



The Contribution of the International Seabed Authority to the Achievement of the 2030 Agenda for Sustainable Development



2021-2030
United Nations Decade
of Ocean Science
for Sustainable Development



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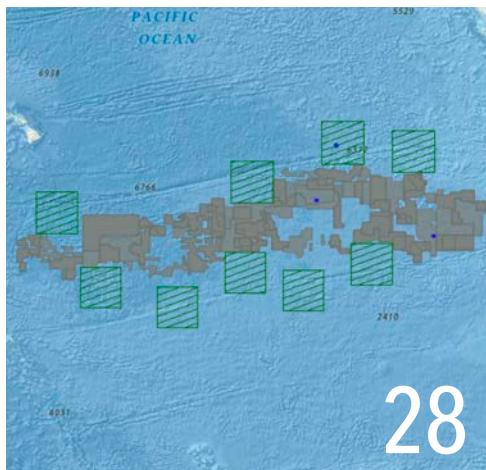
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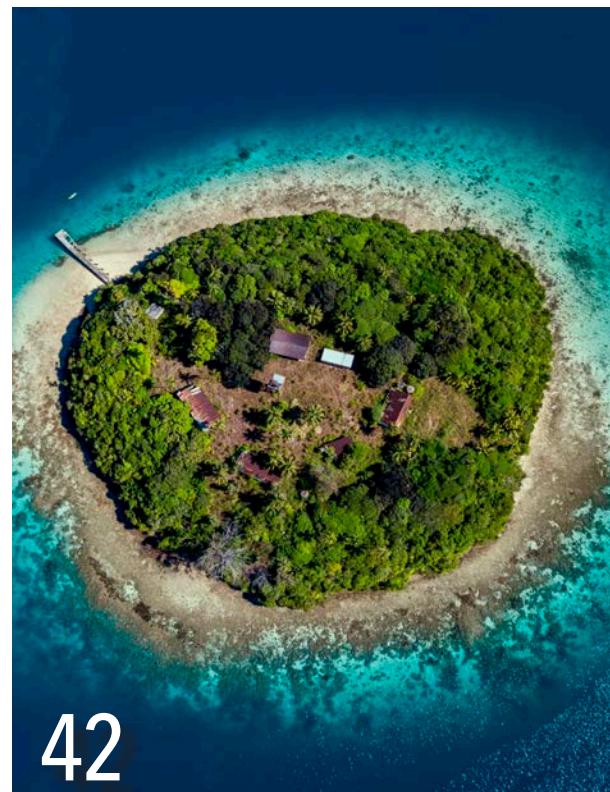
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Acknowledgments

This report was commissioned by the Secretary-General of ISA pursuant to the Strategic Plan of ISA for 2019-2023.¹ The Strategic Plan recognises the importance of ISA's contribution to the timely and effective implementation of the Sustainable Development Goals through discharging the economic, environmental and social mandate assigned to it under UNCLOS and the 1994 Agreement and Goal 14: Life below water, in particular. The High-Level Action Plan for 2019-2023 further identifies that one of the indicators to assess ISA's progress towards meeting this objective is to be found in the programmes and initiatives that contribute to the achievement of relevant goals and targets of the 2030 Agenda (performance indicator 1.1).²

This publication was produced by ISA under the overall supervision of Dr. Marie Bourrel-McKinnon, Senior Policy Officer and Special Assistant to the ISA Secretary-General, with the assistance of Dr. Sonakshi Mishra, Programme Manager, Executive Office of the Secretary-General.

The report is the result of an independent assessment undertaken by a consultant, OpenCities, selected through a global recruitment process. The Secretariat wishes to commend OpenCities on its work and to particularly acknowledge the contributions of David Norman, George Beardon, Paul Elsner, Marc Stephens and Juliette Taylor.

Furthermore, the Secretariat also wishes to express its deepest appreciation to the Group of Experts established by the Secretary-General to provide inputs and strategic advice in the preparation of this report. Each of these eminent and world-renowned experts (see **Annex II**) made a significant contribution in leading and guiding the discussions which led to this comprehensive report.

In addition, the Secretariat also wishes to thank all representatives of Member States, contractors and other stakeholders, including non-governmental, international and regional organizations (see **Annex I**) who agreed to be interviewed for the purposes of this report.

Finally, we thank the Communications Unit for the work on preparation of this publication, particularly Stefanie Neno, Shanique Gregory and Pablo Rebaque.

Acronyms and abbreviations

ADSR

Africa's Deep Seabed Resources

AMDC

African Mineral Development Centre

APEI

Area of particular environmental interest

AUV

Autonomous underwater vehicle

EFMSR

Endowment Fund for Marine Scientific Research

GEWE

Gender equality and women's empowerment

IEA

International Energy Agency

IGO

Intergovernmental organization

IMO

International Maritime Organization

IOC

Intergovernmental Oceanographic Commission

IODE

International Oceanographic Data and Information Exchange

ISA

International Seabed Authority

ITLOS

International Tribunal for the Law of the Sea

JPI Oceans

Joint Programming Initiative Healthy and Productive Seas and Oceans

LLDC

Landlocked developing country

LTC

Legal and Technical Commission

MSR

Marine scientific research

NGO

Non-governmental organization

NORAD

Norwegian Agency for Development Cooperation

OBIS

Ocean Biodiversity Information System

POLYDAT

ISA's Database of Polymetallic Nodule Resources in the Area

P-SIDS

Pacific small island developing State

REMP

Regional environmental management plan

ROV

Remotely operated vehicle

SDG

Sustainable Development Goal

SIDS

Small island developing State

SPC

Pacific Community

UN

United Nations

UN-OHRLLS

United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States

UNCLOS

United Nations Convention on the Law of the Sea

UN DESA

United Nations Department of Economic and Social Affairs

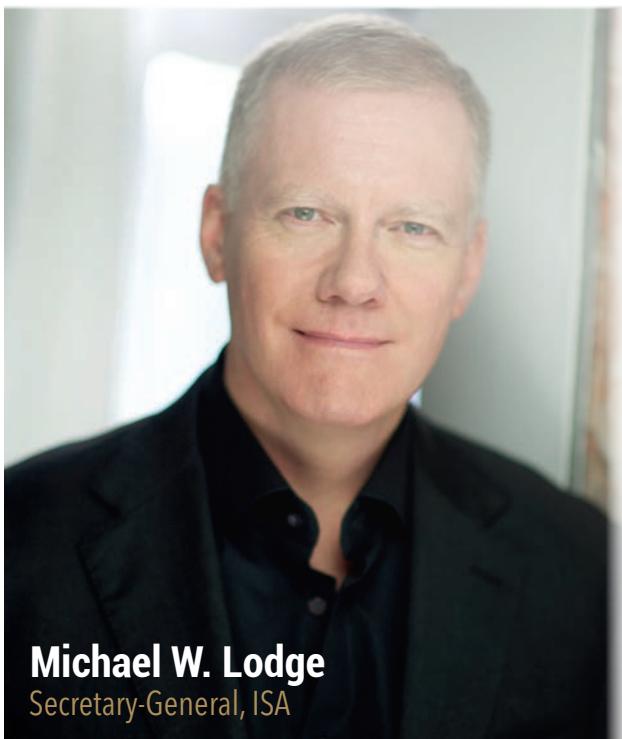
UNESCO

United Nations Educational, Scientific and Cultural Organization





Foreword by the Secretary-General



Michael W. Lodge
Secretary-General, ISA

It gives me the greatest pleasure to introduce this important report on the contribution of the International Seabed Authority to the achievement of the United Nations' 2030 Agenda for Sustainable Development and its Sustainable Development Goals.

The ISA Strategic Plan 2019-2023 explicitly recognises the importance of the Authority aligning its programmes and initiatives towards the realization of the SDGs, in particular Goal 14. Among the key performance indicators for the Authority in implementing its Strategic Plan under the High-Level Action Plan 2019-2023 are to identify the number of programmes and initiatives overseen by the Authority that contribute to the achievement of relevant goals and targets of the 2030 Agenda.

This report not only contributes to that objective but also provides remarkable insight into the breadth and scope of the Authority's activities. It provides evidence that the Authority, and the legal regime established by the 1982 UN Convention on the Law of the Sea together with the 1994 Implementation Agreement, actually contribute in a meaningful way to twelve of the SDGs.

The report is timed to contribute to international efforts to track progress as we approach the halfway point between the framing of the SDGs in 2015 and the 2030 deadline for their achievement. It also coincides with the beginning of the UN Decade of Ocean Science for Sustainable Development in 2021.

I am very grateful to all of those involved in the preparation of this important report, and particularly to the Group of Experts: Saleem Ali, Gillian Davidson, Bebeb Djundjunan, Maria-Theresa Infante, Mathu Joyini, Pedro Madureira, Mariusz Orion-Jedrysek, Alison Stone-Roofe, Siosua 'Utoikamanu, and James Waweru, who gave freely of their time and expertise to offer their advice and help us to test the conclusions of the report. It was a pleasure to work with such a distinguished group, and I thank each and every one of them for their contribution.

I also wish to thank all those who volunteered to be interviewed for the purposes of the report, whose names are listed in Annex 1. In selecting potential interviewees, we deliberately chose as wide a range of views as possible, and I believe this is reflected in the report. What was striking, however, is that all interviewees shared a strong sense of commitment to the underlying mission of the Authority.

It was a pleasure to work with the team from Open Cities, who acted as our consultants on this project. My thanks must also go to Dr. Marie Bourrel-McKinnon and Dr. Sonakshi Mishra from the Executive Office of the Secretary-General, who initially conceived this project and conducted all the hard work in its implementation.

I commend the report and the recommendations contained in it to the Authority's membership and all stakeholders.



Executive Summary



Photo: Japan Oil, Gas and Metals National Corporation (JOGMEC)

This report reviews the contribution of the International Seabed Authority (ISA) to the achievement of the United Nations' 2030 Agenda for Sustainable Development and its constituent Sustainable Development Goals (SDGs). It is timed to contribute to international efforts to track progress as we approach the halfway point between the framing of the SDGs in 2015 and the 2030 deadline for their achievement. The review contributes to the UN Decade of Action to deliver the Global Goals and coincides with the beginning of the UN Decade of Ocean Science for Sustainable Development in 2021. The report is based on an analysis of documentary evidence, along with interviews and online meetings with experts from a broad range of backgrounds, as set out in the Annexes.

ISA provides a neutral platform for collective deliberation on related trade-offs by the nations of the world, leading to joint decision-making on how best to put in place environmental measures and share benefits worldwide. This is an essential contribution to sustainable development as a whole, responding in a cautious and planned way to the projected dramatic increase in the supply of minerals needed for decarbonisation over the next two decades. ISA's mandate particularly contributes to SDG 1 (No poverty), SDG 8 (Decent

work and economic growth), SDG 10 (Reduced inequalities), SDG 12 (Responsible consumption and production), SDG 13 (Climate action), SDG 14 (Life below water), SDG 15 (Life on land), SDG 16 (Peace, justice and strong institutions) and SDG 17 (Partnerships for the goals).

ISA's contribution to the SDGs is embodied within its core mandate: to strengthen the rule of law in ocean governance, preventing unconstrained exploitation of deep-seabed mineral resources whilst ensuring the effective protection of the marine environment and ensuring the equitable sharing of benefits.



ISA makes further contributions focused on SDGs 14 and 16 by setting comprehensive rules, regulations, and procedures that contractors must comply with while exploring for marine minerals as well as during exploitation. Without these rules, the marine environment would not be protected from the harmful effects of future deep-sea mining. Thanks to the existence of ISA, there has been an opportunity to weigh up possible impacts of deep-sea mining and put in place effective measures to protect the environment and mitigate potential damage before moving ahead with exploitation. This is not always implemented in terrestrial mining, and has not been achieved for any other global resource.

Through its core mandate and its Voluntary Commitments and partnerships, ISA contributes to SDGs 14 and 16 by helping to improve the scientific community's knowledge of the deep ocean. The resources required to operate ocean-going vessels for deep-sea research are beyond those available to most research institutes in developing countries. By requiring contractors to undertake environmental studies before they can apply for exploitation contracts, and by setting standards for data collection, ISA enables contractors to contribute to the global knowledge base through the information they collect during exploration. ISA publishes the environmental elements of this research on its DeepData database. It also fosters collaboration between industry and academics by supporting exchanges and other connections via an endowment fund, and by hosting events that bring together industry and researchers to review evidence together.

ISA's Voluntary Commitment on Enhancing the Role of Women in Marine Scientific Research, registered at the United Nations Ocean Conference in 2017, has been at the heart of its contribution to SDG 5 (Gender equality). This programme of work has included informing policy, developing capacities, supporting partnerships, and wider outreach and communications. These have all emphasised gender in deep-sea research, in leadership and in policymaking. ISA's Secretary-General has been recognised as an International Gender Champion, participating in networks of decision makers to promote proactive and positive measures to address Gender Equality and Women's Empowerment (GEWE).

Support for capacity-building is a further area in which ISA contributes widely to the SDGs, in particular SDG 4 (education), SDG 16 (strong institutions) and SDG 17 (partnerships). As interns and trainees on board exploration vessels, some interviewees for this review had gained experience that enabled them to rapidly become leaders in research or government roles. Practical training and internships also contribute to technology transfer, as the experience of seeing what technologies are available and most useful is brought by trainees into their national research institutes or departments and informs later decision-making on technology investments. ISA's wider capacity-building work supports the least developed countries (LDCs), land-locked developing countries (LLDCs), small island developing States (SIDS), and other less technologically-advanced States to enable them to take part in decision-making on the future of deep-sea mining. Some such States have been able to take on the role and benefits of sponsoring a contractor in the exploration phase.

The report concludes with recommendations, including that the ISA Secretariat should share information more widely about how restricted funding streams and other measures ensure that its regulatory function is in no way influenced by incentives arising from its participation in regulated activities. It should also develop a more intuitive interface for the DeepData database and, if resources permit, strengthen its internal scientific capacity. ISA's Members are encouraged to be more explicit in public about their perspectives on trade-offs at the heart of ISA's mandate and ISA's observers are encouraged to respect the legitimacy of the internationally-agreed processes for working through trade-offs and uncertainties. ISA's Legal and Technical Commission could share greater detail on how and why it reaches certain conclusions. Finally, ISA's Members should review whether the resourcing from their contributions will be sufficient for the Secretariat to fully cover all the functions needed to fulfil the potential of ISA's mandate to contribute to the SDGs.

