean ecosystems integrity. Oceans cover 71 per cent of the Earth's surface and harbour enormous biological diversity. Its biological production and existence values provide both renewable and non-renewable resources that sustain hundreds of millions of livelihoods. The oceans provide us with half of all available oxygen, while absorbing about a quarter of the carbon dioxide emitted, thus reducing global warming. It also absorbs 90 per cent of the additional heat caused by greenhouse gas emissions. The price of the warming of oceans is sea level rise, acidification, increasing deoxygenation of ocean waters, and shifts in species distributions and, more importantly, biological cycles. Recent research has also found that ocean warming is higher than previously estimated (Resplandy *et al.*, 2018).

Weak and fragmented ocean governance (fuelled by a systematic neglect of natural systems) has permitted that a rising demand for resources – and coinciding technological progress – has led to a decline in global fish populations, with concomitant impacts on non-target fish species, mammals, reptiles, and seabirds and resulting habitat and ecosystem changes (Rogers *et al.*, 2014). This overall impoverishment of ocean ecosystems has led to statistically recognisable reductions in ecosystem services, such as food provision, and now constitutes the baseline for setting the goal and targets of SDG 14, including to «prevent and significantly reduce marine pollution of all kinds» (SDG 14.1), and to «sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans» (SDG 14.2).

On the contrary, the Area and the overlying deep ocean are likely to be the most pristine ecosystems remaining on Earth. For example, the CCZ in the Pacific is among the very few remaining ocean wildernesses (Jones *et al.*, 2018b, see Fig. 4). Currently, the deep ocean acts as a major buffer to climate change and to biological depletion of the upper layers. Its state of preservation needs to be maintained rather than restored, as is the case for the upper waters. What can be said prior to the first deep seabed mining is that biodiversity loss and concomitant loss of ecosystem functions will be unavoidable (Le *et al.*, 2017; Niner *et al.*, 2018; Van Dover *et al.*, 2017). So far it is unknown what the local and regional effects of individual and multiple mining operations will be. In addition, one can only speculate whether – and to what extent – the potential cumulative impacts from multiple mining operations in various regions may trigger larger-scale changes up to the ocean basin scale, eventually contributing to the stress from rising cumulative impacts throughout all oceans (Halpern *et al.*, 2015). The application of the highest standards of protection

is required from the management regime of the Area,⁶⁰ an obligation confirmed by the advisory opinion of ITLOS (2011), which is further supported by the Goal for the oceans, SDG 14. This protection requires the implementation of measures according to the wording in UNCLOS (see Art. 145, below), and at least the capacity to measure, monitor, and respond to «harmful effects», the operationalisation of the precautionary approach,⁶¹ and mechanisms to secure uniform implementation, compliance, and enforcement (Gjerde and Jaeckel, 2017). Therefore, to be precautionary, and taking the SDGs above seriously:

- Existing environmental uncertainties and unknowns – in particular in relation to assessing the consequences of individual or multiple mining-related activities in different settings – have to be identified, and consensus has to be established as to the measures required, prior to an eventual permitting of environment-sensitive activities.
- Pollution of all kinds has to be prevented and significantly reduced (SDG 14.1) This is also required under UNCLOS Part XI (see Art. 145 (a)) and Part XII. States individually and collectively have to comply with this law. Although this calls for a zero emissions rule for extractive operators, in practice States will likely compromise to minimise the inevitable pollution of various kinds: sediment suspension and discharge, eventually including toxic contaminants, light, noise, emissions during the transfer of ore to transport vessels, etc. In any case, this will result in an increase in global ocean pollution with unknown effects.
- The degradation of natural habitats has to be reduced and biodiversity loss halted by 2020 (SDG 15.5). Yet, deep seabed mining will significantly expand the human footprint to hitherto little impacted depths and will inevitably lead to the degradation of large swaths of ocean floor and unknown volumes of deep ocean waters. This will lead to biodiversity loss in the case of nodule mining and, in addition, to the loss of unique habitats and, eventually, endemic species in the case of massive sulphide mining at hydrothermal vents and cold deposits. In the case of no mining, the deep ocean may eventually help to stabilise the ocean ecosystems vis-à-vis climate change effects (SDG 13).
- Significant adverse impacts on the marine ecosystems have to be avoided (SDG 14.2). The protection requirement applicable to the Area under UNCLOS

⁶⁰ ITLOS, 2011, para 159: the «*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*».

⁶¹ The precautionary approach, in line with Principle 15 of the 1992 Rio Declaration is one of the principles of implementation for the ISA Strategy and the future ISA Mining Code. See Jaeckel (2017a) on the implementation of the precautionary approach by the ISA.

Art. 145⁶² is even more demanding, as it requires «to ensure the effective protection for the marine environment from harmful effects which may arise from such [mining-related] activities», and «the protection and conservation of the natural resources of the Area and the prevention of damage to the flora and fauna of the marine environment» (Gjerde and Jaeckel, 2017). Only when breaching the threshold of «serious harm to the environment»,⁶³ emergency interventions are required. None of the thresholds (harm, serious harm, significant adverse impacts) is environmentally defined at present (Levin *et al.*, 2016), nor are best environmental practices or other relevant standards. Given the lack of understanding of the deep ocean ecosystem and the lack of knowledge about the mechanisms of environmental effects due to mining the deep seafloor, hydrothermal vents, and seamount mineral resources, it will be impossible to create a reliable assessment framework for years to come.

■ Marine protected areas can be instrumental for minimising the loss of biodiversity by protecting representative species, habitats, and ecosystems at a higher standard than the surrounding areas (Secretariat of the Convention on Biological Diversity, 2004). The 10 per cent target of the CBD and SDG 14.5 is the minimum share if, in the other 90 per cent of the ocean, activities are managed sustainably.⁶⁴ In the case of seabed mining, which destructs the respective habitat completely, the fraction of area preserved from all impacts must be much higher. In the prime region of interest for manganese nodules in the Pacific, the ISA has also designated so-called areas of particular environmental interest, APEIs, a non-permanent sectoral closure covering approximately 30 per cent of the CCZ region (International Seabed Authority, 2011; Lodge *et al.*, 2014; Wedding *et al.*, 2013; Wedding *et al.*, 2015). However, contrary to the procedures for deepwater fishing, these areas are located outside the locations of interest for exploration and potential exploitation. Due to a different nodule cover, these APEIs cannot act as reserves in the case of mining (Vanreusel *et al.*, 2016). Therefore,

62 In addition to the general obligation of States under UNCLOS Art. 192, to «*protect and preserve the marine environment*» and Art. 194 (5) «*protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life*», Art. 197 «*cooperation in developing international rules, standards and recommended practices and procedures for environmental protection*», and Art. 206 «*environmental impact assessment*». Importantly, the obligation to protect and preserve the marine environment goes beyond avoiding harm and entails the active enhancement of the state of the marine environment (Gjerde, K.M., Jaeckel, A., 2017. Effective Protection of the Marine Environment. CODE Project Issue Paper #1. Pew Charitable Trusts, pp. 2–12.).

