

# Participation Report

DOSI activities at the Second part of the 28<sup>th</sup> session of the International Seabed Authority

*30 July 2023*

## Overview

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The second part of the twenty-eighth session of International Seabed Authority (ISA) was held in Kingston, Jamaica from 10 to 28 July 2023, and involved the meeting of the Council (10 to 21 July) and the Assembly (24 to 28 July). DOSI participated in person and was supported by a team of experts who participated online.

Items on the agenda of this ISA Council and Assembly session with particular relevance for DOSI included:

- Draft regulations on the Financial Terms
- Draft regulations on the Protection and Preservation of the Marine Environment
- Draft regulations on Inspection, Compliance, and Enforcement
- President's text
- Report of the Legal and Technical Commission
- Discussions on the 2-year rule and pathways forward.
- The decade of Ocean Science and the plans of the ISA to engage and increment scientific knowledge
- The Report of the Secretary General on the progress made by the authority in the period 2021-2023
- Consideration of the strategic plan for the period 2024-2028

## DOSI Delegation participating in person

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Patricia Esquete (Co-lead)

Muriel Rabone

Eulogio Soto

Catherine Blanchard

Sergio Cambronero

Klaudija Cremers

Sonigitu Ekpe

Tiago Pires da Cruz

## DOSI Minerals WG experts supporting other delegations

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Diva Amon (Trinidad & Tobago)

Matt Gianni (Deep-Sea Conservation Coalition)

Pradeep Singh (IUCN)

Giulia Champion (TBA21)

Bobbi-Jo Dobush (The Oceans Foundation)

## DOSI Minerals WG experts supporting virtually

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Jesse van der Grient (Co-lead)  
Catherine Blanchard  
Stephen Cody  
Lisa Levin  
Beth Orcutt  
Diva Amon  
Hannah Lily  
Anna Metaxas  
Kristina Gjerde  
Aline Jaeckel

## DOSI Actions

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### 1. Interventions and textual proposals

DOSI actively intervened in the discussions by delivering a total of 20 interventions (Annex I), that included scientific and expert opinions on how to ensure high environmental standards and the reflection of independent and robust science in the regulations. The interventions delivered can be found on the [ISA website](#) as well.

Our work was mentioned in interventions or had our interventions supported by: PEW Charitable Trusts and the Deep Sea Conservation Coalition (DSCC). Interventions were delivered in English or Spanish.

### 2. Information sheets and Policy briefs

DOSI prepared, printed, and distributed copies of the documents (Annex II):

- a) *What Does the Deep Ocean Do for You? Polymetallic Nodule-Rich Abyssal Plains and the Water Column*
- b) *What Does the Deep Ocean Do for You? The Seamount Ecosystem*
- c) *What Does the Deep Ocean Do for You? Hydrothermal Vent Ecosystems*

### 3. Hosting a side event

DOSI co-hosted a side event, together with Pew Charitable Trust and the Natural History Museum (London) on the evening of the 12th of July entitled ‘*What DeepData can tell us about the Biodiversity in the CCZ?*’ (Annex III). The event featured the recently published study carried out by Dr Muriel Rabone from the Natural History Museum and DOSI member, who compiled and analyzed all available faunal records in the CCZ. The event

started with a welcome reception, followed by a talk by Dr Rabone, a Q&A, and concluded with a social reception so that interested parties could further discuss the topic.

The event was well attended, with at least 100 attendees from various Nations, NGOs and members of the ISA secretariat. The main points of the talk were captured in an information sheet (Annex III), which was distributed during the event.

#### 4. Attendance at side events

DOSI attended the following official ISA side events that took place during the meetings of this session:

- 1) Monday, 10 July 2023: Cluster Maritime Français [ABYSSA] - *Exploring the deep-sea with ABYSSA, a French company.*
- 2) Wednesday, 12 July 2023: The Legal and Technical Commission of the ISA Secretariat - *Informal dialogue with members of the Legal and Technical Commission.*
- 3) Friday, 14 July 2023: Ministry of Foreign Affairs of Spain and ISA Secretariat - *Enhancing cross-sectoral collaboration for sustainable management of fisheries and seabed minerals in areas beyond national jurisdiction.*
- 4) Tuesday, 18 July 2023: Nauru Ocean Resources Inc. - *Environmental Update: Insights into the NORI-D Project's Benthic Meiofauna Research Program*
- 5) Wednesday, 19 July 2023: ISA Secretariat and Sustainable Seabed Knowledge Initiative - *How to advance our understanding of biodiversity: From global collaboration to deep-sea conservation.*

DOSI asked pertinent questions during the Q&A of these events, and Members of the Council often followed up on these questions at a later stage, with regards to general impacts, the relevance of biodiversity studies, and the role of taxonomy on the assessments.