Through the implementation of its mandate and its Voluntary Commitments, ISA contributes towards 12 of the 17 SDGs



**Strengthening the rule of law
in ocean governance**

**Developing deep-sea mineral resources
to benefit humanity as a whole**

**Ensuring a rapid and safe transition
to low-carbon economies**

**Preventing environmental harm through
developing a global regulatory framework
for deep-seabed mining**

**Developing capability and
strengthening institutions**

**Contributing to
marine science**





Introduction

This report reviews the contribution to the achievement of the United Nations' 2030 Agenda for Sustainable Development and its constituent SDGs.³ It is timed to contribute to international efforts to track progress as we approach the halfway point between the framing of the SDGs in 2015 and the 2030 deadline for their achievement. The review contributes to the UN Decade of Action to deliver the Global Goals⁴ and coincides with the beginning of the UN Decade of Ocean Science for Sustainable Development in 2021.⁵

The ISA Strategic Plan 2019–2023⁶ explicitly recognises the importance of ISA contributing to the timely and effective implementation of the SDGs, in particular SDG 14. ISA's High-Level Action Plan 2019–2023⁷ specifically identifies one indicator to enable ISA to assess its progress towards meeting this objective (performance indicator 1.1). To deliver against this important item, the Secretary-General of ISA commissioned this review of the contribution of ISA to the achievement of the 2030 Agenda.

ISA was established under the United Nations Convention on the Law of the Sea of 10 December 1982 (UNCLOS) and the Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea (the 1994 Agreement) as the organization through which States parties to UNCLOS organize and control all mineral-resources-related activities in the Area⁸ for the benefit of humankind as a whole. In so doing, ISA has the mandate to ensure the effective protection of the marine environment from harmful effects that may arise from deep-seabed-related activities.

Scope and process

The scope of this review encompasses the role and mandate of ISA under UNCLOS and the 1994 Agreement, including ISA's core functions and its Voluntary Commitments. ISA comprises 168 Members (167 States and the European Union) and has granted observer status to more than 90 observers including 30 observer States, 32 United Nations agencies and intergovernmental organizations (IGOs) and 30 non-governmental organizations (NGOs). The principal organs of ISA are the Assembly, Council, and Secretariat, each with specific responsibilities. This report looks at the contribution of ISA as a whole, including all of its organs and their subsidiary bodies and its Members acting collectively.

The report is based on an analysis of documentary evidence, along with interviews with experts from a broad range of backgrounds. It concludes with some suggestions for ISA on possible opportunities for strengthening ISA's contribution to the SDGs. The report is written primarily for ISA Members, observers, and implementing partners, including UN agencies, other IGOs and contractors. It will also be relevant for other audiences interested in progress towards the SDGs.

The review was undertaken in several stages. The authors first reviewed ISA's strategies and results frameworks to clarify what ISA intends to achieve in relation to the SDGs, as set out in its formal planning processes (the ISA Strategic Plan and High-Level Action Plan 2019–2023). Recent changes in ISA's operating context were then reviewed to determine whether and how such changes might affect how ISA operates to deliver against its priority SDGs. Internal and external documents were reviewed to collect examples of ISA's contributions, as well as critiques relating to risks that might undermine ISA's achievements in relation to the SDGs. Partnerships were a particular area of analysis in considering how ISA contributes to the 2030 Agenda. Stakeholder interviews were used to explore issues emerging from the documentary evidence and provided an opportunity to compare perspectives on some contested issues. Mini case studies helped illustrate different dimensions of ISA's contributions to the SDGs in more detail.

Finally, the review findings and tentative recommendations were tested with a group of experts established by the ISA Secretary-General (see **Annex II**).⁹ These leading independent voices in their fields, many of whom were also interviewed for the report, gave valuable advice on the trade-offs, risks and opportunities facing ISA in contributing to the SDGs. All the experts are recognized internationally for their contribution to one or several elements of the SDGs and the work of ISA. The report authors are grateful for the experts' support in strengthening the analysis underpinning this review and in deriving applicable conclusions and recommendations from it.

Limitations

The review was intended to produce a concise report rather than a full evaluation or research paper, and the timescale and budget reflected this. There were consequent limits on the range of data that could be collected, including the number of parties interviewed. This was partly mitigated by reviewing written material produced by organizations that were not consulted. Travel restrictions related to the COVID-19 pandemic prevented field trips or visits to the ISA Secretariat or contributing organizations, meaning that all meetings and interviews were held through video and audio conferencing.

Structure

It begins with a brief look at the rapidly-changing context and how this influences the ways in which ISA contributes to sustainable development. It continues by looking at ISA's mandate and its core work of enabling the nations of the world to decide, together, how to sustainably manage and benefit from the mineral resources contained within the seabed beyond the limits of national jurisdiction, which have been designated as the common heritage of humankind. The report also explores the contributions from some of ISA's voluntary commitments, which focus particularly on SDG 14 (Life below water) and then sets out some findings on ISA's particular strengths and offers some insights into how ISA is contributing most effectively to the SDGs, before concluding with recommendations.

The ISA Strategic Plan 2019-2023 identifies nine strategic directions which are in line with the SDGs

1. Realize the role of ISA in a global context



2. Strengthen the regulatory framework for activities in the Area



3. Protect the marine environment



4. Promote and encourage marine scientific research in the Area



5. Build capacity for developing States



6. Ensure fully integrated participation by developing States



7. Ensure equitable sharing of financial and other economic benefits



8. Improve the organizational performance of ISA



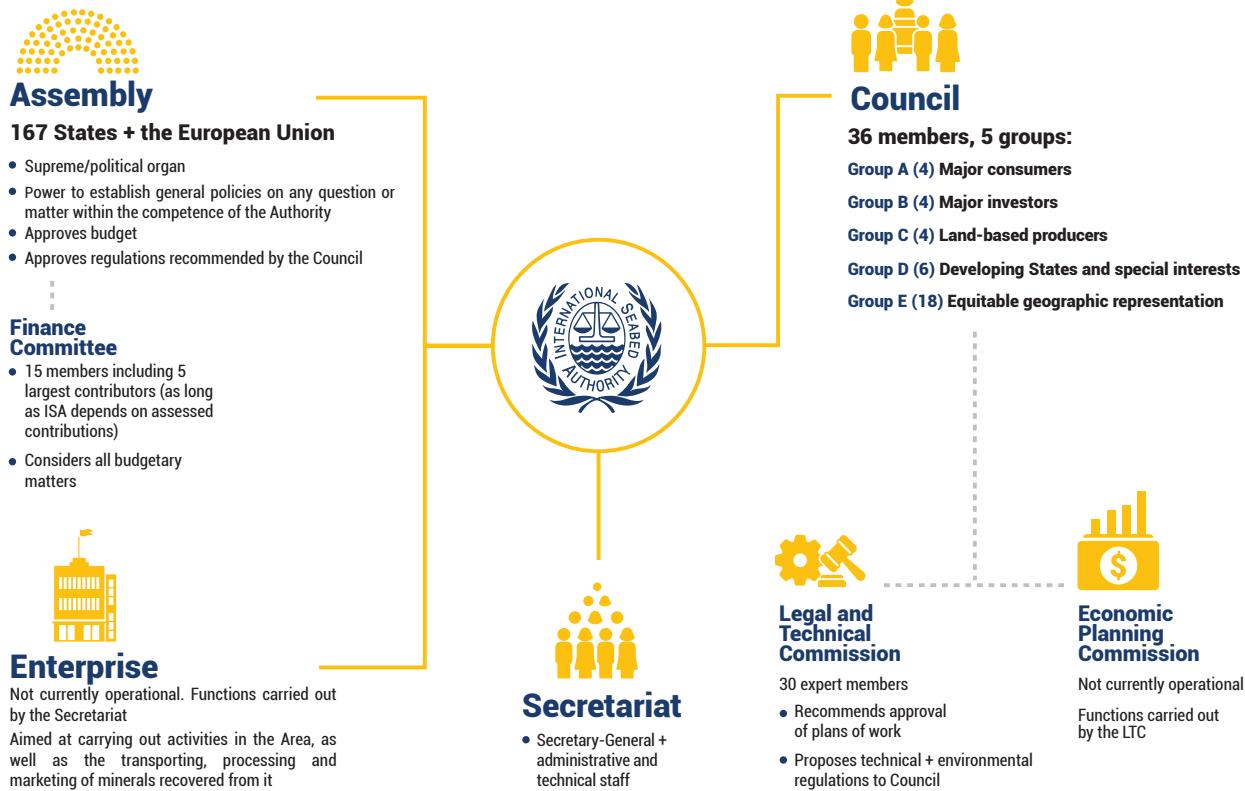
9. Commit to transparency



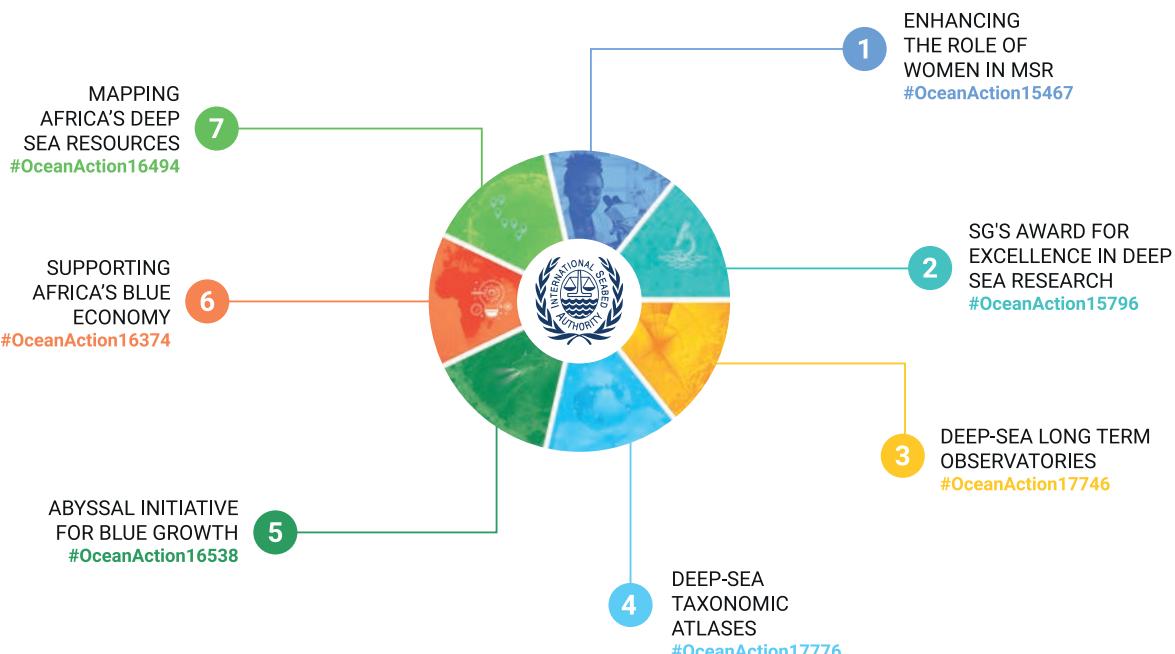
ISA at a glance



Structure and functions of ISA bodies

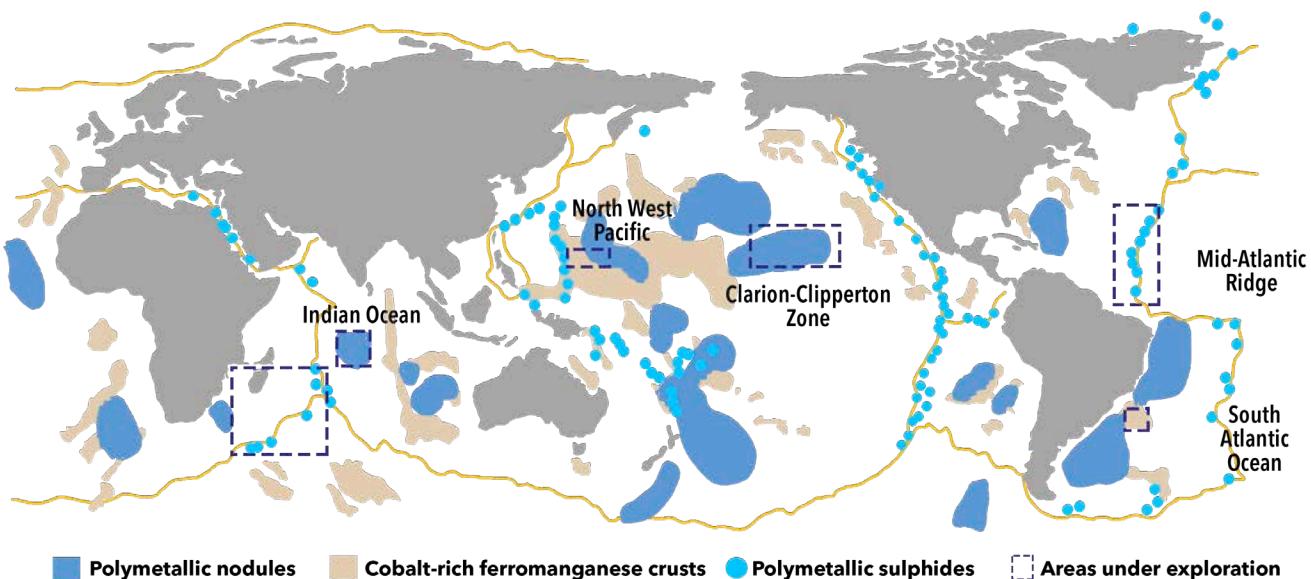


ISA Voluntary Commitments to support SDG 14: Life below Water



International governance of mineral resources in the Area

ISA is the organization through which States parties to UNCLOS organize and control all mineral-resources-related activities in the Area - defined as the seabed and ocean floor and subsoil thereof beyond the limits of national jurisdictions - for the benefit of humankind as a whole.



Context for ISA's contributions towards the SDGs

ISA's core mission was already aligned with a number of the SDGs when these were adopted by all Member States of the UN in 2015. In contrast with the earlier Millennium Development Goals, the SDGs were framed to apply equally to all countries, with the explicit expectation that the private sector, as well as governments and IGOs, would contribute to their delivery.

The 17 SDGs encompass all aspects of sustainable development, including poverty eradication, gender equality, economic development, human rights, climate change, and each element of environmental protection.¹⁰

This review focuses on ten priority SDGs (see figure on the right) and also notes areas in which ISA contributes to others such as SDG 15 (Life on land).

Since 2015, the context in which ISA operates has been changing rapidly. The most fundamental recent change is increased recognition of how dramatically the extraction and processing of certain critical minerals,¹¹ such as cobalt and nickel, will need to grow in order to enable the world's decarbonisation ambitions to be achieved by 2050. The potential for supply constraints to slow down the transition to clean energy is highlighted by the International Energy Agency (IEA) in a recent report.¹² The implications of this analysis are so significant for the world, and so deeply connected with ISA's mandate, that they form a central part of the narrative in Section 3.

Over this period, technological developments have made deep-sea mining feasible, as rising demand has made investment more attractive. Pressures in the opposite direction include the challenges in reaching agreement on the required regulations, along with some marine conservation groups seeking to block all deep-sea mining,^{13,14} with some business and political voices signing up to their campaigns.¹⁵

SDGs of central relevance for ISA



ISA has also prioritised eight further SDGs in its Strategic Plan and High-Level Action Plan for 2019-2023

1 NO POVERTY



4 QUALITY EDUCATION



5 GENDER EQUALITY



8 DECENT WORK AND ECONOMIC GROWTH



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



13 CLIMATE ACTION



16 PEACE, JUSTICE AND STRONG INSTITUTIONS



17 PARTNERSHIPS FOR THE GOALS



Ongoing differences of perspective between countries, in particular those with economic interests in land-based mining, had been anticipated in ISA's governance arrangements, with ISA forums designed to work through such trade-offs. The composition of the ISA Council is designed to reflect all relevant interest groups; this is unique in international bodies and is specifically tailored to ISA governance.