63 Defined by the ISA 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*» (emphasis added). «Significant adverse change» is left undefined. See Currie, D., Morato, T., 2017. Serious harm. CODE Project Issue Paper #2. Pew Charitable Trusts, pp. 14–21.

64 The IUCN World Parks Congress recommends setting aside at least 30 per cent of each marine habitat as no-take zones, www.openchannels.org/news/mpa-news/world-parks-congress-recommends-target-30-no-take-mpa-coverage-worldwide

quantitatively, the APEIs may count towards the SDG 14.5 target «to conserve at least 10 % of coastal and marine areas consistent with national and international law and based on best available scientific information». However, qualitatively they do not meet the criteria of the more elaborate CBD Aichi target 11⁶⁵ (Rees *et al.*, 2018). Regional Environmental Management Plans have yet to be developed for all areas subject to exploration contracts, though discussions have started for the «Triangle Area» for cobalt crust mining in the north-west Pacific Ocean and for the Mid-Atlantic Ridge.

- All sites, habitat, and species types that are subject to conservation measures (MPAs, management measures) or of conservation concern to (e.g. EBSAs, vulnerable marine ecosystems) by other international organisations must be exempt from mining permissions, or, at a minimum, applications must be analysed for risks from mineral exploration and exploitation.

In conclusion, SDG 14 and UNCLOS together call for very high standards and environmental bottom lines in environmental protection. As such, the protection of the marine environment acts as a gatekeeper to potential activities.

SDG 14.A is particularly important for delivering benefits to disadvantaged States such as Small Island Developing States (SIDS) and least-developed countries (LDCs). It calls to «increase scientific knowledge, develop research capacities and transfer marine technology [...] to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular SIDS and LDCs». UNCLOS supports this type of benefit-sharing when developing deep seabed mining, and therefore, the common heritage principle could contribute a lot to capacity development. However, due to the modifications enacted by the Implementing Agreement (1994), there is no enforceable right of developing States to share with developers the increase in knowledge and experience. The current system of common heritage non-monetary benefit-sharing, as practised by the ISA since 1994, is administered by the ISA Secretariat. However, it lacks clear organisation and dedicated organs, such as a school or university that systematically organises education and capacity-building according to overarching education goals (see also below for SDG 4). Due to this lack of spirit, all of the knowledge-sharing and training relies on obligatory action being taken by the current exploration contractors, but on a voluntary scale, and with no sanctions for those who do not provide educational opportunities. Due to the lack of, for example, a comprehensive gap analysis and a research programme proposal by the ISA, the funding – and therefore capacities – of independent research remains extremely limited and continues to be primarily located in the northern States and the European Union.

This leads to the assumption that the funding for deep-sea research is currently strongly tied to the progressing activity level. A postponement of, or moratorium on, mining will likely significantly reduce the current level of funding. On the other hand, funds now being spent on developing commercial technologies for deep

⁶⁵ See www.cbd.int/sp/targets

seabed mining could be used for funding research programmes to investigate the deep ocean, together with SIDS and LDCs, in addition to developing options for a sustainable «blue growth» of sectors that provide wealth to the people.

The call of SDG 14.C to fully implement UNCLOS «[...]including, where applicable, existing regional and international regimes for the conservation and sustainable use of oceans and their resources by their parties» is to be fulfilled by the ISA in administering the common heritage of mankind. However, the international cooperation and coordination of the ISA with other competent authorities could be improved, and legal gaps and overlaps in regulations should be explored and resolved.

Enable access and benefit-sharing within and across generations

One important intention of the mothers and fathers of the common heritage of mankind principle and its rules, laid down in UNCLOS, was to use the benefits derived from the Area for reducing global inequality (SDG 10). Non-monetary transfers were supposed to aid capacity-building for science and technology and provide equal opportunities to participate in the Area's governance processes. Financial and other economic benefits from activities in the Area were supposed to lead to financial transfers that would enable the developing States to reinforce their social and economic systems.

These origins have been superseded by the 1994 Implementing Agreement to UNCLOS, where mainly the industrialised world enforced its interpretation of a more commercialised deep seabed mining regime without any transfer of technology (Fritz, 2015). Today's implementation of the common heritage principle lacks substantial components of transfer and equity as well as collaboration among UNCLOS parties. So far, deep seabed mining has been neither technically nor commercially viable, and there is debate over financial incentives for so-called first movers, lowering the share of returns to the ISA for redistribution. It is currently questionable whether – and to what extent – deep seabed mining would ever have monetary benefits to share with its State Parties.

What is even more disturbing is that mining could be counterproductive to improving the livelihoods of people in disadvantaged States (e.g. SDG 1, 2). In particular SDG 2.1 (access by all to safe, nutritious and sufficient food) is strongly related to coastal and offshore fisheries with local landings, employment, and income generation. Should mining significantly impact access to fishing opportunities and/or the quality of fish or coastal waters for coastal populations (Rademaekers *et al.*, 2015; Popova *et al.*, 2019), or should the processing of minerals on land lead to the further deterioration of living conditions for people in the neighbourhood (Markus and Singh, 2016), then the negative effects would certainly be much more extensive and disrupting for the social system than a monetary contribution from the ISA could compensate for. At a larger scale, this negative effect might also become effective, should the current land producers of minerals have to lower their prices as well as environmental and social requirements due to minerals from the deep sea flooding the market.

Peaceful use of the common heritage of mankind is one of the baseline conditions for the management of the Area (UNCLOS Art. 141). The ISA also ensures full participation of all UNCLOS signatories in its organs: in the Assembly one vote per country, in the Council one vote collectively for regional or interest groups. As the Council is the organ taking many operational decisions, the group representation gives extra weight to Sponsoring States, consumer States, and minerals-exporting States. However, decisions by the ISA are steered by the recommendations of the Legal and Technical Commission (LTC) advisory body with a current membership of 30 individuals, which usually holds meetings in closed session. The Council can reject a recommendation of the LTC for a Plan of Work only with a two-thirds majority. The conformity of the rules, regulations, and procedures – as decided by the ISA – with UNCLOS cannot be commented upon or questioned by the relevant court, the Seabed Chamber of ITLOS. «Mankind» or civil society, not even when accredited observers of the ISA, does not yet have legal standing and cannot request advice in a dispute with the International Seabed Authority, a State Party, or a contractor (Dolidze, 2012).

The 2030 Agenda is to be «of the people, by the people and for the people». Its negotiation set a stark example of inclusiveness that involved governments as well as parliaments; the United Nations system and other international institutions; local authorities; indigenous peoples; civil society; business and the private sector; as well as the scientific and academic communities. This could also be the definition of «mankind», the beneficiary of benefits arising from the common heritage of mankind. Discussions about the interpretation and implementation of the common heritage should be as inclusive as the process leading to the 2030 Agenda and beyond, and as transparent and accountable. There are a number of improvements the ISA could enact to come near this goal (Christiansen *et al.*, 2016).