#### 5. Informal meetings held with other delegations

Several informal meetings were held with various State delegations, including Argentina, Brazil, Chile, Germany, Portugal, Spain, Trinidad and Tobago, Togo, Norway, Belgium, Guatemala, Switzerland, UK, Mexico, Fiji, Cook Islands, Vanuatu, Canada, France, and Nigeria. Meetings included topics such as aspects on marine ecosystems including the protection of the marine environment, biodiversity, marine genetic resources, thresholds, fisheries, plume modeling, discussion about mining impacts, baseline data, and about DOSI as a network of ocean experts. In addition, DOSI had informal meetings with other Observers (DSCC, Greenpeace, Pew Charitable Trust, AIDA, Oceans North, The Ocean Foundation, IUCN) to discuss the course of the negotiations, share ideas, and coordinate interventions where possible. DOSI also held informal conversations with members of the Secretariat seeking future engagement, coordination, and strategies for upcoming ISA workshops.

Meetings were on several occasions followed up by providing additional information, including DOSI policy briefs and information sheets, and scientific articles.

## 6. Press

Dr Patricia Esquete was interviewed by:

- Erik Stokstad from Science Magazine
- Krista Campbell from JamaicaTV
- Lily Kuo, Washington Post
- Laura Bult, Vox.com
- Elizabeth C. Alberts, Mongabay

Dr Catherine Balnchard was interviewed by:

- Hanneke Chin-A-Fo from NRC (Netherlands)



## Gallery

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Source: Photos by Earth Negotiations Bulletin, P. Esquete and T. Pires da Cruz











## ANNEX I. Interventions

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### **Intervention #1 DR38 - Annual Report - delivered by Patricia Esquete on 11/07/2023**

Thank you, Mr Chair,

Since this is the first time the Deep Ocean Stewardship Initiative has been given the floor, may we congratulate you on the progress made.

DOSI believes that transparency is key in monitoring mining activities, and as such we again request that the Annual Reports of each Contractor are made available to the Council rather than limiting it to the Secretary-General, as written in paragraph 1. Independent experts need to be able to review the actual results from environmental monitoring programmes, and how the results evaluate against the thresholds, although these still require to be developed. DOSI would also like to know in what timeframe these reports will be made available on the Seabed Mining Register, as such a timeframe is currently not set for the Secretariat.

Regarding paragraph 2g, DOSI again recommends alignment of the annual report content to reflect the requirements of the recent BBNJ Agreement for reports to include sample batch identifiers from the common Marine Scientific Research clearinghouse proposed in articles 12 and 14 of the Agreement.

Finally, DOSI is keen to hear how the Secretariat will aim for the effective management of the submitted information to fill in existing gaps in knowledge, including their sensitivity and resilience, the determination of environmental quality standards and appropriate exploitation equipment, as this requires highly technical expertise.

DOSI stands ready to assist in reviewing the current scientific environmental information so far provided by industries to aid in bridging scientific gaps in deep sea mining environmental impact assessment knowledge.

Thank you, Mr Chair

### **Intervention #2 - Report on the value of ecosystem services and natural capital of the Area - delivered by Patricia Esquete on 11/07/2023**

Thank you, Mr Chair

The Deep-Ocean Stewardship Initiative welcomes the report on the environmental costs of exploitation activities in the Area and how to internalize the costs associated with environmental externalities, and has reviewed the information and results therein with great interest.

DOSI would like to support Costa Rica, Belgium, Spain and other delegations that requested more time for discussing this very relevant report. Likewise, emphasize the limitations highlighted in the study, including the limited number of studies available for the evaluation of ecosystem services in the deep sea and on polymetallic nodules specifically, the lack of studies focusing on international waters, and the limited number of ecosystem services for which



valuation estimates are available. This lack of data means the valuation is likely to be underestimated and cannot be applied across different ecosystems due to their differences. Importantly, and a conclusion DOSI wishes to stress, the report states that it is currently not feasible to conduct robust value estimates for the Area, or for the areas targeted by deep-sea mining.

As such, DOSI supports the steps forward to fill these gaps, including the identification and further understanding of key ecosystem services, the quantification of impacts on ecosystem services, the selection and implementation of relevant valuation methods, the gathering of data and resources to conduct the valuation process, and the characterisation of uncertainty in the data. In order to deliver robust, usable results, and supporting Costa Rica, we suggest that sufficient time be allocated for these pieces of work to ensure progress. There is a risk of requesting the work but not being able to produce results, which is not useful for decision-making by the Council.