Moves towards an international legally-binding instrument on marine biodiversity in areas beyond national jurisdiction continue; this does not appear likely to have immediate implications for ISA's contributions towards the achievement of the SDGs.

THE NEGOTIATIONS THAT LED TO UNCLOS

In a 1967 speech to the United Nations General Assembly, Malta's Ambassador to the UN, Arvid Pardo, spoke of the superpower rivalry that was spreading to the oceans, of the pollution that was poisoning the seas, of the conflicting legal claims and their implications for a stable order and of the rich potential that lay on the seabed. Pardo ended with a call for "an effective international regime over the seabed and the ocean floor beyond a clearly defined national jurisdiction".

Pardo's urging came at a time when many recognized the need for updating the freedom-of-the-seas doctrine to take into account the technological changes that had altered humanity's relationship to the oceans. It set in motion a process that spanned 15 years and saw the creation of the United Nations Seabed Committee, the signing of a treaty banning nuclear weapons on the seabed, the adoption of the declaration by the General Assembly that all resources of the seabed beyond the limits of national jurisdiction are the common heritage of humankind and the convening of the Stockholm Conference on the Human Environment. What started as an exercise to regulate the seabed turned into a global diplomatic effort to regulate and write rules for all ocean areas, all uses of the seas and all of its resources. These were some of the factors that led to the convening of the Third United Nations Conference on the Law of the Sea, to write a comprehensive treaty for the oceans.

The Conference was convened in New York in 1973. It concluded nine years later with the adoption in 1982 of UNCLOS. During those nine years, shuttling back and forth between New York and Geneva, representatives of more than 160 sovereign States discussed the issues, bargained and traded national rights and obligations in the course of the marathon negotiations that produced the Convention.

BOX 1



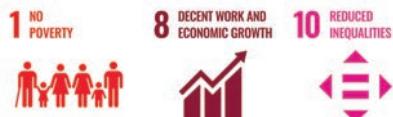
Mr. Arvid Pardo in 1965 as new Permanent Representative of Malta to the United Nations.
Photo: United Nations

ISA's mandate: a global legal regime to organize, regulate, and control all mineral-related activities in the Area for the benefit of humanity

Strengthening the rule of law in ocean governance



Developing deep-sea mineral resources to benefit humanity as a whole



Ensuring a rapid and safe transition to low-carbon economies



Prevention of environmental harm through developing a global regulatory framework for deep-seabed mining



Capacity development and institutional strengthening



Contributions to marine science

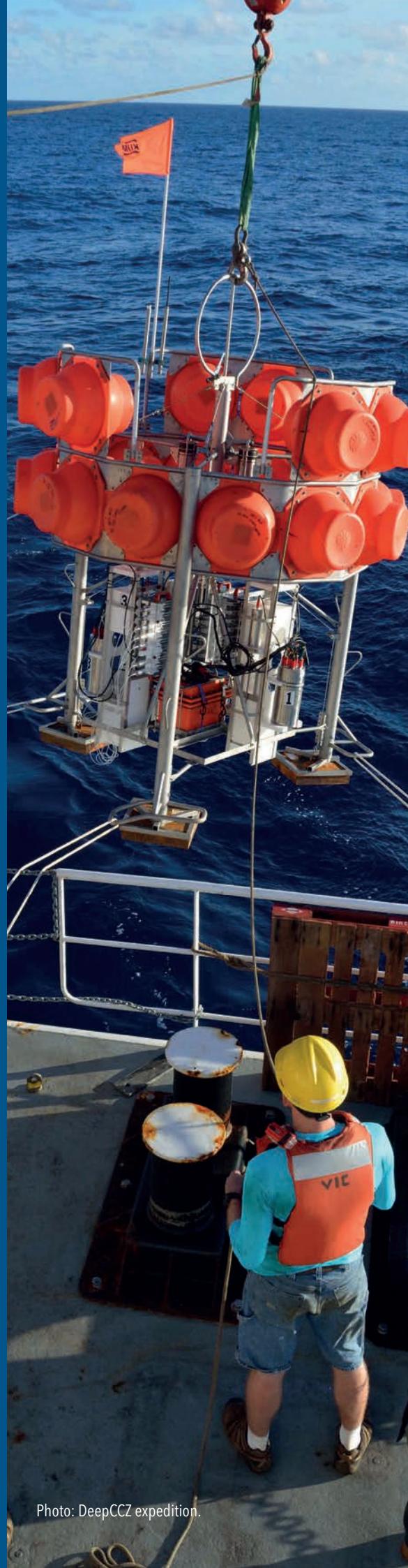




Photo: Federal Institute for Geosciences and Natural Resources of Germany (BGR)

STRENGTHENING THE RULE OF LAW IN OCEAN GOVERNANCE

The delivery of its core mandate, i.e., implementation of a global legal regime to prevent unconstrained exploitation of the seabed and secure benefits for humanity as a whole from the mineral resources of the seabed, is ISA's most significant contribution to the SDGs. Polar regions, space and the Area are vast areas accessible to humankind where the world's nations have had the opportunity to decide, from first principles, how best to manage these for the collective good of humanity. Setting up ISA through UNCLOS was thus a bold and critical commitment by the nations of the world to establish a unique governance architecture through which they would cooperate to co-manage the Area and its resources for the benefit of all humanity (see **Box 1**). Without such a governance system, moves to exploit deep-seabed minerals would already be going ahead, in an unregulated way, in the interests of whoever moved fastest to establish their claims, and without any basis for ensuring that exploration and exploitation benefit humankind as a whole.



This system of international management of a substantial part of the global commons has at its heart the resolution of trade-offs through collaborative, evidence-based decision-making. An important set of possible trade-offs occurs in deciding where the essential growth in critical mineral supply should come from. Undoubtedly a significant part of the additional demand for metals will be met by well-regulated terrestrial mining, in which responsible companies partner with host countries to deliver economic and social benefits for those countries while contributing to the transition to a low-carbon future.^{16,17} The contribution of well-managed terrestrial mining to the SDGs is considerable.^{18,19} At the same time, the social and environmental impacts of poorly-run or weakly-regulated terrestrial mining can be high.²⁰ These impacts often occur in areas where international visibility of mining operations is poor.

The trade-offs managed through ISA are central to its contributions to the SDGs, because different possible paths to meeting rapidly rising global mineral demand have different social, environmental and economic consequences. A critical trade-off may exist between deep-sea mining, which would be highly scrutinised and regulated through ISA, and reliance on growth in weakly-regulated sub-sectors and sites of terrestrial mining, leading to substantial social and environmental impacts. Reflecting on this, most people interviewed for this review believed deep-sea mining has a role to play, as long as regulations are designed cautiously and, if necessary, rapidly adapted in the light of increased knowledge and monitoring in early stages of exploitation.

Some ocean-focused NGOs and marine researchers disagree with this and believe that plans for deep-sea mining should be halted regardless of their governance arrangements. But whatever balance the nations of the world ultimately agree on collectively, between preserving the deep seabed and utilizing its resources sustainably for human development, the process of carefully weighing up different perspectives and evidence would not be possible without the governance system enabled by ISA. At the core of such a system is the need to allow the equitable sharing of benefits. ISA's governance system also provides the mechanisms for resolving

other kinds of trade-offs, such as potential differences in interests between countries with substantial terrestrial mining operations and those that could most readily benefit from deep-sea mining.²¹

ISA actively contributes to the development of particular points of international law in relation to the management of global commons for current and future generations. In fact, it is the only international organization specifically mandated to do this. As a result, deep-sea mining is the only activity to be governed by a unique global legal regime. This universal regime includes the already-adopted exploration regulations and will soon be complemented by exploitation regulations, which are currently under development (see **Box 2**).

Another example of the contribution of ISA in strengthening the rule of law can be found in the decision taken in 2011 by the ISA Council to formally seek an Advisory Opinion from the International Tribunal of the Law of the Sea (ITLOS), aiming to clarify the potential liability that sponsoring States might have if contractors sponsored by them caused damage.²² The outcome strengthened and clarified the law in ways that contributed to developing States, particularly SIDS, being able to take on the responsibilities of a sponsoring State and effectively participate in activities carried out in the Area.

► A critical trade-off may exist between deep-sea mining, which would be highly scrutinised and regulated through ISA, and reliance on growth in weakly-regulated sub-sectors and sites of terrestrial mining.



THE MINING CODE

The Mining Code refers to the comprehensive set of rules, regulations and procedures issued by ISA to regulate activities (exploration and exploitation) in the Area. ISA has already issued Regulations on Prospecting and Exploration for Polymetallic Nodules (2013), for Polymetallic Sulphides (2010) and for Cobalt-rich Ferromanganese Crusts (2012). These regulations set out the necessary requirements to abide by when applying for exploration rights and standard terms of exploration contracts. They are accompanied by various recommendations and guidance for contractors, such as on the assessment of the environmental impacts of exploration.

ISA's Legal and Technical Commission (LTC) has already developed draft regulations for exploitation of mineral resources in the Area, which are currently under consideration by the ISA Council. Once adopted, these will form part of the Mining Code alongside those for exploration. The regulations will be supported by more detailed standards and guidelines. As decided by the Council, these are being written in a three-phased approach, with specific standards and guidelines needed by the time of adoption of the draft regulations on exploitation (Phase 1), prior to the receipt of an application of a plan of work for exploitation (Phase 2) and before commercial mining begins (Phase 3). Standards and guidelines undergo a four-stage process: development by the LTC, stakeholder consultations, approval by the LTC and submission to the Council for approval. The LTC has prepared initial drafts of all Phase 1 standards and guidelines and these were open for public consultation until July 2021.

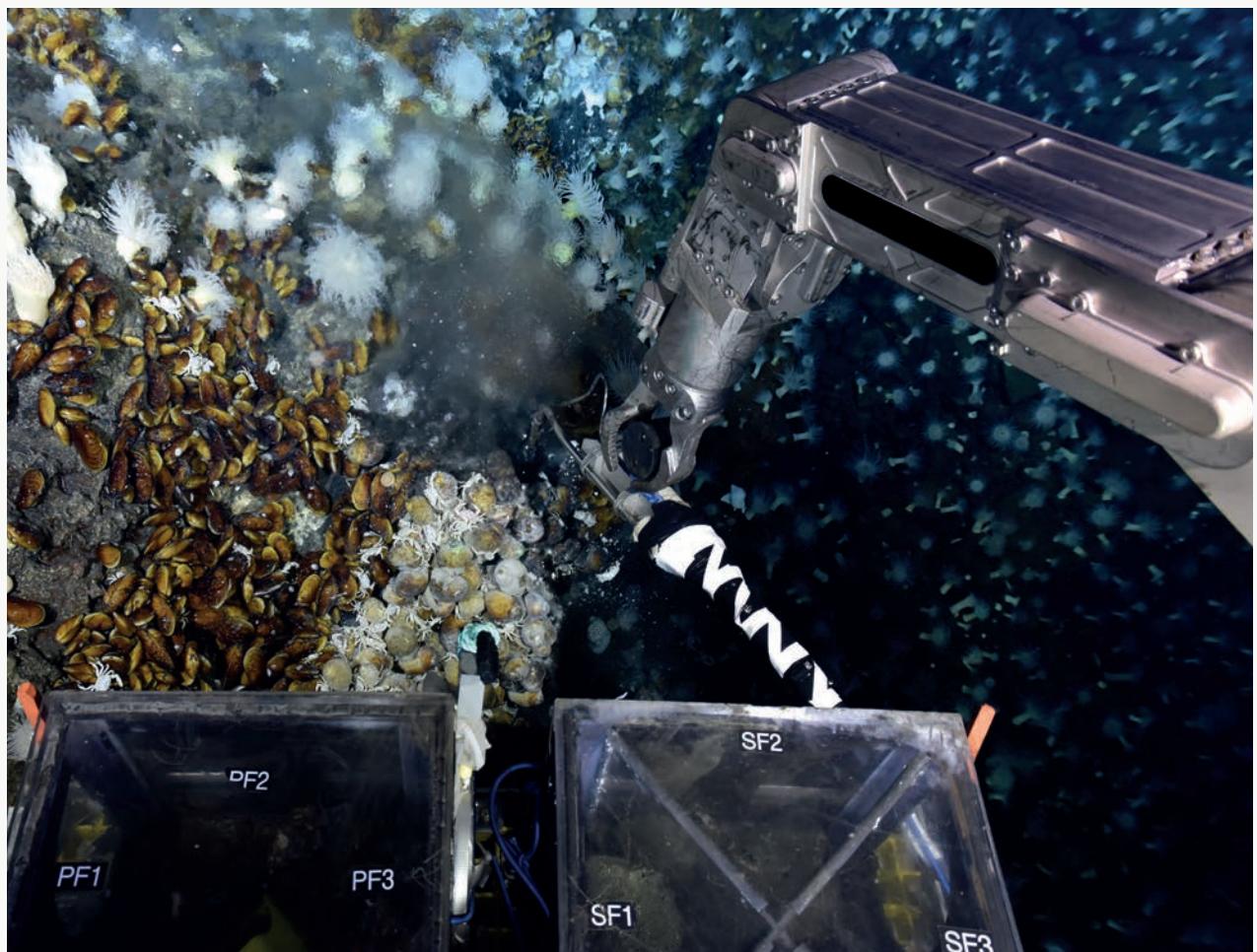
The Mining Code is at the core of ISA's contribution to the SDGs. UNCLOS and the 1994 Agreement, supported by the rules, regulations and procedures in the Mining Code, constitute the foundation of the rule-based international governance of mineral resources in the Area. By avoiding a "tragedy of the commons" situation in the deep sea and minimising harmful practices, the Mining Code helps to promote peace, justice, and strong institutions (SDG 16). Through setting out a regulatory regime that enables a sustainable supply of minerals critical for decarbonisation, the Mining Code will contribute to affordable and clean energy (SDG 7), sustainable cities and communities (SDG 11) and climate action (SDG 13).



Global Sea Mineral Resources NV (GSR) purpose-built prototype nodule collector Patania II during trials in April 2021. Photo: GSR

The Mining Code also places special emphasis on the importance of ensuring effective protection of the marine environment and the development of the capacity of developing States. Exploration regulations contribute to life below water (SDG 14) through mitigation of the impacts of activities in the Area and promotion of marine scientific research. They include requirements for environmental baseline data to be gathered, measures to be taken to manage pollution and mitigate impact, and requirements for monitoring to assess environmental impacts. Contractors are required to provide and fund training opportunities for personnel from developing States and ISA, with a particular focus on recruiting women. By encouraging the participation of developing States in deep-sea mining, the Mining Code aims to promote decent work and economic growth (SDG 8), reduce inequalities (SDG 10), eliminate poverty (SDG 1), and achieve gender equality (SDG 5).