Inspire social equity

The common heritage of mankind does make substantial contributions to SDG 4 («Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all») and could do even more by enhancing its current programmes in a more organised and permanent way. Currently, the training of individuals from developing countries is realised using three parallel options:

- ISA contractors are obliged to provide and fund training opportunities, which can be at-sea training, fellowships, internships, or study opportunities. From 2013 to 2018, a total of 69 training places were provided by nine contractors.⁶⁶
- So far, 126 scientists and government officials from 45 developing countries had stipends financed by an Endowment Fund for Marine Scientific Research in the Area (supplied with voluntary funds provided by member States) to support

⁶⁶ Report of the Secretary-General of the International Seabed Authority under article 166, paragraph 4, of the United Nations Convention on the Law of the Sea, ISBA/24/A/2 (29 May 2018), paragraphs 106–108.

their participation in marine scientific research programmes and training, technical assistance, and scientific cooperation programmes.

- The ISA internship programme provides students and young government officials from diverse academic backgrounds with the opportunity to experience the work and functions of the ISA.

One of the main tasks of the ISA is to promote and encourage marine scientific research and to eventually carry out research concerning the Area and its resources (UNCLOS Art. 143). So far, the ISA has been engaged in multiple scientific projects, including the organisation of, and cooperation in, international workshops. Yet, the ISA has not yet provided a gap analysis of the most needed research or a framework proposal for an international research project. As UNCLOS also tasks the ISA with the coordination and dissemination of the results and analysis of relevant research, this would be a straight-forward action that could benefit researchers all over the world.

The technology and scientific knowledge-transfer aspirations of UNCLOS (Art. 144) were superseded by the later negotiated Implementing Agreement (1994), meaning that deep seabed mining technology shall now be acquired either on the open market or via joint-venture arrangements. An important aspect in stimulating the North-South dialogue on science and technology developments is international cooperation. In recent years, a couple of European collaborative projects have advanced the technical and environmental understanding of deep seabed mining activities, including dedicated biological work on the recovery potential of disturbed deep seabed. The EU also financed a collaborative project in the South Pacific region for developing a regional legislative framework.⁶⁷ However, this was neither initiated nor funded by the ISA under the common heritage. Overall, inter-State cooperation is very limited, and only «sister» contractors collaborate.

This is clearly a meagre result after now 25 years of the ISA being in existence. More funds and more collaboration are required to come near the aspirations of the common heritage and Goal 17 (*to strengthen the domestic financial system, technology, capacity-building, trade, systemic issues, policy and institutional coherence, and multi-stakeholder partnerships*). Partnerships are most certainly the best possible aspiration for the common heritage of mankind.

Support sustainable livelihoods

Mineral resources are a foundation of social and economic development. Many of the goals and targets in the 2030 Agenda for Sustainable Development depend on minerals, for example for infrastructure and technology development all over the world. Due to a rising demand for minerals by a growing world population – coinciding with a relatively low global rate of recycling – the International Resource Panel expects a continued increase in minerals mining, and therefore shortages for some

⁶⁷ See <http://dsm.gsd.spc.int>

critical metals over the coming two to three decades (Ali *et al.*, 2017).⁶⁸ In order to bring the needed minerals mining in line with the quest for sustainable development, the International Resource Panel calls for a decoupling of metal resource use and environmental impacts from economic growth as an imperative for the world by 2050. Their vision is to use the metals as accelerators for the SDGs, maximising benefits and fostering the transition to circular economies. Technology advances in land-based mining and processing are seen as guarantors for this supply, «curbing the rush to mine in fragile environments such as the deep seabed and the Arctic».⁶⁹

The 168 member States of the ISA represent the range from least-developed to highly industrialised States, from minerals exporters to minerals importers, and from coastal States and land-locked States. This results in the broadest possible range of interests, including in the benefits to potentially be derived from the Area, whether for this or later generations. This also means completely different starting points in the debate about rising resource needs, in conjunction with resource provision from land-based sources or the deep sea: on the one hand the building up of economic power, on the other the need to reduce the global resource footprint and transit to circular economies associated with an increase in efficiency and recycling levels; and replacement by other materials. Some of the poorest States depend on mineral exports from land mining, while the richest sit on huge amounts of minerals in use or on waste dumps. Whereas the poorest and most vulnerable parts of the world population still struggle to maintain their subsistence lifestyles of minimal resource use, a rising share of the world population is able to participate in the Western-type consumer world. The 2030 Agenda shall lead to a rethinking of the current socio-economic way of life – as currently led in the North – as a global role model to a transition towards a lifestyle that Earth can support all its inhabitants in the long term.

Mineral development can be viewed as supporting the concept of sustainable development if the extraction of minerals takes place in a manner that minimises the environmental impacts; equitably shares the benefits from the new wealth created; utilises the capital obtained to provide adequate healthcare, education, and other social services; and reduces the level of waste through recycling and improved technologies to optimise recoveries (Nooten, 2007). The common heritage of mankind principle aims at all of these elements. However, environmental degradation will be substantial, the amount of financial benefits is likely to be modest, and the efforts to avoid deep seabed mining by improving a global circular economy are not part of the debate on the exploitation of the Area. Investing in the developing of resource efficiency, the substitution of critical metals, and recycling instead of investment in mining technology, and a *per capita* reduction of resource-use in industrialised countries could provide solutions in line with SDG 8.4.

Deep seabed mining is not likely to have any substantial employment effect (Rademaekers *et al.*, 2015). Therefore, the access given to the Area to all States may,

⁶⁸ See also www.unenvironment.org/pt-br/node/23727

⁶⁹ Interview with A. Pedro, www.unenvironment.org/news-and-stories/story/mineral-resource-governance-21st-century-conversation-antonio-pedro

at best, have indirect effects on the economic growth of LDCs, should substantial financial benefits be distributed by the ISA. Sustainable economic growth – and, in particular, so-called blue growth of maritime industries – should be carefully balanced with coinciding environmental and economic costs and rely on renewable resources to improve the lives of the population directly, rather than through unpredictable taxes paid by a foreign seabed mining company.

There is an important link made in the argumentation for the need to mine deep seabed minerals in the near future: The transition from non-renewable energy production to renewable energy production is likely to require a new mix of minerals in as of yet unknown quantities. The good news is that innovation is taking place at a fast pace, resulting in new concepts for material substitution, increases in resource efficiency, miniaturisation, and recycling almost every day. This makes reliable long-term fore-casts of resource needs almost impossible, and thus may also prevent the relatively inflexible deep seabed mining from ever becoming a commercially viable option. A recent analysis confirms that, even under a scenario of continued very high demand for key minerals, there is no need for minerals from deep sea sources to complete the transition towards 100 per cent renewable energy production by 2050 (Teske *et al.*, 2016).