In the coming days, three briefs prepared by DOSI on the ecosystem services provided by polymetallic-nodule abyssal plains, hydrothermal vents and seamounts will be made available on the table outside and at the evening side event.

Thank you, Mr Chair

### **Intervention # 3 - DR44 - General obligations - Delivered on 12/07/2023 by Patricia Esquete**

Thank you, Madam Facilitator.

Since this is the first time the Deep Ocean Stewardship Initiative takes the floor in this working group, may we congratulate you with the progress made

We welcome the work undertaken by the intersessional working group on DR44 streamlining and simplifying the text of the regulation and support that general obligations are held by all entities involved.

If part of the facilitator's text wording is kept, DOSI supports the suggestion of T&T, with reference to paragraph 2(g), that the word 'ecosystems' is changed to 'ecosystem services' as the examples listed after are ecosystem services. This distinction is important given that ecosystem services can and should be valued to understand the external costs of deep-sea mining and be weighted against the potential benefits. As it stated in the Report on the value of ecosystem services and natural capital of the Area discussed yesterday, this is at the moment challenged by the lack of data.

Further, DOSI would like to clarify that offsetting is not applicable to the deep sea, and will never be, independently of the state of knowledge, because many of the species and ecosystems found in a given area of the deep-sea are unique, and cannot be replaced. We therefore respectfully disagree with what has been previously suggested concerning the reinsertion of 'offsetting' in paragraph 1(c).

Finally, we support the inclusion of Traditional and Indigenous knowledge in this regulation. As discussed in the policy brief prepared by DOSI, traditional knowledge is important for management of deep-sea mining. Indigenous ways of knowledge embody cultural and spiritual values associated with the natural environment and a respectful interaction with Nature. This policy brief is available on DOSI's website for delegates who are interested in reading more.

Thank you, Madam Facilitator

**Intervention #4 -DR45 - Development of environmental Standards and Guidelines -  
Delivered on 12/07/2023 by Patricia Esquete**

Thank you Madam Facilitator.

We thank Germany for the work done on streamlining this regulation.

DOSI would like to suggest 2 additions to DR45 which, we believe, would be in line with either the version of DR45 or DR45alt

First, DOSI suggests that a clear timeframe is added for the review of the Environmental Standards. With the increased availability of environmental baseline data that ought to be collected during the Exploration Contract Periods, we will learn more about the structure, functioning and services of the ecosystems.

Further, it is likely that ongoing research will provide increased certainty on thresholds for various impacts. In addition, with the ongoing climate change emergency, it is likely that conditions previously not observed will appear, and this requires potential changes to emergency responses and contingency plans. Thus, to ensure that the Standards reflect the best available scientific information, DOSI suggests that the ISA should be mandated to conduct a proactive review every 2 or 3 years.

Second, DOSI suggests that the Council considers the possibility of a new Standard for the design criteria of Impact Reference Zones and Preservation Reference Zones, which are currently included as an appendix. The Impact and Preservation Reference Zones are key components for successful monitoring, and included their design criteria as a Standard would allow for clarity for applicants or contractors on their use and adherence to their design, and more importantly, allows for the design criteria to be updated as knowledge and techniques on conservation improve.

Thank you, Madam Facilitator

**Intervention #5 - DR 46[bis] - Environmental monitoring- Delivered on 12/07/2023 by  
Patricia Esquete**

Thank you Madam Facilitator,

With regard to paragraph 2 and 2 alt., DOSI favours paragraph 2 as it explicitly states that the release of the findings and results are shared for wider dissemination, which is important for transparency and provides an opportunity to fill in knowledge gaps.

In addition, referring to paragraph 3, DOSI wishes to clarify that the monitoring plan is created for the whole mining life cycle, with potentially an extra detailed plan or additional independent verification for the first 7 years. In addition, this monitoring plan should be reviewed every five

years to adapt to the new information that is gathered, and to provide an opportunity to submit new detailed plans for the following 5 years.

Last, DOSI emphasizes the need to start monitoring from the commencement of mining. This is to respond to the text-box comment, [Or](#) for discussion on the submission that monitoring would not be necessary for the first five or seven years. Effects of mining on biological communities need to be evaluated for the first time within a year of the commencement of the operation. Starting monitoring later can mean that estimates of resilience and recovery are less accurate, and provide a missed opportunity for scientific evaluation to reduce uncertainty in our understanding of mining impacts on the marine environment in a timely fashion.

Thank you, Madam Facilitator

**Intervention #6 - DR47 - Environmental Impact Assessment Process - delivered on 12-07-2023 by Patricia Esquete**

Thank you, Madame Facilitator

DOSI first welcomes the streamlining work being conducted on the provisions on EIAs, and stands ready to assist for further work on EIA provisions. For example, the current provisions relating to the EIA process in DR47 and EIAs in DR47bis, and their distinction, require further clarification.