Interviewees agreed on the central importance of the Mining Code, with some highlighting areas to be particularly mindful of to ensure its success. In applying the precautionary approach, some interviewees stressed the importance of adaptive environmental management, rather than postponing action altogether. Regarding the LTC, further transparency, such as detailing how stakeholder comments are incorporated into final draft regulations and sharing information on timelines, would serve to make the process more accessible to all.



By avoiding a "tragedy of the commons" situation in the deep sea and minimising harmful practices, the Mining Code helps to promote peace, justice, and strong institutions (SDG 16). Photo: BGR



DEVELOPING DEEP-SEA MINERAL RESOURCES TO BENEFIT HUMANITY AS A WHOLE

If strengthening the rule of law in ocean seabed governance is the essence of ISA's work, its ultimate goal is the protection of the marine environment and development of deep-sea resources in ways that benefit humanity as a whole. This goal contributes to poverty eradication (SDG 1), the creation of decent work and economic growth (SDG 8) and the reduction of inequalities (SDG 10). In relation to SDG 8, ISA works closely with the International Labour Organization (ILO) and the International Maritime Organization (IMO) to ensure seamless regulatory regimes covering health, safety and working conditions.

These are largely projected benefits at this stage. Deep-sea mining will not begin until the full regulatory framework for exploitation has been agreed upon and proposals to move to commercial exploitation have been subjected to regulatory scrutiny. Indeed, as one interviewee put it, this sequencing is itself testimony to ISA's fulfilment of its environmental protection role and reflects the application of the precautionary approach by ISA. But the processes already underway point towards likely contributions in these areas. These include the active participation of developing States in exploration and future mining contracts. To date, 31 contracts for exploration have been granted to contractors sponsored by 21 different States, including 10 developing States, six of which are SIDS.

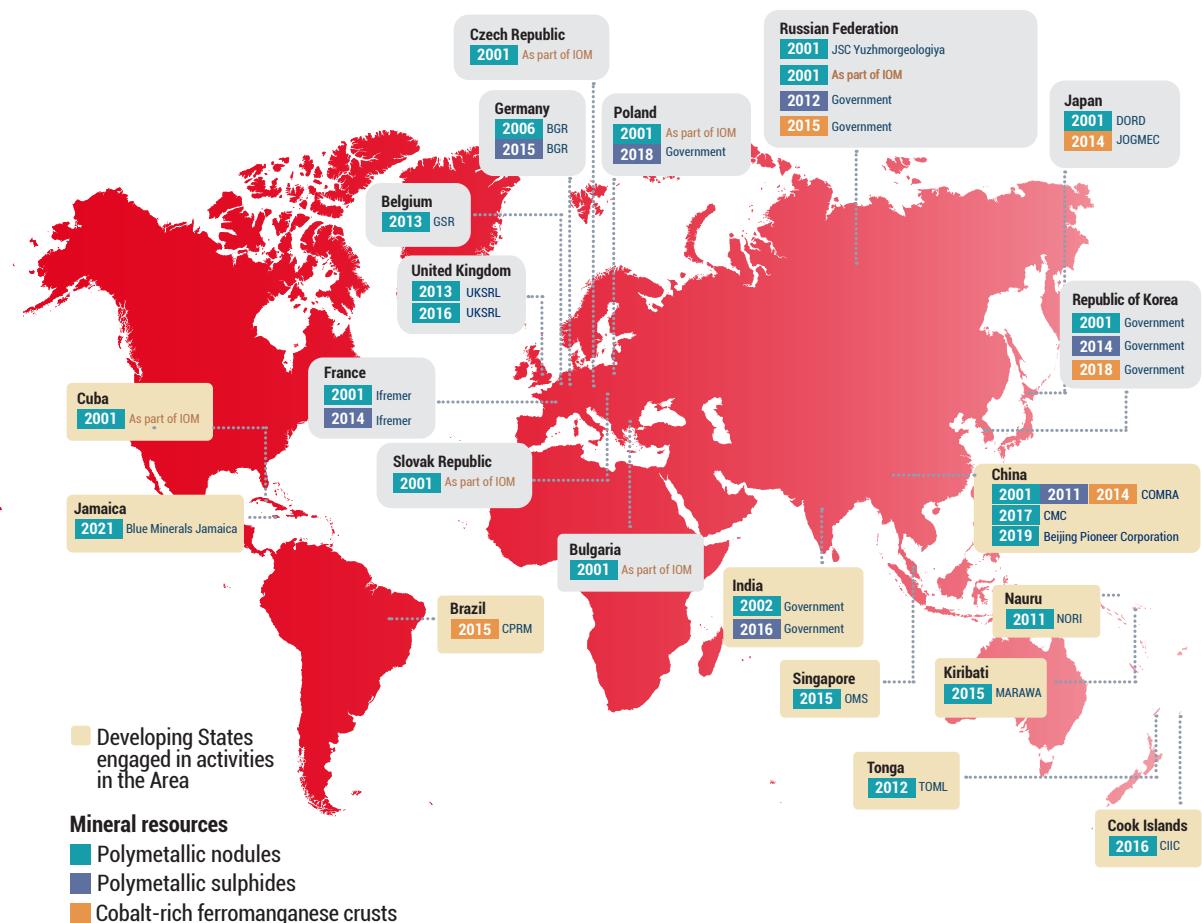
So, in the earliest stages of this process, with all of the technological advantages held by richer nations, the processes overseen by ISA have nevertheless led to a majority of sponsoring States being developing countries. Benefit-sharing arrangements would additionally lead to deep-sea mining revenues being allocated to countries in ways that would contribute to poverty eradication. These arrangements are still under discussion, and therefore it is not yet possible to assess how significant such financial flows are likely to be or the form in which they will be delivered (e.g., through a global fund).



Photo: Deep Ocean Resources Development Co. Ltd. (DORD)

In relation to the “decent work” elements of SDG 8, social aspects of poorly-regulated terrestrial mining operations need to be considered. ILO estimates that more than a million children are engaged in child labour in mines and quarries worldwide.²³ This includes child labour in the supply of critical minerals, for which demand is increasing rapidly in response to the need to decarbonise economies. For example, most of the world’s cobalt supply²⁴ comes from a country in which ILO has documented children as young as seven years old working in life-threatening conditions in cobalt mines, subject to violence, extortion, and intimidation.²⁵ Forced labour of children and adults also occurs on a wide scale, particularly in artisanal mining. If deep-sea mining were to cover some of the additional demand for minerals anticipated over the next two decades, this could help avoid the “gold-rush” conditions under which such abuses can multiply in countries with weak capacity to regulate.

“ Benefit-sharing arrangements would lead to deep-sea mining revenues being allocated to countries in ways that would contribute to poverty eradication.”



To date, 31 contracts for exploration have been granted to contractors sponsored by 21 different States, including 10 developing States, six of which are SIDS.



ENSURING A RAPID AND SAFE TRANSITION TO LOW-CARBON ECONOMIES

The transition to low-carbon societies and economies is driving much of the increased need for critical minerals. The demand for those minerals in the immediate future requires an unprecedented scaling-up of mineral production worldwide. A recent report from IEA states that reaching the goals of the Paris Agreement on climate change "would mean a quadrupling of mineral requirements for clean energy technologies by 2040".²⁶ For critical minerals needed for battery production, the growth in demand will be even more acute with, for example, an expected increase in demand for cobalt and nickel of around 20 times today's levels by 2040.

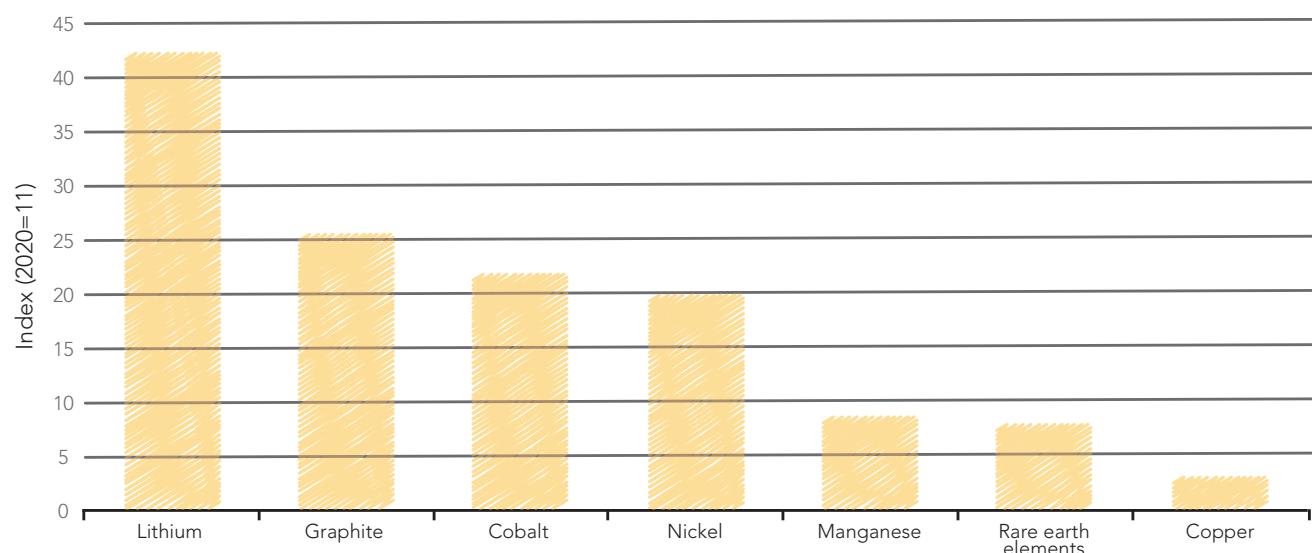


The IEA analysis points towards mineral supply problems as a major obstacle, potentially, to the fulfilment of the world's decarbonisation ambitions. "Today's supply and investment plans are geared to a world of more gradual, insufficient action on climate change... there are many vulnerabilities that may increase the possibility of market tightness and greater price volatility."²⁷ These market risks combine with a high geographical concentration of mineral production, long project development lead times, declining ore quality, and exposure of water-intensive mining operations to risks from climate change. The result is a real supply threat to the achievement of the SDG 13 targets needed to keep the world on a climate-safe trajectory.

How far can ISA's mandate help contribute to solving this problem and keeping the world on track for SDG 13? One interviewee, an expert in this area, accepted that it would be technically possible to meet increased mineral demand without drawing on deep-sea sources. He continued: "The question though, is not whether you could. It's whether you should." If the responsibility for meeting all the additional

demand for metals anticipated by IEA were to fall entirely on the terrestrial mining sector, much of this new production would occur in countries with weak regulatory capacity. The social and environmental costs of that poorly-regulated production would be so significant that some contribution made instead by highly-regulated deep-sea mining could play an important role in reducing net negative impacts.

Deep-sea minerals are also typically of higher quality, in ore grade and concentration, than their terrestrial counterparts, making them more valuable in the transition to low-carbon economies. Where land-based ores are of lower quality, a wider exploitation area is required, and this can in turn extend the range of any negative impacts. Increased metal recycling will also be essential to help reduce such impacts, but its potential is nowhere near enough to offset increased demand. IEA estimates that, by 2040, recycled quantities of critical metals from spent batteries could reduce combined primary supply requirements for these minerals by around 10 per cent.²⁸



Growth in demand for selected minerals from clean energy technologies for the sustainable development scenario, 2040 relative to 2020. Source: IEA.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



13 CLIMATE ACTION



14 LIFE BELOW WATER



16 PEACE, JUSTICE AND STRONG INSTITUTIONS



PREVENTION OF ENVIRONMENTAL HARM THROUGH DEVELOPING A GLOBAL REGULATORY FRAMEWORK FOR DEEP-SEABED MINING

ISA is the only organization specifically mandated to protect the marine environment from the possible negative impacts associated with deep-sea mining in the Area. The creation of a systematic approach for doing so, which is the heart of ISA's work, is a precondition for achieving SDG 14. This is a prime example of the development of strong institutions and partnerships needed across the 2030 Agenda, as expressed in SDGs 16 and 17.

ISA and the processes it oversees enable international visibility of the impacts of deep-sea mining in the Area. This offers a considerable advantage in managing those impacts compared to deep-sea mining within national waters and terrestrial mining. Neither of these are subject to a global framework to assess and mitigate environmental and social impacts. The situation is different for terrestrial mining, where scrutiny of social and environmental costs depends greatly on local circumstances. The use of forced labour and child labour is mentioned above, and other negative impacts of poorly-regulated terrestrial mining may include displacement of communities, pollution of land and fresh water, deforestation, waste generation, and carbon dioxide emissions.²⁹ Terrestrial mining can in turn affect the oceans through some of these impacts, such as disposal of mine tailings at sea.



These impacts are lower or absent for deep-sea mining. There is greater uncertainty about the relative costs of terrestrial versus deep-sea mining in terms of habitat and biodiversity loss. These are typically high for poorly-regulated terrestrial mining, especially where significant sources of critical minerals lie in tropical forests. The density of non-microbial biodiversity is on average far higher on land than in the sea. Although the oceans cover over two-thirds of the Earth's surface, they account for perhaps between 5 and 15 per cent of nonmicrobial species.³⁰ However, great uncertainties about deep-sea habitats and associated biological communities make a robust assessment of relative impacts difficult.

Another consideration is the limited scale of deep-sea mining being considered. At present, less than 1 per cent of the seabed is covered by exploration contracts. While there remain significant uncertainties as to the extent of impacts that may be caused by sediment and discharge-water plumes, the area of the seabed that would be affected by deep-sea mining will be much smaller than the area currently under exploration.

Looking at these factors, many of the interviewees for this report believed it likely that highly-regulated deep-sea mining would compare favourably, in terms of its overall environmental and social impacts, with many currently poorly-regulated terrestrial mining activities. SDG 15 (Life on land) is not currently listed by ISA as one of its priority SDGs. But if the negative social and environmental impacts of some terrestrial mining are greater than the negative impacts of deep-sea mining, then the governance processes enabled by ISA would make significant contributions to SDG 15. The scale of mineral production required by 2040 to meet decarbonisation targets is so vast that relieving pressure to exploit new land areas for mining is likely to be significant. The impacts prevented by deep-sea mining would include some of those caused by new mining operations in remote, biodiversity-rich habitats, which, as high-cost options for meeting mineral needs, would be among those most readily substituted for by deep-sea mining.

Some marine researchers and ocean activism groups believe the opposite is true, i.e., that the overall negative environmental and social impacts of deep-sea mining outweigh those associated with terrestrial mining. It is not the purpose of this review to reach a conclusion on this question, but interviews about these trade-offs, and about the high social and environmental footprint of terrestrial mining, suggested that there is no simple path for the world to accelerate progress towards the SDGs by abandoning all consideration of deep-sea mining.