Deep seabed mining bound by 30-year contracts would maintain the resource-intensive patterns of the economic growth of the 19th and 20th centuries, which were built on the discoveries of coal, oil, and gas for energy production (Edenhofer *et al.*, 2012) and at the expense of colonised (later independent) countries that produced raw materials. In order to satisfy the legitimate demands of a growing world population for decent standards of living, the consumption and production patterns prevalent in the industrialised world have to be revisited to address the limits of planetary resources for this and future generations.

In practice, a transition towards more sustainable resource consumption means that countries with the highest standards of living, that is, the most resource-consuming, have to change their modes of economic production to enable the least resource-consuming countries to catch up and enable their populations to attain an equitable share of the globally available resources to achieve higher standards of living (Kesler, 2007). The emerging economies of, for example, China and Taiwan demonstrate how rises in economic power and living standards for broad parts of the population are correlated with exponential increases in levels of resource consumption. The challenge of the striving for sustainability is to not increase non-renewable resource consumption to levels that impede development intra- and intergenerationally. This may include, as a first step, reviewing «the meaning of the wealth of nations and [finding] the best economic methods to promote it» (Giarini, 2012), which may also help to make sustainable development become more fair and equitable:

- Long-term visions and appropriate decisions instead of short-term advantages: Before enabling deep seabed mining, it should be considered what the long-term effects of starting this new industry will be on achieving the political goal of

prioritising a sustainable economy, including decreasing new demand for minerals; circular production and consumption; optimisation of raw material use based on lifecycle analysis; and innovations.

- The true price has to be paid: Deep seabed mining is likely to externalise all unquantifiable environmental cost, which will entail a value reduction for the global commons, the Area, the high seas, and ultimately coastal waters and the atmosphere.
- Mineral consumption and standards of living have to be decoupled: The further promotion of deep seabed mining – that is, the opening up of new sources for minerals to feed the world market for continued growth and consumption – could adversely affect the actions that are required under SDG 12 (transition to sustainable consumption and production) (European Parliament, 2018; Roze-meijer *et al.*, 2018). The financial resources now used for developing the industry should be spent for research and development on developing sustainable alternatives, and specifically on the transition to sustainable consumption and production and circular economies.
- The wealth of the 21st century will be determined by the sustainable management of the global commons (Edenhofer *et al.*, 2012) and require shifting societal values away from material goods towards education and services (Wood, 2017), and from quantitative growth to quality of life.

Outlook

Both the common heritage of mankind principle and the 2030 Agenda are forward-looking and inspirational frameworks for the design of a future on planet Earth, which aims at reducing the prevailing inequities, uneven access to education and resources, and resulting imbalances in opportunities within and among States, as well as between present and future generations. Both frameworks should ideally interact and support each other: For example, the range of goals set out in the 2030 Agenda could guide the interpretation and implementation of the common heritage in the Area. Vice versa, the preservation of natural ecosystems in the Area (and ideally the high seas as a whole) will provide a very important contribution to achieving the objectives of SDGs 13 (*combat climate change*) and 14 (*conserve and sustainably use the oceans, seas and marine resources for sustainable development*) overall; in particular, it is likely to strengthen the recovery of fish stocks and ecosystems in coastal waters, especially in developing countries (White and Costello, 2014). Yet, in order to develop the full potential of the two frameworks, the design of superseding, integral mechanisms are paramount. In the case of the common heritage of mankind principle, this could be the commitment to a commonly agreed contemporary vision for what shall be achieved, over which time periods, and how different values and interests ought to be prioritised and balanced.

6. Towards a contemporary vision for the common heritage

As seen in the previous chapters, the common heritage principle and its implementation in today's context has so far not been the focus in managing the Area and its resources. Fortunately, not only do many questions around the meaning of many UNCLOS provisions prevail, but there is currently no foreseeable market for minerals from deep seabed resources, nor is the technology ready to generate significant financial benefits that can be shared with mankind. However, the state of the ocean ecosystems and their envisaged future are such that a revolution in perspective is required for ocean governance: from almost unlimited utilisation to the conservation and recovery of the oceans. Although the developments towards enabling deep seabed mining in the future will continue, there may be a window of opportunity to collectively develop a new, contemporary vision for the overall interpretation and implementation of the common heritage of mankind principle while the ISA regulatory framework is under development.

Although operational since 1994, there is still no commonly agreed definition of what the common heritage principle entails (Fritz, 2015). The process of developing the ISA regulations for the exploitation of minerals from the Area, ongoing since 2015, has revealed the fundamentally different understanding of the common heritage principle by States and stakeholders in different regions of the world.⁷⁰ Only recently have discussions been initiated to, first of all, put the different viewpoints on the table (Pew Charitable Trusts and RESOLVE, I., 2018).⁷¹ However, at present, there is only limited debate and no particular forum in the ISA or elsewhere that aims to bring together the different expectations of States and stakeholders, the different ethical concepts, and the related reflection on the principle within the regulatory framework under development.

A collaborative process, for example in the ISA Assembly, towards an agreement on a contemporary vision for the implementation of the common heritage principle should precede the elaboration of the details of the Mining Code. It would provide an opportunity for all States and stakeholders to learn about the diversity of aspirations and wishes that are tied to the concept and principle, and to compromise on the way to find a commonly agreed vision. This vision could also be instrumental in placing more emphasis on some implicit key elements of the common heritage

⁷⁰ See ISA stakeholder survey 2018, www.isa.org.jm/files/documents/EN/Regs/2018/Comments/Comments.pdf, and previous surveys.

⁷¹ See also IASS/UBA 2019, www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2019-02-07_fb_workshop-tiefseebergbau.pdf; and Christiansen *et al.*, (2018).

provisions in the UN Convention on the Law of the Sea of 1982, namely solidarity, sustainability, and collective governance. Solidarity means that the common heritage is a value shared by mankind, to be used for the benefit of mankind, and commonly administered by mankind.⁷²

Solidarity

Ensure transparency and inclusive participation

The development of a vision for the common heritage has to first make sure that mankind has the opportunity to engage in the process as a stakeholder and beneficiary. The process towards developing the global 2030 Agenda (UN General Assembly, 2015) has set a precedent with high levels of transparency, involvement, and participation by civil society. Taylor (2012) considers the common heritage to be linked to a renewed interest in global citizen movements and the Earth Charter Initiative (Taylor, 2017),⁷³ which calls on people to «join together to bring forth a sustainable global society founded on respect for nature, universal human rights, economic justice, and a culture of peace». Many of these principles are now reflected in the 2030 Agenda, including the quest for transparency and inclusive decision-making.

A full accountability of ISA to States and civil society is key to building trust in the decisions and actions taken by States and the ISA as a trustee for mankind. As identified by Ardron *et al.* (2018), the current practices of the ISA will benefit from further improvements in six areas of good transparency practice that increase the accountability of deep seabed mining:

- access to information;
- reporting;
- quality assurance;
- compliance information/accreditation;
- public participation; and
- ability to review/appeal decisions.

A lot of information is required before truly informed decisions about the future of the common heritage of mankind can be taken in a manner that involves non-State actors and the public in a way that corresponds to their global responsibilities and interests. As requested also by SDG 16, there should be unhindered access to information and documents, both at the international level in the ISA's decision-making processes, but also domestically as part of States' decision-making processes concerning applications for sponsorship, contracts, environmental data, and information (Ardron *et al.*, 2018).

The communication policy of the ISA will have to change to provide this comprehensive information to the public and offer invitations to discussions in non-expert

⁷² Tladi (2015) and Tladi (2018) in The Pew Charitable Trusts and RESOLVE, I. (2018).

⁷³ See <http://earthcharter.org/discover/the-earth-charter>

fora. A stakeholder engagement strategy is needed that determines the type, level, and extent of participation in decision-making processes within a framework of responsive actions, and ensures that stakeholder input is taken into account before decision-making (Christiansen *et al.*, 2016).

The 2030 Agenda set the standard for inclusiveness with its aim to not leave anyone behind. Therefore, the development of a contemporary vision for the common heritage has to be open to the full range of cultural traditions related to the oceans and fully include indigenous and coastal community knowledge and experience (Dunn *et al.*, 2017). Care has to be taken to not override the interests of these most vulnerable stakeholders.

Collective action for a common goal

This sense of a collective community responsibility certainly needs to be developed with respect to the common heritage of mankind, the Area. It will require that States revise their priorities and roles in the ISA: Rather than representing their national (commercial) interests, the focus should shift towards collaborating to meet the common responsibility of sharing any benefits to mankind today and in the long term, including through the protection of ecosystems (Taylor, 2012).

In this study, we call for the development of a common vision of what the common heritage shall entail in light of today's knowledge about the extent of mineral resources on the seafloor, the environmental price of mining activities, and the multiple governance challenges ahead (see chapter 4). This could be a first step towards developing improved cooperation mechanisms to find common ground over some principles to equitably manage the Area and its resources for the benefit of mankind.

Rather than State interests, the benefit of mankind (States and non-governmental actors) should be placed at the centre of considerations for the determination of a common societal goal to be achieved with the common heritage of mankind, as foreseen in UNCLOS. This would require a readjustment of the values the Area provides: It could mean, for example, that the sharing of scientific knowledge of the intact deep seabed ecosystem and its value for education and public information is considered a higher value than the financial returns from exploitation by individual contractors, or that the intrinsic value of the deep sea and the ecosystem services it represents are greater than the benefits that could be reaped from seabed mining. Or it could mean that the transition to a circular economy and fully sustainable maritime industries is the goal to be achieved, without tapping the resources of the Area.

Advice

Scientific, technical, and legal advice is needed for guiding the discussions towards a common vision for the common heritage of mankind. Such advice needs to be subject to a clear set of pre-agreed rules and procedures, be fully transparent and accountable, represent a range of expertise and perspectives, and be open to contributions from the broader stakeholder community.

The expert advice will help to determine the basic facts about the Area and its values, that is, to:

- acknowledge the crucial role of ocean ecosystems to our life-support system, including the obligation to mitigate climate change;
- acknowledge the intrinsic value of maintaining the ecological integrity of the Area;
- establish the range of benefits that are provided by the Area, as well as trade-offs that might accrue from mining the minerals in light of their importance for progress towards the SDGs;
- reconsider the basic assumption that it will be possible to limit the environmental effects of deep seabed minerals mining in the Area to acceptable levels, given the degree of ignorance about the functioning of the ecosystem in the deep sea;
- reconsider the presumed need for mineral resources from the Area in conjunction with the need for global resource governance and the need for an overall transition to sustainability;
- consider how fair and equitable benefit-sharing can be realised. This includes a payment mechanism that balances potential commercial interests with a fair and equitable return to the common heritage, and the protection of the minerals-exporting developing countries from adverse effects on their economies. What could be a just distribution mechanism? How large would the funds have to be to justify the ecological costs?

Sustainability

Future generations

The common heritage principle clearly requires finding a balance between sharing the values and resources today and ensuring opportunities for future generations, including the effective protection of the environment, which emphasises the link to sustainable development (Jaeckel *et al.*, 2017). Tladi (2015) argues that, since inter-generational equity is based on the «ability of future generations to meet their own needs», then «biological diversity needs to be conserved in a way that preserves options for future generations to meet their own needs, even those that we cannot foresee at present». He concludes that the standard of protection is higher than mere conservation, which could be realised by designating MPAs and introducing effective environmental impact assessment procedures. As Jaeckel *et al.* (2017) summarise, the Seabed Chamber in its advice (ITLOS, 2011) articulates three aims that are presumed to be shared by States, namely ensuring:

- that high environmental standards are upheld by all;
- the safety of mining operations; and
- that any mineral development does not undermine the common heritage of mankind.

In this line, developing a common vision of the common heritage principle will involve the consideration of how the needs of future generations could be taken into

account, what these are according to the best knowledge available today, and how the needs of future generations can best be balanced with the need for generating more equity among States today. Such considerations go deeply into the culturally different approaches to valuing the future: Would a limited contribution of the common heritage to the budgets of developing countries, for example through shared financial benefits, gained at high environmental cost be fair to future generations? How high is the overall integrity of the environment in the Area valued as an asset to be maintained over the generations? What does equal access to ocean resources for mankind today and in the future mean? An appointed trustee for the concerns of mankind at the ISA may be a way to ensure that all decisions take into account their effects on future generations.

Determine the need for exploitation

An important element of a common vision on the benefits that the common heritage could bring to present and future generations is the following consideration: Under what conditions should deep seabed minerals mining proceed, if at all, and are these conditions currently being met (Jaeckel *et al.*, 2017)? Such an overall policy framework should be placed in the ISA Strategy and anchored in future exploitation regulations. It would aid the ISA to determine whether exploiting the minerals is, in fact, in the interest of mankind, and also to eventually determine the right point in time when exploitation would become the best option for achieving progress towards the SDGs (independent of whether exploitation was technically feasible prior to that time). Such a framework would allow for assessing incoming applications for exploration or exploitation under the lens of a commonly agreed and comprehensive vision of the benefits and costs of minerals mining in the Area.

This is urgently necessary, as the criteria for assessing exploration applications and the draft criteria for assessing applications for exploitation contracts⁷⁴ are predominantly formal and unlikely to lead to non-approval, making the exploitation of the common heritage prey to the interests of national or private contractors.