Ensuring effective protection of the marine environment is at the heart of ISA's mandate and activities. This is seen in requirements for environmental baseline studies, impact assessments and monitoring, as set out in exploration and future exploitation regulations. ISA has also adopted the environmental management plan for the Clarion-Clipperton Zone (see **Case Study 1**), through which representative habitats are protected from the impacts of future exploitation activities. ISA is continuously strengthening its approach to environmental protection, for example through establishing Regional Environmental Management Plans (REMPs) in more regions where exploration activities are taking place, and strengthening monitoring components, ensuring these are all balanced with the social and economic goals of sustainable development.

• The impacts prevented by deep-sea mining would include some of those caused by new mining operations in remote, biodiversity-rich habitats.

Case Study 1

Development of the Clarion-Clipperton Zone Environmental Management Plan



Photo: DeepCCZ expedition

Why is this important?

ISA is mandated to adopt rules, regulations, and procedures for: (i) the prevention, reduction, and control of pollution and other hazards to the marine environment and of interference with its ecological balance; and (ii) 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. This gives ISA a central role in protecting the marine environment and its biodiversity. One approach used by ISA to achieve these objectives is the development of regional environmental management plans (REMPs).

What has ISA done to develop the CCZ EMP?

The first EMP established by ISA was for the Clarion-Clipperton Zone (CCZ) in the Pacific. This EMP provided the basis for a policy decision to develop further REMPs for other zones. The CCZ EMP was adopted in 2012 and included the designation of a network of nine “areas of particular environmental interest” (APEIs). Such APEIs, covering a total of 1.4 million km² of seabed in the Area, are protected from exploration and future exploitation of mineral resources.

As part of the ongoing review of the CCZ EMP, ISA convened a workshop on CCZ biodiversity in October 2019 in collaboration with the Deep CCZ Project.³¹ The outcomes of the workshop supported the original design of the network of APEIs, by confirming that it was appropriate to use the main environmental drivers of biodiversity patterns across the CCZ. The results of the workshop also provided the scientific basis for the identification of additional APEIs that would lead to improved representativity, replication and connectivity of the overall network. These outcomes have provided the basis for a recommendation in 2021 by the LTC on additional APEIs to enhance the effectiveness of the current APEI network.

The CCZ EMP is a direct contribution by ISA to SDG 14 (Life below water) and by extension indirectly to the SDGs which have a stake in the oceans, such as SDG 1 (No poverty), SDG 2 (Zero hunger), and SDG 3 (Good health and wellbeing).

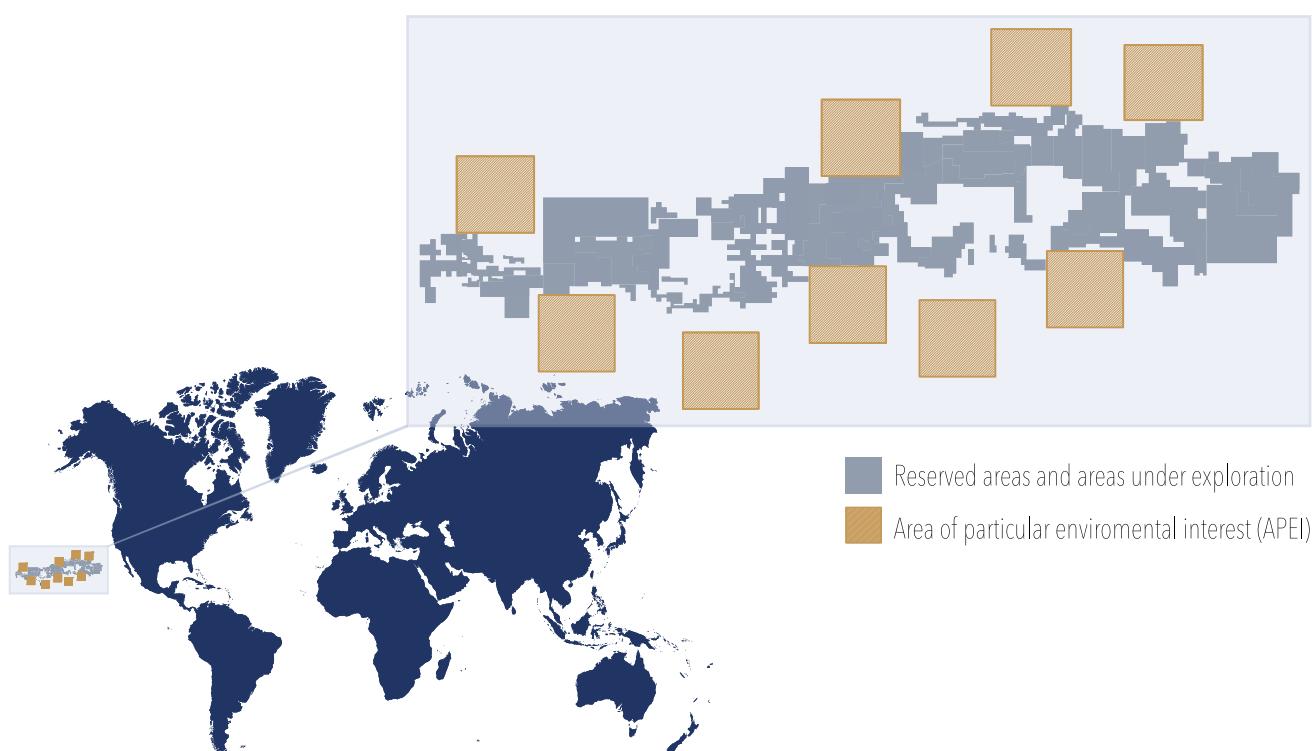
What difference has it made?

Within the ISA Council and Assembly, Members have affirmed the need for REMPs to be in place in a mineral province before mining could start. Stakeholders interviewed agreed that getting REMPs right, evolving them further in the light of experience, and putting in place sufficient protected areas are all essential and complementary environmental protection measures.

Within this context and as per its High-Level Action Plan, ISA is committed to developing, implementing and keeping under review REMPs for all mineral provinces in the Area where exploration or exploitation is taking place. REMPs are developed to:

- Provide the relevant organs of ISA, as well as contractors and their sponsoring States, with proactive area-based and other management tools to support informed decision-making that balances resource development with conservation.
- Provide ISA with a clear and consistent mechanism to identify areas thought to be representative of the full range of habitats, biodiversity, and ecosystem structures and functions within the relevant management area.
- Provide those areas with appropriate levels of protection.
- Help ISA to meet globally agreed goals and targets, such as SDG 14.

Although at present there is only one REMP in existence, further work is underway for the development of REMPs in the Mid-Atlantic Ridge, the Indian Ocean triple junction ridge and nodule-bearing province and the North-West Pacific and South Atlantic for seamounts. ISA has scheduled a series of workshops for each area.



APEIs in the CCZ cover a total of 1.4 million km² of seabed and are completely protected from future exploitation of mineral resources.



4 QUALITY EDUCATION



5 GENDER EQUALITY



8 DECENT WORK AND ECONOMIC GROWTH



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



16 PEACE, JUSTICE AND STRONG INSTITUTIONS



17 PARTNERSHIPS FOR THE GOALS



CAPACITY DEVELOPMENT AND INSTITUTIONAL STRENGTHENING

ISA's capacity development programmes include its Contractor Training Programme,³² the Endowment Fund for Marine Scientific Research,³³ and the Internship Programme.³⁴ More than 500 people have benefited from these schemes so far, and around 44 per cent of these were women.³⁵ Additional activities have been undertaken since 2017 through the implementation of ISA's Voluntary Commitments (described in the following section). More recent initiatives include the establishment of regional and national training centres (such as the ISA-China Joint Training and Research Centre³⁶) and the launch of the ISA Junior Professional Officer programme.³⁷

ISA's contribution to capacity development is widely valued by interviewees, including some with direct personal experience with it. A majority of interviewees mentioned this as being significant, highlighting ISA's contributions to marine science (SDG 14), to gender equality (SDG 5), and to strengthening institutions, collaboration and partnerships (SDGs 16 and 17).



Photo: ISA.





500 people have benefited from ISA capacity-building programmes and initiatives so far, including 44 per cent of women. Photo: Ana Carolina Ronda / ISA.

Previous trainees with experience of ISA's capacity-building programmes strongly endorsed the value of their experience in interviews for this report. From internships and workshops to experience on research vessels, all the opportunities were described as being of high quality. In every case they contributed to the participants' careers. For some women, this was significant in the development of their leadership roles in marine science (see **Case Study 3**).

Perspectives varied on the extent to which this kind of initiative contributed to changes beyond the individual. One felt that understanding what technologies are available on research vessels

had been important for her country, as it had contributed to securing the right equipment later when funds permitted. Others suggested that more people would have indirectly benefited from training if there had been more structured opportunities for trainees to pass on their new knowledge and experience. Former trainees valued ISA maintaining regular contact and sharing future opportunities with them, especially through country representatives, which helps build a pool of influential individuals committed to the organization over the long term.

4 QUALITY EDUCATION



5 GENDER EQUALITY



14 LIFE BELOW WATER



16 PEACE, JUSTICE AND STRONG INSTITUTIONS



17 PARTNERSHIPS FOR THE GOALS



CONTRIBUTIONS TO MARINE SCIENCE

As the organization exclusively mandated to manage activities in the Area, ISA is required to promote and encourage the conduct of marine scientific research in the Area, as well as coordinate and disseminate the results of scientific research and analysis, when available. ISA also has the duty to encourage development and implementation of appropriate programmes for strengthening the research capabilities of developing States and technologically less-developed States.

ISA's commitment to this important mission has been well reflected, especially through Strategic Direction 4 (Promote and encourage marine scientific research in the Area) of the ISA Strategic Plan for the period 2019-2023, which is being implemented according to the High-level Action Plan for 2019-2023. In addition, the ISA Action Plan in support of the United Nations Decade of Ocean Science for Sustainable Development was recently adopted, with six strategic research priorities identified to further guide the work of ISA related to marine scientific research in the Area.³⁸



In this regard, ISA has implemented various initiatives, especially to facilitate the development of scientifically robust and coherent methodologies for advancing deep-sea biodiversity assessments. For example, ISA has organized a series of taxonomic standardization workshops since 2013, with the latest workshop in September 2020 focusing on identifying strategic approaches for collaboration to advance deep-sea taxonomy. New initiatives on enhancing deep-sea biodiversity assessments resulted from this workshop and are currently under development. The outcomes of this workshop will also be consolidated into a roadmap to promote effective integration of deep-sea taxonomic information into efforts towards sustainable development within the context of ISA.



ISA has implemented initiatives to facilitate the development of coherent methodologies for deep-sea biodiversity assessments.
Photo: The Metals Company.



Exploration in the Area contributes to building up global knowledge of the deep sea. Photo: The Metals Company

Some interviewees felt that one of ISA's most significant contributions to the SDGs relates to the advancement of marine science and global understanding of the deep-sea and ecosystems functions. This enables the development of evidence-based environmental regulation (SDG 14), and also strengthens the rule of law (SDG 16) through ensuring that evolving rules in the new field of deep-sea mining are consistent with the best available science. By undertaking marine scientific research as part of the exploration activities in the Area, contractors are building up global knowledge of the deep sea. This is especially valuable given the high cost of marine research at such depths. Research activities carried out on some contractor vessels is undertaken by independent scientists and environmental data is shared through ISA's public DeepData database (see **Case Study 2**).

Case Study 2

DeepData Sharing



Photo: ISA.

Why is this important?

The collection and dissemination of deep-seabed data increases global knowledge of the deep seabed and its environment. Overall access to data is important not only for science-based policy making, but also to allow scientific research to be done at global scales and to increase global understanding of the deep ocean. More data on the deep sea and seabed helps to provide a stronger evidence base for environmental protection measures.

DeepData opens access to deep-seabed data to developing States and others who face barriers to accessing such a specialized dataset. In addition to strengthening knowledge of biodiversity and ecosystem functions, it also extends knowledge on geochemical and oceanographic patterns that are important for climate regulation.

What has ISA done for data sharing in the marine space?

ISA is the primary international organization through which marine scientific research in the Area is undertaken, and it shares research results broadly. ISA has a specific responsibility under UNCLOS to promote and encourage the conduct of marine scientific research with respect to activities in the Area and to coordinate and disseminate the results of such research and analysis when available. This commitment is reflected in ISA's Strategic Plan, particularly in Strategic Direction (SD) 4, which aims to share data and information in an open and transparent manner (SD 4.3) and to promote access to non-confidential information and data, in particular those data relating to the marine environment (SD 4.4). Recognizing its unique mandate, ISA has also developed an action plan in support of the UN Decade of Ocean Science for Sustainable Development.³⁹

To these ends, ISA has developed a Deep Seabed and Ocean Database, known as DeepData. DeepData is an internet-based repository for all deep-seabed activity-related data. It is populated primarily with data collected by contractors from exploration surveys in contract areas, including environmental and resources data and associated metadata for the Area. The ISA DeepData platform has now joined the International Oceanographic Data and Information Exchange (IODE) network of the Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO) as an Associate Data Unit, enabling the ISA Secretariat to serve as a node for IODE's Ocean Biodiversity Information System (OBIS).⁴⁰

DeepData has its origins in ISA's Central Data Repository (CDR), established in 2000, which itself succeeded ISA's initial database of polymetallic nodule resources of the Area, called POLYDAT, which compiled data submitted by pioneer investors since the early 1980s. As exploration activities expanded to cover other resource types, the CDR was expanded to include information on all mineral resources under exploration. In 2015, the LTC recommended that the database be expanded to include all necessary information for drafting of the Mining Code, including environmental data, and be accompanied by a clear data management strategy, including protocols and templates to ensure better standardization. DeepData therefore contains information on mineral resources as well as environmental baseline data collected by contractors, including information on biological, physical, and geochemical parameters of the marine ecosystems from the sea floor to the ocean surface. Environmental information is accessible to the public, with contractors having proprietary rights to the geological data in accordance with the Mining Code.

With data on the deep sea and seabed in the Area so sparse, the data produced via the exploration contracts overseen by ISA are a vital contribution to the field of marine scientific research. DeepData and the research of ISA's contractors are aligned with SDG 14 (Life below water), particularly target 14.a on increasing scientific research in order to improve ocean health.

What difference has it made?

Several interviewees have expressed the view that without the research of contractors, which is funded both publicly and privately, much less would be known about the species and ecosystems of the deep ocean. Contractors will have to undertake a significant number of environmental studies before they can apply for an exploitation contract, and are therefore generating large amounts of data and information on the deep ocean that are collected in the DeepData database. DeepData is driving improved knowledge of "life below water" (SDG 14). On top of the DeepData database, exploration has resulted in dozens of publications. Without the incentive of security of tenure provided by the legal regime administered by ISA, much of this information is unlikely to be generated by governments and their oceanographic research institutes because the cost of such highly targeted and coordinated research would be prohibitively expensive.

In terms of risks to manage, some experts who were interviewed raised questions about whether the data produced by contractors are consistent and comparable. Though ISA has produced guidelines for data collection, the concern was that there might be inconsistencies in the ways contractors apply the required sampling methods. If the data are not collected in ways that support comparability among contractors, then the usability and applicability of the data for global and regional assessments is reduced. ISA has recognized this and has made extensive efforts to ensure data comparability through such methods as taxonomic standardization initiatives, the establishment of environmental data collection protocols and templates and workshops involving contractors and scientists aimed at ensuring consistency in methodologies. Other experts interviewed had confidence in the contractors' partnerships with academics. Some expressed the hope that the ISA Secretariat might secure additional resources from Members to strengthen its own independent contribution to deep-sea science.