A number of questions need to be addressed, such as those modified from Jaeckel *et al.* (2017):

- Are minerals from the Area essential for enabling the transition to sustainable economies and societies, as envisaged in the SDGs? Could the exploitation of minerals from the Area become publicly acceptable?
- Should this be the case, would it be for a limited time only to get the circular economy started? Is it worth the risks to the environment (see below)?
- How to prevent investments into deep seabed mining from hampering the transition to a predominantly circular economy (Rozemeijer *et al.*, 2018)?
- How to prevent the exploitation of minerals from interfering with the right to exploit related genetic resources and the protection provisions under development for the biodiversity in areas beyond the limits of national jurisdiction?

⁷⁴ See www.isa.org.jm/sites/default/files/documents/isba24_ltcwp1rev1-en_0.pdf, Section 3.

- Should there be an upper limit for the number of exploitation contracts at any given time in view of the potential impacts of price changes on profitability, that is, the development of the payments to the ISA for redistribution, and cumulative environmental risk?
- What are the risks and benefits of seabed mining now versus in the future, when technology has improved and need has increased?
- How to determine what should be left to future generations, and in which form?
- How can it be ensured that the financial and other economic benefits from mining mineral resources in the Area constitute a real benefit to mankind, in particular to civil societies in developing countries? How can impacts on the economies of minerals-exporting countries be prevented?

The question of whether there is a need for minerals from the Area is, of course, closely linked to developments on land – as are all of the sustainability aspects. Holistic science projects and stakeholder dialogues may be helpful to find solutions on metal resource development, uses, and fates (Boetius and Haeckel, 2018); see also below.

Environment

A common vision for the common heritage of mankind necessarily requires a commonly agreed vision for the long-term future and role of the marine environment to be preserved and transferred to future generations. The effective protection of the marine environment is a core obligation of the management regime under Art. 145 of UNCLOS and the 1994 Implementing Agreement, strengthened by the protection obligation to States under Part XII of UNCLOS. So far, however, the ISA has not yet adopted a comprehensive environmental management strategy. Such a strategy would include agreed environmental goals and targets as well as procedural means to assess – individually and cumulatively – the expected (and later real) impacts of current and future activities on the environment in the Area and the water column above (Jaekel, 2015).

The Environmental Strategy, including a long-term vision, could implement the environmental side of the ISA Strategic Plan (International Seabed Authority, 2018, part III, para. 2), which characterises the multiple requirements arising from the common heritage status of the Area:

«[T]he challenge for the Authority is to adopt a policy and regulatory framework for environmental management that achieves the effective protection of the marine environment, under circumstances of considerable scientific, technical and commercial uncertainty. The framework should be adaptive, practical and technically feasible. It must satisfy the extensive marine environmental protection requirements of the Convention, as well as taking into account relevant aspects of the Sustainable Development Goals and other international environmental targets, such as the Aichi Biodiversity Targets. The process for developing the framework and its implementation must be transparent and allow for stakeholder input. The development of regional environmental assessments and management plans, in particular, demands

a collaborative and transparent approach to both the collection and sharing of environmental data. The process must ensure the fully integrated participation of developing States, not least in connection with international obligations to build technical capacity.»

All of the legislation applicable to the Area implicitly assumes that mining will cause environmental damage (International Seabed Authority, 2017; Jaeckel, 2017b), which requires that the precautionary principle has to be implemented (ITLOS, 2011). This not only requires the consideration of scientific knowledge (the known facts) but also the identification and examination of uncertainties (the known unknown). In particular, the considerable uncertainties with regard to the scale and severity of environmental changes likely to be caused by deep seabed mining operations limit the current options for decision-making on making progress towards an exploitation regime. Given the uncertainties, value considerations (What is it worth to us? Which risks are we willing to take?) play an important role. Values are always subjective values, and in order to capture the various concerns and viewpoints on perceptions of risk and acceptability of harm, public participation should be ensured (Jaeckel, 2017a; Stern, 2011). A transparent and inclusive debate on the values and valuing the common heritage of mankind will also be essential for balancing the potentially competing interests of mining operators, civil society, States, regulators, etc.

The process towards the agreement of a vision, goals, and objectives for the marine environment in the Area will therefore touch the core questions of a common vision for the common heritage. Some of the essential elements are to find answers related to the implementation of the environmental protection obligations of UNCLOS in Art. 145 «to ensure effective protection for the marine environment from harmful effects which may arise from such activities», including «the prevention, reduction and control of pollution and other hazards to the marine environment», and «the protection and conservation of the natural resources of the Area and the prevention of damage to the flora and fauna of the marine environment». In addition, States have the duty «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» (Art. 194 (5)).

- What is effective protection, what are harmful effects, and how is precautionary action triggered?
- What are the natural resources of the Area, which are the fragile ecosystems and otherwise endangered species and habitats to be protected?
- What level of environmental harm to the common heritage would be consistent with Art. 145 and the SDGs or otherwise acceptable, if at all, under the prevailing pressures and large-scale changes from other human activities? How can it be ensured that the management of the common heritage does not lead to new impacts on the physical and biological functional properties of the oceans (and atmosphere) that will further enhance the stress on biosphere function, integrity,

and, eventually, indirectly climate change indicators such as carbon sequestration potential and stratification?

- How could threshold values for activities, emissions, or recipient reactions be found given the overall uncertainty and ignorance as to the individual and cumulative effects of activities on the functioning of the deep-sea ecosystem?
- How could the environmental risks of proceeding towards commercial exploitation be assessed with some certainty, given the need for reliable data and confidence on the cause-reaction mechanisms?

Overall, a common environmental vision has to aim for the long-term preservation of the integrity of the ecosystems of the Area and related ecosystem services. The highest priority will be to organise and fund further collaborative research programmes, such as those of the EU Joint Programming Initiative on Oceans and its «MiningImpact» projects, which are collaboratively funded by several European governments.⁷⁵ Ideally, such collaborations involve the partnership with a scientific institution from a less-developed country, providing for a longer-term, structured environment for exchange and training. This will significantly help to share the benefits in terms of scientific knowledge and experience, visualisation of the deep ocean for the public, and capacity development in governments from the common heritage.

Knowledge and capacity development

Although it is likely that some exploration contract areas in the CCZ of the tropical Pacific are among the best investigated deep-sea sites globally, in view of the limits of scientific sampling and experiments in the deep and the vastness of the regions concerned, this does not mean much: Although knowledge about the taxonomic composition of the different seafloor habitats is slowly improving, the functional relationships, the natural short- and long-term variability, and, in particular, the knowledge about the deepwater column organisms and their sensitivities need substantial research efforts.

The Decade of Ocean Science for Sustainable Development (2021–2030) proclaimed by the UN⁷⁶ offers an ideal chance to collaboratively intensify deep-sea research, independent of any exploration contractor. One of the core objectives is to improve the scientific knowledge base through capacity development to regions and groups that are presently limited in capacity and capability, especially Small Island Developing States and least-developed countries. The main intention is to support efforts to reverse the cycle of decline in ocean health and gather ocean stakeholders worldwide behind a common framework that will ensure ocean science can fully support countries in creating improved conditions for the sustainable development of the ocean.

As the deep sea is the place with most of the persistent knowledge gaps (only 5 % of the ocean floor has been mapped at high resolution; 99 % of habitable marine

⁷⁵ See <https://miningimpact.geomar.de>

⁷⁶ See <https://en.unesco.org/ocean-decade>

areas lack basic biodiversity knowledge for their management),⁷⁷ investing in further research will contribute to developing research potential in places other than the current few nations with large research capacities, will enable science to develop investigations independently, and will take away the pressure on scientists to apply for mining-related funds. More science will also involve more technology development for visual, acoustic observations, sampling, and experimental research.

Within the framework of the Decade of Ocean Science for Sustainable Development, the ISA could design a global research plan for the Area (set out for national/international funding) based on existing knowledge and gap analysis – this should lead to the strengthening of international research cooperation with a strong component of longer-term education and capacity-building for developing countries.

As the current programmes of the ISA for enabling education, training, and capacity development of scholars from developing countries are limited to short-term and individual visits, there is a substantial need to put it on a long-term and reliable basis. Despite their contractual obligation to do so, not all of the contractors offer opportunities for external scholars. Why doesn't each contractor act as a godfather for the training of deep-sea scientists from non-sponsoring States?

The capacity development needs of most countries around the world to enable them to be well-informed in order to participate in the complex ISA debates (and the formation of an opinion with regard to their common heritage vision) ranges across various deep seabed disciplines, including the Law of the Sea, marine geology, mining technology, contract negotiation, protection of the environment, etc. A dedicated university – a sibling to the World Maritime University – could be a means of delivering the required expert knowledge on scientific, governance, and legal aspects of the Area and the common heritage of mankind to students and governance personnel from developing countries and help address persistent challenges, such as those identified for Small Island Developing States (Salpin *et al.*, 2018).

Governance

Resource governance

Building a common vision for the common heritage of mankind would necessarily be linked to a global overview of present and future resource need and demand on the world market. The ISA has the obligation to conduct a study of the potential impact of mineral production from the Area on the economies of developing land-based producers of those minerals that are likely to be the most seriously affected⁷⁸; however, this has not been pursued, yet. In view of the expected changes in the global demand for minerals in the course of the transition to a sustainable and circular use of minerals, Ali *et al.* (2017) propose to establish a global resource governance mechanism to enable systematic resource assessment, analysis, and planning.

⁷⁷ See <http://unesdoc.unesco.org/images/0026/002619/261962e.pdf>

⁷⁸ 1994 Agreement, annex, sect. 1 (5) (e).

In particular, more robust foresight methodologies and capabilities need to be developed to assess future minerals and metals demand, as influenced by such factors such as regulatory regimes adopted by countries; the power of incentives; bottom line issues, including financial return, metal prices, and operational costs; global economic growth; population dynamics; the development of the global middle-class and urbanisation; geopolitical risks; the impact of technologies; advances in materials science; progress in minerals and metals recycling rates; and the possible substitutions of rare minerals and metals in their main uses. This wealth of information would strengthen minerals and metals governance and contribute to the design of better public and industrial strategies, including those aimed at mitigating the environmental impact of resource extraction and use.⁷⁹

While for most mineral resources, depletion is not considered to be an issue, despite annual growth in consumption of 4–6 per cent, Henckens *et al.* (2016) propose to adopt a new international agreement on scarce mineral resources to reduce the currently unsustainable rate of depletion of mineral resources to sustainable levels. As future generations may have a legitimate expectation of equitable access to planetary resources,⁸⁰ the agreement would create a fixed level of reduction in the extraction rate for a number of priority minerals in order to prevent the depletion of these minerals for use by later generations. Out of 65 minerals (mostly metals and metalloids), the extractable global resources of only 15 of these will be depleted within about 350 years, with five due to be depleted within 100 years (Henckens *et al.*, 2014). The scarcity of minerals is only a matter of the price for extraction, which increases with decreasing concentration, not rarity. This is why minerals from the deep sea are attractive to miners: The comparatively high concentrations of minerals in extractable ore have been depleted over centuries of land mining.

It is therefore a much better long-term strategy to artificially limit the recovery of scarce metals than to exploit new resources under unsustainable conditions. The agreement was proposed because it was considered unlikely that market mechanisms would be effective in reducing the current metal consumption rate (Henckens *et al.*, 2016).

Ocean governance

The common heritage regime, as exercised by the ISA, is by no means isolated from other governance mechanisms or other legitimate ocean uses and their effects on the marine environment. Chapter 4 elaborated on the range of potential conflicts with other interests that may arise once mining starts. The overall goal would be to establish a comprehensive systems governance for the high seas and the Area – supporting each other – and a strong land-sea interconnection, in particular with respect to a global resources budget.

⁷⁹ Interview with A. Pedro, www.unenvironment.org/news-and-stories/story/mineral-resource-governance-21st-century-conversation-antonio-pedro

⁸⁰ International Law Association, 2014. Legal Principles Relating to Climate Change, Washington Conference quoted by Henckens *et al.* (2016).

As a first step, a joint concept for biodiversity protection in the high seas and the Area should be developed and implemented before permitting the first exploitation of mineral resources, and ideally before finalising the ISA Mining Code. Therefore, the final steps in the development and adoption of the ISA exploitation regulations should be aligned with the current negotiations towards an international agreement for the conservation of biodiversity in areas beyond national jurisdiction. Measures should be harmonised, such as procedures and criteria for environmental impact assessments, to ensure that all activities and impacts, including cumulative impacts, are considered and assessed. The ISA's mandate is restricted to the Area and its resources, yet its impacts may go far beyond the Area. Where impacts of seabed mining will impact marine biodiversity in areas beyond national jurisdiction – including the high seas from sediment dispersion – the role of the new Agreement will be essential in prescribing both standards and procedures for the protection of marine biodiversity as well as methods of coordination and governance to ensure cross-sectoral cooperation as well as governance.

In view of the ongoing debate about whether marine genetic resources of the Area – often inseparable from mineable resources, but subject to the high seas regime under development – should be subject to a common heritage regime as well, care should be taken to not destroy opportunities for future use. Tladi (2017) therefore argues that, ideally, a harmonised governance under a common heritage of mankind idea might help to guard the best interests of current and future generations.

When considering the development of a contemporary vision for the common heritage of mankind, even a more revolutionary, integrated picture could be imagined, nearer to the original proposal of Arvid Pardo in his famous speech in 1967.⁸¹ Given the concerns for the globally deteriorating status of the ocean ecosystems, it seems advisable to include in the vision for the common heritage the supporting and regulating marine ecosystem functions and services as an untradeable public good that has to be maintained as well as possible for future generations. A far-reaching, visionary – yet likely politically not achievable – proposal is to return to the original idea for the common heritage of mankind by Arvid Pardo (Pardo, 1993) and apply the common heritage provisions, including the associated environmental responsibilities, as a normative principle to all oceans, acknowledging them as a global commons (Taylor, 2018b).⁸²

As proposed by Kim and Bosselmann (2013), this could be part of a global goal-oriented, purposive system of multilateral agreements that unifies the different current international regimes and organisations under a common «grundnorm». The protection of the integrity of Earth's life-support system or planetary boundaries could serve as a unifying goal and benefit for at least partly overcoming the continued degradation of the marine environment due, in part, to the fragmentation

81 See document A/C.1/PV.1515 UN General Assembly First Committee 1515th Meeting official records, <http://undocs.org/A/C.1/PV.1515>. See also Taylor (2018a).