ISA's Voluntary Commitments and strategic partnerships

Voluntary Commitments in support of SDG 14

At the United Nations Ocean Conference in 2017, ISA registered seven Voluntary Commitments contributing to the 2030 Agenda for Sustainable Development. The Voluntary Commitments reflect the economic, social, and environmental components of the mandate assigned to ISA by UNCLOS and contribute to advance SDG 14 (Life below water).

The Voluntary Commitments are diverse, ranging from focused initiatives such as developing taxonomic atlases of deep-sea marine life, to broader initiatives such as supporting Pacific small island developing States (P-SIDS) and African States in the fulfilment of their "blue economy" strategies with a view to ensuring that they can benefit fully from the sustainable development of deep-seabed resources.

The SG's Award for Excellence in Deep-Sea Research (#OceanAction15796) is one of the more specific Voluntary Commitments. The Award recognizes the achievements of young researchers from developing States who have made an outstanding contribution to humankind's understanding of deep-sea environments or to the development of regulatory frameworks which protect these environments. It was conceived as a means of encouraging the participation of young researchers from developing States in marine scientific research programmes in the Area. It therefore contributes to a number of the SDG 14 targets. Most clearly, it contributes to target 14.a on increasing marine scientific knowledge, but it also contributes more indirectly to targets 14.2 on sustainable management and protection of marine ecosystems, 14.5 on conservation of marine ecosystems, and 14.c on conservation and sustainable use of oceans and their resources by implementing UNCLOS. Thus far, the Award has been received by two young researchers, respectively from Trinidad and Tobago (2018) and Brazil (2019) (see **Case Study 3**).

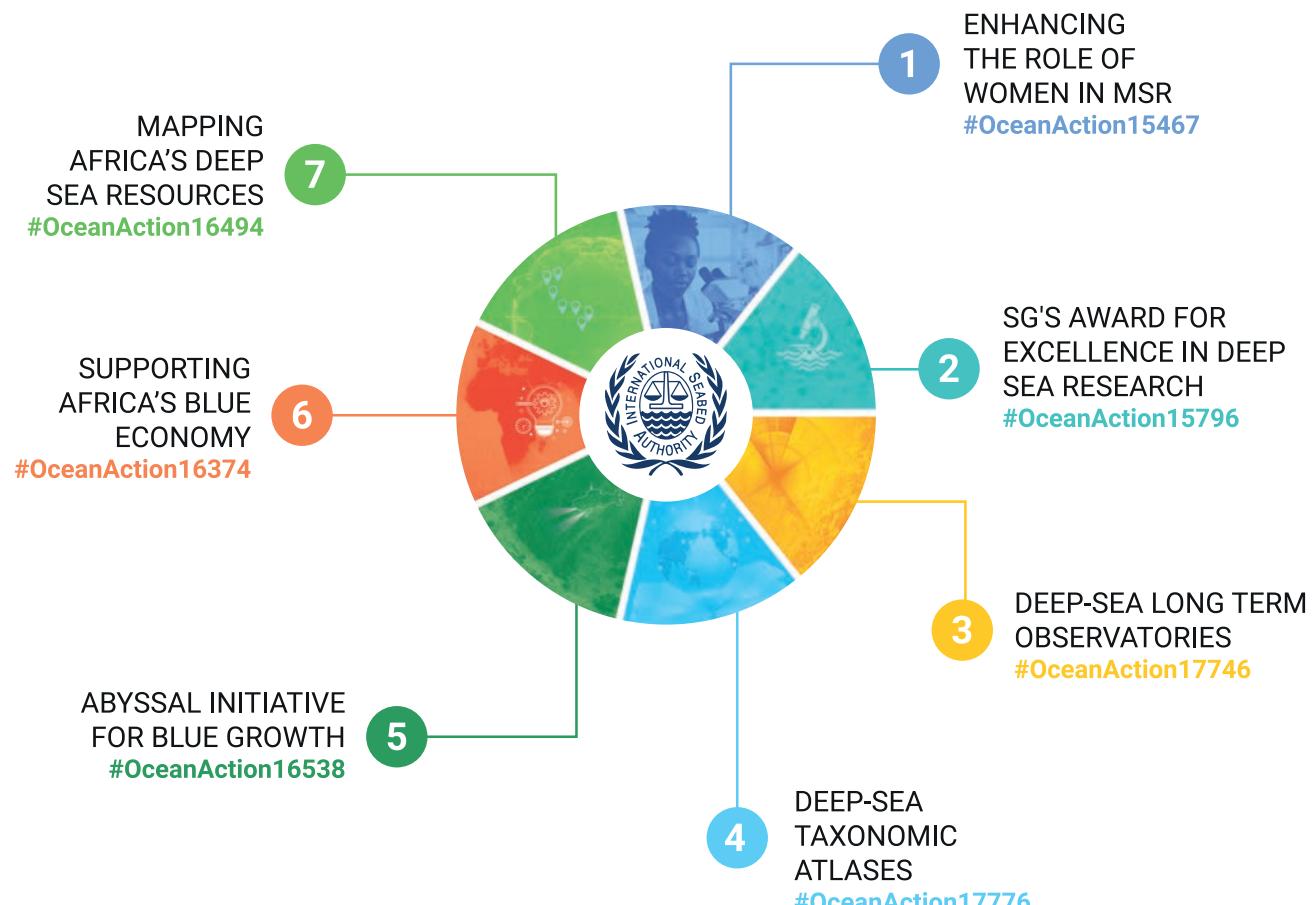
The development of Deep-Sea Taxonomic Atlases (#OceanAction17776) is another of the more specific Voluntary Commitments made by ISA that attempts to tackle a global problem. Its intention is to help address challenges and advance deep-sea taxonomy, including the need for improved standardization of marine species taxonomy; the lack of taxonomists globally; the need to develop faster and easily replicable methodologies such as eDNA and artificial intelligence for image and video analysis; and the need for more accessible species catalogues to allow for rapid identification. ISA has committed to establishing publicly-accessible atlases detailing scientifically-classified species collected in the Area. The atlases are intended to be used by contractors and the scientific community alike in assessing biodiversity in the Area. This Voluntary Commitment therefore contributes to SDG targets 14.a on increasing marine scientific knowledge and 14.2 on sustainable management and protection of marine ecosystems.

One of the broader Voluntary Commitments made by ISA is to support Africa's "blue economy" (#OceanAction16374). This has been identified as a development priority within the context of "Agenda 2063: The Africa we want".⁴¹ However, Africa is the only region that has not yet engaged with activities in the Area by obtaining or sponsoring exploration contracts from ISA. In partnership with the African Mineral Development Centre (AMDC) of the African Union and the Norwegian Agency for Development Cooperation (NORAD), ISA is implementing the "Africa's Deep-Seabed Research" project. This project has led to the organization of regional workshops to raise awareness among African States about the importance of the sustainable development of activities on the African continental shelf and the Area, as well as to discuss strategies that could

help African States and nationals to build capacity to engage in deep-seabed activities in the Area. So far, three of the five planned workshops have been undertaken, one in Côte d'Ivoire, one in South Africa, and one remotely hosted by Mauritius, bringing together experts from the international legal and scientific communities with national and regional government officials, scientists, researchers, and academics. Furthermore, ten mid-career professionals from African countries have been selected, including five women, to undertake secondments with the ISA Secretariat.⁴² This Voluntary Commitment,

therefore, contributes to SDG target 14.c on the conservation and sustainable use of oceans and their resources.

While the above Voluntary Commitments are all making contributions to the 2030 Agenda, Case Studies 3 and 4 illustrates in more detail two of ISA's more striking contributions through its Voluntary Commitments, all explicitly mentioned by a number of interviewees, namely: (i) Enhancing the Role of Women in Marine Scientific Research and (ii) the Abyssal Initiative for Blue Growth.



ISA registered seven Voluntary Commitments to support the implementation of SDG 14 at the UN Ocean Conference 2017.



Case Study 3

Enhancing the Role of Women in Marine Scientific Research (#OceanAction15467)

Photo: Ana Carolina Ronda/ISA

Why is this important?

Science, technology, and innovation are the foundations of solutions to the economic, social, and environmental dimensions of the 2030 Agenda for Sustainable Development. Yet, the scientific and technological advances on which the SDGs depend in turn rely on women's full and effective participation in science and scientific industries. The vital role of women in contributing to the 2030 Agenda (including specifically to those SDGs relating to the oceans) is by now well established and has been repeatedly reaffirmed by governments and key UN conferences and meetings, including within the agreed conclusions of the Commission on the Status of Women in 2011, the UN Resolution on Science, Technology, and Innovation for Development in 2013, and more recently, the World Oceans Day 2019's theme of Gender and the Ocean.

According to the Global Ocean Science Report produced by IOC-UNESCO,⁴³ women today account for only 38 per cent of the world's researchers in ocean science, and the rate is even lower for women from developing States. This constitutes a loss to ocean science as well as gender equality and women's empowerment. Women oceanographers face obstacles including a culture of scientific research founded in exclusion, unsafe work environments, and a lack of institutional support. Women belonging to marginalized groups, including people of colour and LGBTQ+⁴⁴ individuals, face heightened obstacles in the sciences, including ocean science.⁴⁵

What has ISA done for women in the marine scientific research (MSR) space?

Further initiatives are needed to empower women and achieve gender parity in the field of MSR. ISA itself has a vision of women from developing States playing a central role in MSR and in strengthening the scientific and technological capabilities of their countries. To realize its vision, ISA made a Voluntary Commitment at the UN Ocean Conference in June 2017 to promote women's empowerment and leadership in MSR and particularly in deep-sea research with a focus on designing and implementing tailored activities and programmes aimed at addressing the specific challenges faced by women scientists from developing States including least developed countries (LDCs), landlocked developing countries (LLDCs) and small island developing States (SIDS) (#OceanAction15467). This commitment was the first of its kind within the UN System.

Since 2017, this Voluntary Commitment has been implemented in four thematic areas:

- **Informing policy:** ISA is proactive in raising awareness of Gender Equality and Women's Empowerment (GEWE) issues in the context of UNCLOS and deep-sea research, striving for senior decision-makers to address shortcomings in policy processes. One example of ISA's awareness-raising is through its Secretary-General's recognition as an International Gender Champion and participating in networks of decision makers to promote proactive and positive measures to address GEWE.

- **Building and developing capacities:** ISA is mandated under UNCLOS to develop the capacity of its Members, especially developing States. Capacity development is also a central feature of ISA's activity in the field of GEWE. Capacity development of women has been delivered via a number of mechanisms such as its Endowment Fund for Marine Scientific Research (EFMSR), the Contractor Training Programme, Internship Programme, and Africa's Deep Seabed Resources (ADSR) Project. The EFMSR was established to support the participation of scientists and technical personnel from developing States in MSR and has to date benefitted 62 women (out of 158 total beneficiaries). The Contractor Training Programme requires contractors to provide and fund training opportunities for trainees from developing States and has benefited some 59 women to date (out of 136 total beneficiaries). ISA has also welcomed a further 25 women interns to ISA and trained 5 women through the ADSR Project. Its training has therefore supported a total of 151 women to date, representing 45 percent of its trainees.
- **Sustainability and strategic partnerships:** ISA has established strategic partnerships to push forward the GEWE agenda, including that with the Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries, and Small Island Developing States (UN-OHRLLS). ISA and UN-OHRLLS have recently launched the "Women in Deep Sea Research" project to address the specific barriers faced by women from SIDS, LDCs, and LLDCs in accessing opportunities for careers and leadership roles in deep-sea research. ISA has also partnered with UN-OHRLLS to establish a platform where decision makers of permanent missions in New York are made more aware of such challenges.
- **Communications and outreach:** ISA showcases and promotes the success of women in the field of deep-sea research, for example through inviting women who have benefitted from its initiatives to share stories through its public communications.

The work of ISA via its Voluntary Commitment to promote women's empowerment and leadership in marine scientific research and particularly in deep-sea research is a direct contribution to SDG 5 (Gender equality). ISA is one of a small number of organizations promoting GEWE in a field that has traditionally been dominated by men. At the same time, this Voluntary Commitment has the potential to contribute to SDG 14 (Life below water) by ensuring marine science benefits from the knowledge, experience, and capabilities of women. Institutions in this area are strengthened by embracing more diverse representation among their leadership including women, therefore also contributes to SDG 16 (Peace, justice and strong institutions).

What difference has it made?

Various stakeholders (including former trainees and members of the LTC) view ISA's contribution to capacity development for MSR as vital in addressing GEWE in the field of deep-sea research because of its particular focus on the needs of women. The "SG's Award for Excellence in Deep Sea Research", which was received by a woman from Trinidad and Tobago in 2018, is seen by business interest groups as a valuable way of raising the profile of women in industry. Meanwhile, the requirement that 50 per cent of trainees in ISA's capacity development programme should be female was also welcomed. ISA's outreach in Africa and the Pacific has also raised awareness about what ISA does and has inspired more women to enter the field, although some of those interviewed indicated that there is a need to raise even more awareness about ISA's Women in Deep Sea Research programme in order to increase participation amongst Members. Taken together, these initiatives have resulted in a marked increase in the number of opportunities made available to women by ISA as a result of these activities.

More specifically, a marine geophysicist and former trainee via the Contractor Training Programme spoke highly of the training provided to her by ISA, which was instrumental in establishing a career path that has led to her current role as a focal point for women in marine research. Even though the support that ISA provides is only for a relatively small number of individuals, the capacity of these women to transfer their knowledge more widely is often significant.

Strategic partnerships

Partnerships are at the heart of the way that ISA works. ISA's mandate to foster the conservation and sustainable use of ocean resources in the Area necessarily requires the combined efforts of a diverse set of sub-regional, regional, and global actors.

More specifically, its Strategic Plan and High-Level Action Plan for 2019–2023 note the importance of strategic partnerships in fulfilling ISA's roles and responsibilities in many places.⁴⁶ Indeed, the number of strategic alliances made with sub-regional, regional, and global actors is adopted as a performance indicator under Strategic Direction 4, measuring the level of involvement of ISA in international efforts towards the achievement of the 2030 Agenda.

Partnerships are viewed as particularly important in the area of MSR, where the Strategic Plan and High-Level Action Plan envisage strategic alliances and partnerships with IOC-UNESCO, the International Hydrographic Organization, and collaborative programmes such as JPI Oceans.⁴⁷ These partnerships are vital in pushing MSR forward, opening up opportunities for data and information exchange, and avoiding the duplication of efforts across organizations. Partnerships are also viewed as necessary for identifying, understanding, and addressing barriers to the participation of developing States in the mineral-related activities of the Area.

ISA's understanding of the need for strategic alliances and partnerships in implementing the regime for the Area aligns well with the international community's understanding of what is needed for achieving sustainable development more generally. SDG 17 (Partnerships for the Goals) recognizes the need for global partnerships for sustainable development.