82 See also WGBU, 2013. World in Transition. Governing the Marine Heritage. German Advisory Council on Global Challenge, p. 26 (Summary).

of legal and management instruments (Kim and Bosselmann, 2013; Taylor, 2014, 2018a). A global conversation involving all stakeholders and members of the public should assess all of these factors, which will help contribute to an informed, transparent, and meaningful decision about the benefits and costs of seabed mining as seen through the lens of a contemporary vision of the common heritage of mankind.

Conclusions

The way deep seabed mining is driven forward today, it will reinforce unsustainable patterns of production and consumption, divest from recycling, put in place environmentally harmful practices, and further exacerbate inequality in both spatial and temporal dimensions (Kim, 2017). Time should be taken to reconsider which future we want to give to the common heritage in the long term. Now, while a legal framework enabling the exploitation of minerals from the Area is still being developed, and prior to any mining, the time is right to step back and develop a joint vision of the common heritage of mankind, how it can contribute to achieving the SDGs, and which decisions may affect the path to sustainability. Given the finite mineral resources on Earth, the prevailing structural disadvantages of the Global South, planetary boundaries for human interventions, the dwindling of ocean wildernesses and loss of ocean biodiversity, and the numerous usage conflicts that deep seabed mining may incite, collective international governance efforts are needed to meet our responsibilities to future generations and to bequest to them all the opportunities for enjoying ecological integrity as well as the beauty and resources of the oceans.

ABBREVIATIONS

APEI	Area of Particular Environmental Interest
BBNJ	Biodiversity in Areas Beyond the Limits of National Jurisdiction
BGR	Federal Institute for Geosciences and Natural Resources/ Bundesanstalt für Geowissenschaften und Rohstoffe
CBD	Convention on Biological Diversity
CCZ	Clarion-Clipperton Fracture Zone
EBSA	Ecologically or Biologically Significant Area (CBD)
ISA	International Seabed Authority
ITLOS	International Tribunal for the Law of the Sea
km	Kilometre
LDC	Least-Developed Country
LTC	Legal and Technical Commission (ISA)
m	Metre
mm	Millimetre
MPA	Marine Protected Area
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
SDG	Sustainable Development Goal
SIDS	Small Island Developing States
SMS	Seafloor Massive Sulphides
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea

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ABOUT THE AUTHORS

Dr Sabine Christiansen is a marine ecologist with longstanding experience with serving the science-policy interface for fostering marine conservation and ocean governance, including on the high seas and the Area. She has actively contributed to developing the environmental regime of the International Seabed Authority representing observer organisations since 2009, and she is currently coordinating the R&D project «Deep Seabed Mining – Test Mining and Fair Benefit Sharing», 2018–2020, at the Institute for Advanced Sustainability Studies (IASS) in Potsdam, Germany.

Duncan Currie, LL.B, LL.M is an international lawyer who has attended International Seabed Authority meetings since 2012. He has practised international environmental law for more than 30 years.

Katherine Houghton, MALD, LL.M is an international law expert with a special focus on lawmaking at the interface of legal sciences and international politics, in particular in relation to the Law of the Sea and technical environmental protection.

Alexander Müller is the Managing Director of TMG – ThinkTank for Sustainability in Berlin, Germany. He was Study Leader of «The Economics of Ecosystems and Biodiversity for Agriculture and Food (TEEBAgriFood)» hosted by UN Environment. From 2006 to 2013, he served as Assistant Director-General of the Food and Agriculture Organization of the United Nations (FAO). During this time, he was a Member of the Advisory Group of UNSG Ban Ki-moon on Energy and Climate Change (AGECC) and Chair of the UN Standing Committee on Nutrition. From 2000 to 2006, he served as State Secretary in the German Ministry for Consumer Protection, Food and Agriculture.

Dr Manuel Rivera is a sociologist and leads the Narratives of Sustainability Research Group at IASS. Previous experience includes working as a office manager for the German Council for Sustainable Development (RNE). As a researcher, he has covered topics as diverse as the emergence of the Sustainable Development Goals, urban development policies, and arts-based methods for sustainability research.

Oscar Schmidt is an environmental and agricultural economist and research associate in the Narratives of Sustainability Research Group at IASS. Previous work experiences include the IASS Global Soil Forum and the Leibniz Institute of Agricultural Development in Transition Economies (IAMO). As a researcher, he has covered a variety of topics, including the political ecology of biofuels and bioenergy, the

sustainable governance of groundwater resources, and the analysis of sustainability discourses.

Prue Taylor, LL.B, LL.M, LL.M is the Deputy Director of the New Zealand Centre for Environmental Law and a legal academic at the University of Auckland. Her work focusses on transformative legal approaches to governance of the commons. She has published extensively on the common heritage concept, including a 2013 Bibliography of Legal Writing on the Common Heritage of Mankind.

Sebastian Unger leads the Ocean Governance Research Group at IASS. He has 15 years of experience in international ocean policy and has worked previously in government and for international organisations. His research focusses on global governance processes for ocean sustainability.



Institute for Advanced Sustainability Studies e.V. (IASS)

Berliner Straße 130

14467 Potsdam

Tel: +49 (0) 331-28822-340

Fax: +49 (0) 331-28822-310

Email: media@iass-potsdam.de

www.iass-potsdam.de



ThinkTank for Sustainability (TMG)

EUREF-Campus 6-9

10829 Berlin

Tel: +49 (0) 30-92107407-00

Email: info@tmg-thinktank.com

www.tmg-thinktank.com

Towards a Contemporary Vision for the Global Seafloor

Implementing the Common Heritage of Mankind

The open ocean hosts an inconceivable wealth of marine life. Most of it remains unseen and unknown. Actually, the international community has agreed to develop a new legally binding agreement for the conservation and sustainable use of marine biodiversity by 2020. It aims to respond to the global ocean crisis caused by overfishing, pollution with plastics, ocean acidification, climate change, and other stressors from human activities.

At the same time, States are also working on the legal framework for deep seabed mining – a considerable contradiction. As too little is known about the wealth that could be lost due to harmful impacts from mining activities, humankind should take its time to reflect, develop robust governance systems, and develop the knowledge needed to take informed decisions.

The present study, authored by scientists from different backgrounds, makes the eloquent case for such a reflection, pause, and reassessment. The publication is recommended to any reader concerned about our oceans' future.

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