Each of the Voluntary Commitments established at the UN Ocean Conference in 2017 involves some form of partnership work. ISA has partnered with UN DESA, Norway, and the Pacific Community (SPC), for instance, to build the capacity of P-SIDS through the Abyssal Initiative for Blue Growth. It has partnered with the African Union and NORAD under the ADSR project to foster international and regional cooperation in support of the sustainable development of Africa's blue economy. Contractors themselves are also partners of ISA, especially with respect to Voluntary Commitments relating to enhancing the role of women in MSR and improving the understanding of essential ecological functions.

Whilst ISA's strategic alliances and partnerships under the Voluntary Commitments were widely welcomed by interviewees, a smaller number of them indicated scope for ISA to leverage partnerships more widely, outside of its core constituency of contractors and Member States. One interviewee suggested further collaboration with other multilateral ocean organizations, where ISA could be positioning itself as a leading authority on marine science in the Area. Another interviewee suggested that the UN Decade of Ocean Science for Sustainable Development is a perfect opportunity for ISA to collaborate more widely with others on sustainable development.



Case Study 4

Abyssal Initiative for Blue Growth (#OceanAction16538)

Photo: Eva Kaufman/Getty Images

Why is this important?

The cultures and identities of SIDS are intrinsically connected to the oceans, with economies sustained for millennia by the oceans, primarily through fisheries. However, many SIDS aspire to diversify their economies in order to safeguard the livelihoods of generations to come. In this context, the sustainable use of marine minerals both in the Area and in national jurisdictions is one potential and increasingly attractive option.

What has ISA done as part of the Abyssal Initiative for Blue Growth?

The right of all States to access the Area and its resources is enshrined in UNCLOS. In this context and as per its Strategic Plan for 2019-2023, ISA actively promotes and seeks opportunities for developing States in the Area, paying special attention to the needs of LDCs, LLDCs and SIDS (Strategic Direction 6: "Ensure integrated participation by developing States"). To this end, ISA registered a Voluntary Commitment at the UN Ocean Conference in 2017 to promote the "blue economy" concept as a means of enabling P-SIDS to benefit fully from the sustainable development of deep-seabed resources. Known as the "Abyssal Initiative for Blue Growth" (#OceanAction16538), the objective of this Commitment, which is implemented in partnership with the UN Department for Economic and Social Affairs (UN DESA) and NORAD, is to ensure that P-SIDS are well positioned to comply with the national and international obligations set out in ISA's mandate in order to realize their economic potential in deep-sea mining.

One of the fundamental objectives of the Abyssal Initiative is to address the capacity-development needs of Sponsoring States in the Pacific, i.e., currently the Cook Islands, Kiribati, Nauru, and Tonga. This responds to ISA's Strategic Direction 6: "Ensure integrated participation by developing States". As a first step, a workshop was held in Tonga in February 2019, bringing together nine P-SIDS, regional bodies, civil and NGOs, and the private sector, as well as representatives of ISA (the Secretariat and LTC), in order to identify pressing capacity needs of SIDS seeking to sponsor activities in the Area. Based on this assessment, ISA organized two further capacity-development workshops in 2019, in Nauru ("Role and responsibilities of sponsoring States") and Kiribati ("Marine scientific research in the Area").

Taken together, the ambitions and activities of the Abyssal Initiative have the potential to contribute to a number of SDGs. The capacity-development activities undertaken as part of the Abyssal Initiative contribute to SDG 4 (Quality education) by raising the skill sets of officials in P-SIDS, as well as SDG 9 (Industry, innovation, and infrastructure) through transfer of technology to these States and bolstering of their deep-sea mining industries. The overall ambition of the Abyssal Initiative is unambiguously aligned with SDG 8 (Decent work and economic growth), in that it seeks to diversify the economies of P-SIDS and offer their peoples opportunities for employment. Increasing deep-sea mining's share of P-SIDS' economies can make them more sustainable by decreasing their susceptibility to fluctuations in fishing stocks and trends in tourism. Finally, the focus on SIDS means that the Abyssal Initiative contributes to SDG 10 (Reduced inequalities) by prioritising their participation relative to other states.

What difference has it made?

The workshops undertaken by ISA in Nauru and Kiribati were welcomed by informants in addressing capacity-development needs in relation to the roles and responsibilities of sponsoring States, participation in MSR, environmental management and monitoring, and benefit-sharing. The Abyssal Initiative has given ISA's capacity-building activities a sharper focus. According to an interviewee based in the Pacific, prior to the Abyssal Initiative, there was a sentiment amongst the P-SIDS that ISA's work was more focused on its contractors than its Members. The same interviewee felt that much of the capacity development delivered over the previous 30 years had not sufficiently addressed the actual needs of these States and had not produced any "real change". Others suggested that this may be because the P-SIDS did not have the absorptive capacity to make use of ISA's capacity development.

The Abyssal Initiative, on the other hand, is more purposeful and deliberately aligned with the actual needs of the P-SIDS. Giving stakeholders the opportunity to voice what they wanted to achieve from the Initiative has differentiated it from the capacity development of ISA's past and that of other organizations. In the view of the P-SIDS interviewed, the consultations and subsequent workshops delivered by ISA will indeed help these States effectively engage with activities in the Area.

Interviewees from the Pacific indicated that deep-sea mining and the work of ISA have great potential to assist P-SIDS in their sustainable development. Because of COVID-19, these States have lost income from tourism, which is one of two industries that Pacific Islands are most dependent on, the other being tuna fisheries. P-SIDS need to diversify their economies and find another source of income for the future. These perspectives underscore the importance of the Abyssal Initiative for such States.

Conclusions

ISA's strengths and best examples of contributions to the SDGs

ISA's mandate

ISA's greatest strength, and at the same time its greatest potential contribution to the SDGs, is embodied within its core mandate: **strengthening the rule of law in ocean governance, preventing unconstrained exploitation of deep-seabed mineral resources whilst ensuring the effective protection of the marine environment, and ensuring the equitable sharing of benefits.** ISA provides a neutral platform for collective deliberation on these trade-offs by the nations of the world, leading to joint decision-making on how best to put in place environmental measures and share benefits worldwide. These are essential contributions to sustainable development as a whole, responding in a cautious and planned way to the projected dramatic increase in the supply of minerals needed for decarbonisation over the next two decades.

Rule-making

ISA makes valuable contributions to SDG 14 (Life below water) and SDG 16 (strong institutions) by **setting comprehensive rules, regulations, and procedures** that contractors must comply with while exploring for marine minerals as well as during exploitation. Without these rules, the marine environment would not be protected from the harmful effects of future deep-sea mining. Thanks to the existence of ISA, there has been an opportunity to weigh up the possible impacts of deep-sea mining and put in place effective measures to protect the environment and mitigate potential damage before moving ahead with exploitation, something that is not always implemented in terrestrial mining and that has not been achieved for any other global resource. ISA has already identified nine APEIs comprising 24 per cent of the CCZ, which will be protected from mining activities, and will be considering

a proposal to establish a further four such areas, which would bring the total protected area to 32 per cent.

Capacity-building



The final area many interviewees stressed as a significant contribution of ISA to SDG 4 (education), SDG 16 (strong institutions), and SDG 17 (partnerships) was its support for capacity building. This was described in terms of individual experience, in which interns and trainees on board exploration vessels had gained experience that rapidly enabled them to become leaders in research or government roles. This also contributed to technology transfer, as the experience of seeing what technologies were available and most useful was taken by trainees into national research institutes or departments, and informed later decision-making on technology investments. Perhaps more significantly, **ISA's capacity-building work supports LDCs, LLDCs, and SIDS and other less technologically-advanced States to enable them to take part in decision-making on the future of deep-sea mining.** Some such States have been able to take on the role and benefits of sponsoring a contractor in the exploration phase.

Research



ISA also contributes to SDGs 14 and 16 by helping **to improve the scientific community's knowledge of the deep ocean.** The resources required to operate ocean-going vessels for deep-sea research are beyond those available to most research institutes in developing countries. By requiring contractors to undertake environmental studies before they can apply for exploitation contracts, and by setting standards for data collection, ISA enables contractors to contribute to the global knowledge base through the information they collect during exploration. ISA publishes

the environmental elements of this research on its DeepData database, and ISA guidance is for contractors to have policies that allow scientific and academic institutions engaged by them to freely publish. For some contractors, publication and open access are mandatory. Interviewees

suggested that one of ISA's strengths is fostering collaboration between industry and academics, both through supporting exchanges and other connections through an endowment fund, and through hosting events that bring together industry and researchers to review evidence together.

Possible opportunities for ISA's Members and Secretariat to achieve more Engagement

ISA is already making clear contributions to the SDGs and has the potential to make further contributions when exploitation begins. However, its contributions are sometimes overshadowed within a wider debate, led by conservation organizations, about the necessity of deep-sea mining. From its inception, ISA has had a central role for civil society engagement in its processes, and the 30 NGOs among its formal observers have an influential voice. NGOs have made valuable contributions to the framing of environmental regulations. Nevertheless, some are also simultaneously making a case outside ISA processes for a moratorium on deep-sea mining wherever it may occur. Many ISA Members who reach different conclusions on this issue, however, are currently shying away from engagement in the debate.

If deep-sea mining has an important role to play in supplying the minerals urgently required for decarbonisation (promoted under SDG 13), then the failure of ISA's Members to engage with critics may hinder progress towards the SDGs. ISA is already delivering on many of the environmental protection measures (related to SDG 14) being called for by marine scientists and NGOs. ISA's Members should be helping to frame the debate and ensuring that the benefits of deep-sea mining are widely understood, including the sharing of economic benefits (SDGs 1 and 8) and the potential to prevent impacts on land (SDG 15) as the demand for minerals grows.

Transparency

Some interviewees felt that ISA could do more to make its processes more transparent, as SDG 16 has targets on strong institutions and increased transparency. Although ISA Council and Assembly meetings are already public, some

interviewees believed more aspects of the LTC's meetings could be made public, or greater detail could be provided on why the LTC comes to certain recommendations. Extensive stakeholder consultation is already a prominent feature of ISA's processes. However, the more open the process of designing regulations, the greater the confidence all parties can have that they represent a fair balance between a complex set of considerations. For example, it was suggested that when ISA receives comments on regulation design, it could make it clear how those comments are being integrated into revisions of the Mining Code or share reasons why they are not being included.

Regulation vs exploitation

Being clearer about how, in practice, ISA's regulatory function (contributing to SDG 14) is separate from its role in exploitation, particularly through the Enterprise, will be important to allay concerns about tensions between those functions. A number of interviewees commented on this, pointing out that regulators are generally required to have no interests in the activities they are responsible for regulating. To make a success of its commitment to protect the marine environment, ISA needs to demonstrate that its decision-making among the trade-offs is never even unintentionally influenced by internal incentives to increase the rate of resource exploitation. The separation of funding of different ISA functions from different revenue streams (from its Members, from contractor fees, and from the Enterprise) is one important element of the solution to this issue which is currently being addressed by the Finance Committee.⁴⁸

Capacity-building

Interviewees felt that ISA's capacity-building programmes (related to SDG 17) have improved since the organization developed its Strategic Plan, becoming more focused, results-oriented, and equitable. Consultations with stakeholders to assess gaps in current capacity-building activities and formulate plans can be credited with improved targeting in ISA's approach. However, now that basic knowledge of the Area has been acquired, ISA could strengthen the elements that will help developing States reap the commercial benefits of the training. One interviewee pointed out that, despite the ADSR project, there is not yet a sponsoring State from the African continent.

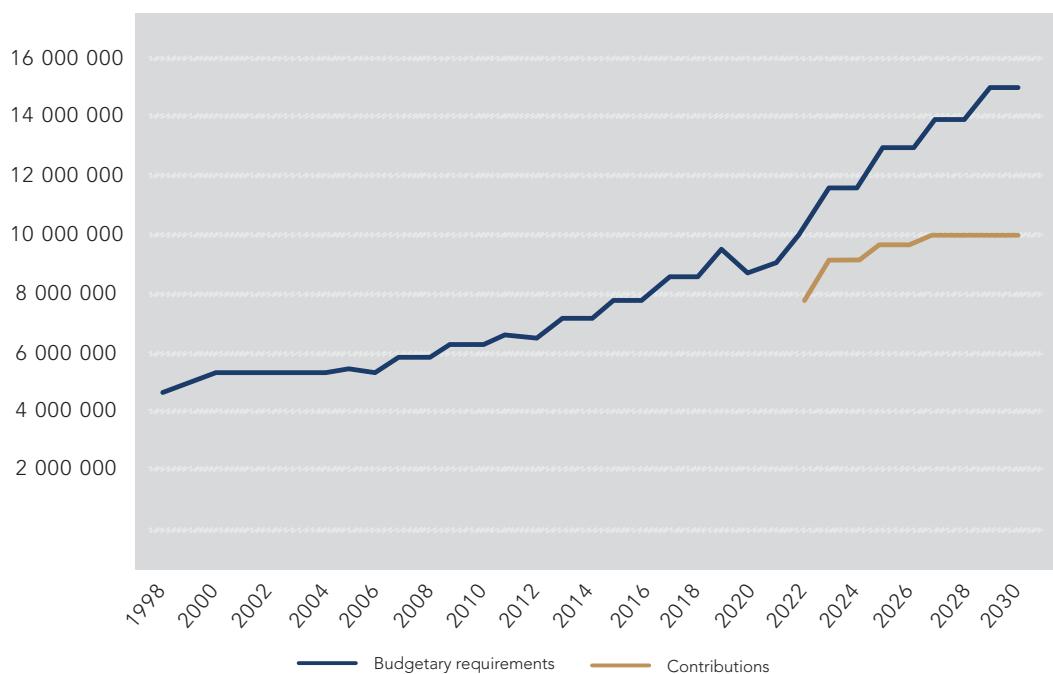
Data integrity

Most of the research and data collection that ISA supports (towards SDG 14) is undertaken by contractors. Indeed, this is at the heart of the relationship between ISA and contractors: with the approval of a contract, the contractor is being invited to explore the deep seabed on behalf of all humankind. Some interviewees suggested that the credibility of this research could be undermined because of contractors influencing

data collection in line with their own interests. In practice, most of the environmental data collected on the deep ocean is independently researched on behalf of the contractors and all environmental data collection is mandated by ISA requirements. But there may be scope for ISA to communicate the independence of this research better than it is currently doing.

Resourcing

As momentum builds towards the potential initiation of commercial-scale deep-sea mining, demands placed upon ISA have grown in ways that the organization has sometimes struggled to meet. The financial resources of ISA have not increased in line with these expanding responsibilities (see figure below). One interviewee questioned whether LTC members operating on a voluntary basis, alongside full-time professional roles, was sufficient to ensure the required detail and quality in the regulations being developed. It was also suggested that resource constraints sometimes limited ISA's ability to be proactive and timely in providing updates. This is relevant for the continued contribution of ISA across all its priority SDGs.



Comparison of actual and projected budgetary requirements (1998–2030) and projected contributions (2022–2030) (US Dollars).⁴⁹

Recommendations

For ISA's Members

Engagement

If ISA's Members collectively believe that deep-sea mining will make an important contribution to the achievement of the SDGs, and that its negative impacts can be managed through the mechanisms ISA is putting in place, Members could be more explicit in public that this is their position. The Secretariat's primary role is to enable a participatory decision-making process to resolve difficult trade-offs, and this may be incompatible with taking a strong public stance on the issue. Yet, it is not clear at present who is responsible for setting out all the possible trade-offs and the balance of Members' perspectives on them.

Transparency

The LTC should be encouraged to make more aspects of its work public and to share greater detail on how and why it reaches certain conclusions. One suggestion is that ISA should publish more detail on how stakeholders' comments are being integrated into revisions of regulations (such as the Mining Code) and share rationales for why certain comments are not incorporated.

Resourcing

If deep-sea mining has an important role to play in meeting the urgent demand for significant growth in the mineral supply required for decarbonisation, Members should review whether the resourcing from their contributions will be sufficient for the ISA Secretariat to fully cover all the functions needed to fulfil the potential of ISA's mandate to contribute to the SDGs.

For the ISA Secretariat

Regulation vs. the Enterprise

The Secretariat should share information more widely about how restricted funding streams and other measures ensure that its regulatory function is in no way influenced by incentives arising from

its participation in the regulated activities (through the Enterprise or, indirectly, through contractors' fees).

Scientific capacity

If resources permit, the Secretariat should strengthen its internal scientific capacity, enabling it to make a greater independent contribution to evaluating measures required in environmental management plans and regulations. This could also enable more visible participation in marine scientific research, helping to demonstrate how ISA ensures the integrity of data collected primarily by its contractors.

DeepData database

The Secretariat should develop a more intuitive interface for the database, so that researchers and non-specialist users can easily run more powerful queries, with a better presentation of results within the application itself. At the moment, researchers need to download data and use their own software for analysis and presentation.

For ISA's Observers

Engagement

All parties should respect the legitimacy of the internationally-agreed processes for working through difficult trade-offs and uncertainties on this issue. Pressure that leads to worse decision-making could have high social and environmental costs. Given the known impacts of weakly-regulated terrestrial mining, it might be harmful to do too little deep-sea mining, or alternatively to do too much without adequate regulation. It is entirely legitimate for interest groups to seek to steer collective decision-making towards one or another end of a spectrum of conclusions. Engagement should be done in ways that uphold and strengthen the institutions of collective decision-making, in line with ISA's contributions to those institutions and partnerships through SDGs 16 and 17.





Annexes

I. People interviewed for this report

- **Saleem Ali***, Global Environmental Facility; UN International Resource Panel
- **Erasmo Lara Cabrera**, Deputy Head of Mission to the Embassy of Mexico in Germany and member of ISA Legal and Technical Commission
- **Bebek Djundjunan***, Director for Legal Affairs and Territorial Treaties, Ministry of Foreign Affairs of the Republic of Indonesia
- **Suzan El-Gharabawy**, Associate Professor, Egypt National Institute of Oceanography and Fisheries (NIOF)
- **Alan Evans**, Head of Marine Policy and Marine Science Policy Adviser; Advisory Panel of ISA's Endowment Fund, UK National Oceanography Centre
- **Liu Feng**, Secretary-General, China Ocean Mineral Resources Research and Development Association (COMRA)
- **David Freestone**, Executive Secretary, Sargasso Sea Commission
- **Andrew Friedman**, Associate Manager of Seabed Mining Project, Pew Charitable Trusts
- **Matthias Haeckel**, Senior Scientist, GEOMAR Helmholtz Centre for Ocean Research
- **Richard Herrington**, Head of Earth Sciences, UK National History Museum
- **Andrew Jones**, Director of Geoscience, Energy and Maritime, Pacific Community
- **Mathu Joyini***, Permanent Representative of South Africa to the United Nations, South Africa
- **Se-Jong Ju**, member of ISA Legal and Technical Commission, Korea
- **Andreas Motzfeldt Kravik**, Deputy Director for Treaties and Ocean Law, Royal Norwegian Ministry of Foreign Affairs
- **Pedro Madureira***, Deputy Head & Technical and Scientific Coordinator, Task Group for the Extension of the Continental Shelf, Portugal and member of ISA Legal and Technical Commission
- **Young-Dawng Moh**, Liaison for collaboration with ISA, National Marine Biodiversity Institute of Korea (MABIK)
- **Mariusz Orion-Jedrysek***, Professor and Head of Department of Applied Geology, Geochemistry and Economy of the Environment, University of Wroclaw (formerly, PM, Secretary of State, and Chief Geologist, 2005-2007 and 2015-2019, Ministry of the Environment of Poland)
- **Judith Owusu**, Geochemist, Ghana National Petroleum Corporation
- **Sverre Magnus Petersen**, Adviser, Norwegian Agency for Development Cooperation
- **Vladimir Ryabinin**, Executive Secretary, Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO)
- **Yoshihisa Shirayama**, Director, Japan Agency for Marine Science and Technology (JAMSTEC)
- **Samantha Smith**, Director, Blue Globe Solutions and President, International Marine Minerals Society
- **Tearinaki Tanielu**, Director, Multilateral Affairs Division, Ministry of Foreign Affairs and Immigration, Kiribati
- **Akuila Tawake**, Deputy Director of Georesources and Energy Programme, Pacific Community
- **Siosiua Utoikamanu***, Independent Consultant, member of ISA Legal and Technical Commission
- **Kris Van Nijen**, Managing Director, Global Sea Mineral Resources
- **Gu Wu**, Director, China National Deep-Sea Centre (NDSC); ISA-China Joint Training and Research Centre (JTBC)

* People marked with asterisks were interviewed in their personal capacity as members of the ISA Secretary General's Experts Group on the Sustainable Development Goals, and not in their official capacity.

Comments from all interviewees have been aggregated and anonymised throughout this report.



II. The SDG Group of Experts

The Secretary-General of ISA established a Group of Experts to provide, as appropriate, expert inputs and strategic advice in the preparation of this report. The Group of Experts consists of professionals of different backgrounds and disciplines representing a wide array of expertise and knowledge. They are internationally recognized for their contribution to one or more elements covered by the SDGs and ISA. The Group of Experts held three meetings between May and July 2021 during which they provided expert inputs and guidance on the compilation of the final report. The Group of Experts also reviewed various drafts of the report.

The Group of Experts was comprised of the following individuals acting in their personal capacity:



Prof. Saleem Ali

Scientific and Technical Advisory Panel, Global Environment Facility, UNEP

Prof. Ali received his doctorate in environmental planning from MIT, Master's degree in environmental studies from Yale University and Bachelor's degree in chemistry from Tufts University (summa cum laude). Currently, he holds the Blue and Gold Distinguished Professorship in Energy and the Environment at the University of Delaware and is a Senior Fellow at Columbia University's Center on Sustainable Investment.

Professor Ali's fieldwork experience has spanned over 100 countries on six continents for which he has also been named a National Geographic Explorer and a Young Global Leader by the World Economic Forum. He is a distinguished academic researcher and author focusing on environmental security, climate diplomacy and industrial ecology, particularly involving extractive industries.



Ms. Gillian Davidson

Leadership Council, Resolve

Gillian Davidson has a PhD in Development Economics and Geography. In her career, she held various senior roles in government, academia and consulting industry as a leader in the extractives and natural resources sectors.

Currently, Ms. Davidson is a senior adviser to global extractives companies and international organisations, an Executive Board member of the Global Battery Alliance and a Non-Executive Director at New Gold Inc. Central Asia Metals and Lundin Gold where she chairs the Sustainability Committees of the Board.

Ms. Davidson is Chair of International Women in Mining, a fellow of Chatham House, The Royal Society of International Affairs, and Chair of the Resolve Leadership Council.





Mr. Bebeb Djundjunan

Director of Legal Affairs and Territories, Ministry of Foreign Affairs, Republic of Indonesia

Mr. Djundjunan received his degrees in law from Padjadjaran University, Indonesia, and University of Kent, Canterbury, UK. He is a doctoral candidate in law at the Padjadjaran University, Indonesia.

Currently, Mr. Djundjunan serves as the Director of Legal Affairs and Territorial Treaties in the Ministry of Foreign Affairs of the Republic of Indonesia. In his career, he served in a variety of diplomatic, consular and secretarial positions in and for the government of Indonesia and its representations in various United Nations entities.

Mr. Djundjunan has been nominated by the Government of the Republic of Indonesia as an Ambassador Designate to the Hellenic Republic.



H.E. Ms. Maria-Teresa Infante

Judge of the International Tribunal for the Law of the Sea

H.E. Infante was appointed a judge of the International Tribunal for the Law of the Sea in 2020.

In her career, H.E. Infante held a host of positions as a professor in Chile, as a practicing lawyer appearing on behalf of Chile in disputes before the International Court of Justice, as an Ambassador of Chile to the Kingdom of the Netherlands, as a Permanent Representative to the Organization for the Prohibition of Chemical Weapons, as a Chair of the Sub-Working Group on Non-State Actors of the OPCW and as a Co-Chair of the Study Group on Governance of The Hague Working Group of the ICC Assembly of States Parties.

H.E. Infante has advised and participated in research programs for several international organizations and participated in diplomatic negotiations on issues of integration, limits, international law and cooperation on border policies.



H.E. Ms. Mathu Joyini

Permanent Representative of South Africa to the UN

H.E. Joyini has a Bachelor's in social work from Wits, Master's in social work from the University of Pennsylvania, USA, Master's in business administration from Wits Business School. Currently, she is a Deputy Director-General at the Department of International Relations and Cooperation heading the Diplomatic Academy and the Policy Research and Development Unit.

H.E. Joyini has held various senior managerial and executive positions in the private sector in different industries, including mining, finance, petroleum and consulting. She has also occupied numerous managerial and executive positions in the government including, inter alia, as a Permanent Representative of South Africa to the International Seabed Authority between 2010 to 2015.



Prof. Pedro Madureira

Deputy Head, Portuguese Task Group for the Extension of the Continental Shelf

Prof. Madureira is an Associate Professor at the University of Évora where he got his PhD in igneous petrology and geochemistry. Currently, he is working as a geologist in the Task Group for the Extension of the Portuguese Continental Shelf. He coordinates the scientific and technical work related to the acquisition of data and information to support the outer limits of the continental shelf as submitted by Portugal to the United Nations.

In his career, prof. Madureira served as a principal investigator of several oceanographic campaigns in the North Atlantic and as a member of the Legal and Technical Commission of the International Seabed Authority. His main academic interests include the formation and distribution of deep-sea mineral resources, marine environment and deep-seabed exploration.



Prof. Marius Orion-Jędrysek

Former Secretary of State, Chief National Geologist, Deputy Minister of Environment of Poland, Former President of ISA Assembly (2018)

Prof. Orion-Jędrysek is the Head of Lab Isotope Geology and Geoecology and Head of Department for Applied Geology, Geochemistry and Environment at the Institute of Geological Sciences, University of Wrocław, Poland.

In his career, prof. Orion-Jędrysek, member of various national and international scientific organizations, recipient of various awards and grants, an author of hundreds of scientific articles, held a variety of positions in academia, government and international organizations throughout his prolific career.

He was elected the President of the Council of the International Seabed Authority three times and the President of the Assembly once. He was also member of the Bureau of the Council or the Assembly of the International Seabed Authority several times.



H.E. Ms. Alison Stone Roofe

Permanent Representative of Jamaica to ISA

Ambassador Stone Roofe has worked in the Jamaican Foreign Service for over 30 years. In 2021, she was appointed Jamaica's Permanent Representative to the International Seabed Authority.

Ambassador Stone Roofe graduated from the University of the West Indies and holds an M.Phil. in International Relations from the University of Oxford, England, she obtained as a Commonwealth Scholar. She served as Jamaica's Ambassador to Brazil with concurrent accreditation to Argentina, Chile, Paraguay and Uruguay. She is the Under Secretary for Multilateral Affairs at the Ministry of Foreign Affairs and Foreign Trade of Jamaica.

Ambassador Stone Roofe taught as a part-time lecturer at the University of the West Indies, Department of Government, and enjoys teaching, academic research and writing. She is an avid cricket and tennis fan.



Mr. Siosua 'Utoikamanu
Member of ISA Legal and Technical Commission

Mr. 'Utoikamanu is an independent consultant who specializes in international development issues. A national of Tonga, he has post-graduate degrees in economics and finance from the University of Birmingham in the United Kingdom and Victoria University of Wellington in New Zealand.

In his career, Mr. 'Utoikamanu held the position of Minister for Finance of Tonga, of the Governor of the National Reserve Bank of Tonga and of the Director of the Pacific Islands Centre for Public Administration at the University of the South Pacific in Suva, Fiji.



H.E. Mr. James N. Waweru, OGW
Registrar of Treaties, Ministry of Foreign Affairs, Kenya

Ambassador Waweru is the former Legal Advisor at the Permanent Mission of the Republic of Kenya to the United Nations.

Ambassador Waweru has an LL.B from Nagpur University, India, and an LL.M in International Economic Law from Warwick University, United Kingdom. He is an Advocate of the High Court of Kenya and a Certified Secretary and an alumnus of the Rhodes Academy of Oceans Law and Policy.

Ambassador Waweru joined the Office of the Attorney General and Department of Justice where he served in different capacities until his secondment to the Ministry of Foreign Affairs. He is an avid rugby fan, a budding chef and a volunteer at children psychological and psychosocial wellbeing organizations Sense101 Club and JoyVillage.

III. Selected bibliography

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- ⁶ ISBA/24/A/10 (July 2018).
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- ⁸ The international seabed area (the "Area") – the part under ISA jurisdiction – is the seabed and ocean floor and its subsoil, beyond the limits of national jurisdiction (i.e., beyond the continental shelf). The Area represents around 50 per cent of the total seabed of the world's oceans.
- ⁹ See Annex 2.
- ¹⁰ For more information on the SDGs, see <https://sdgs.un.org/goals>
- ¹¹ In this report, critical minerals are defined as those that are essential to the global economy and society, particularly to global decarbonisation efforts, and whose supply is potentially at risk.
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- ¹⁸ De Haan et al. (2020).
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- ²¹ See comparative analysis of the financial aspects of seabed mining and land-based mining as requested by the ISA Council in February 2020: <https://www.isa.org.jm/index.php/event/webinar-comparative-analysis-seabed-mining-and-land-based-mining>. In practice, the rapid and ongoing growth in overall demand for critical minerals will lead to growth in terrestrial mining operations as well. Therefore, deep-sea mining would contribute to only part of the additional global demand. International Tribunal on the Law of the Sea (2011).
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- ⁴⁶ There are around 38 references to partners or partnerships in the High-Level Action Plan adopted to operationalize the Strategic Plan.
- ⁴⁷ Joint Programming Initiative Healthy and Productive Seas and Oceans: <https://jip-oceans.eu>.
- ⁴⁸ ISBA/26/FC/7.
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