On the content of draft regulation 47, Regarding Paragraph 3b, DOSI supports the suggestion made by Trinidad & Tobago to add cumulative impacts and synergistic effects to the list of elements that the Environmental Impact Assessment should include. Specifically, cumulative effects are additive effects, meaning that the sum of effects equal the individual effects combined; synergistic effects are a form of interactive effects, meaning that the sum does not equal the individual effects combined. For instance, the effects of climate change must be always taken into consideration.

Paragraph 3b(vi) would benefit from more clarity. Every deep-sea species has a different life cycle, most of them unknown, with different durations that range from days to thousands of years, and varying use of the habitat. Regardless of the duration of the impact, it will affect the survival of many species.

Regarding paragraph 3c, DOSI would like to support New Zealand and our colleagues from DSCC, and reiterate that offsetting is not applicable to the deep sea, and will never be, independently of the state of knowledge, because many of the species and ecosystems found in a given area of the deep-sea are unique, and cannot be replaced: The loss of genetic resources, for example, cannot be offsetted.

Thank you, Madam Facilitator

**Intervention #7 - Regulation 47[bis] - Environmental Impact Assessment - Delivered on 13/07/2023 by Patricia Esquete**

Thank you, Madam Facilitator,

DOSI thanks the emphasis given by DSCC to the need of more knowledge and scientific research



For paragraph 3, DOSI would like to reiterate the suggestion to include both cumulative and interactive effects, consistent with our suggestion for draft regulation 47. We clarify: they are different concepts:

Cumulative effects are additive effects, meaning that the sum of effects equal the individual effects combined; synergistic effects are a form of interactive effects, meaning that the sum does not equal the individual effects combined.

We are open to the suggestion that this could be done by way of adding synergistic effects to a definition of cumulative effects in the Schedule, as long as the distinction of both is made.

Thank you, Madam Facilitator

**Intervention #8 - Regulation 48 - Environmental Impact Statement - Delivered on 13/07/2023 by Patricia Esquete**

Thank you Madam Facilitator,

We listened with interest to the proposal by South Africa to remove the peer review process from the EIS before submission. We question whether the same role will be performed by the LTC. A peer review is a process that looks at the EIS data and methodology in great detail and validates the accuracy of these. The role of the LTC is to review the EIS against their decision-making criteria, and report to the Council. We are unsure that the LTC could also be expected to verify all of the contractor's data and findings, in the same way as a peer reviewer. We would therefore suggest to retain the peer review requirement, a. As a useful layer of independent expert review, that can help the LTC and the Council to do their job.

In addition, DOSI supports the inclusion of paragraph 4k, These are important verification mechanisms, and should be reported even if no impacts have occurred.

Thank you, Madam Facilitator

**Regulation 48 ter - Test mining - Delivered by Patricia Esquete on 13/07/2023**

Thank you, Madam facilitator

DOSI wishes to thank Germany and Belgium proposal, and congratulate the intersessional working group for the work done on the development of a regulation of test mining. We have a few comments that we would like to share for consideration by the Council:

We would like to stress that, although the data collected during test mining would be valuable for a better understanding of the potential levels of environmental harm to be incurred, the potential resilience to mining impacts, including via the improvement of plume models, test mining remains an activity that has an impact in the marine environment. Therefore, if conducted, it should always be subject to an Environmental Impact Assessment, the development of an Environmental Impact Statement, and Monitoring.

We agree with the statement in the report of the intersessional working group that modeling requires baseline data. The results of a model are only as good as the input data, and we must reiterate that we are far from having sufficient and adequate data for reliable results of modeling for most of the deep-sea ecosystems and areas targeted for deep-sea mining.

Finally, we would like to stress that mining tests performed without a complete system and full scale of the collector, rising system, and other machinery do not allow us to accurately assess the possible impacts of the marine environment of mining activities. Such impacts are assessed

for both the seafloor and the water column, from microbes to large animals. Without such thorough methods, the data collected is not reliable. As shown on two posters outside this room, independent research carried out in the framework of the project Mining Impact, testing a smaller pre-prototype of a collector has demonstrated that this is not sufficient to be able to draw conclusions on the ecological impacts of the operations for most of the parameters studied.

Thank you madam facilitator

**Intervention#10 - Report of the Secretary-General on the implementation of the decision of the Council in 2022 relating to the reports of the Chair of the Legal and Technical Commission - delivered on 17/07/2023 by Patricia Esquete ([2310808E.pdf \(isa.org.jm\)](#))**

Thank you Mr. President,

DOSI acknowledges the report of the Secretary General and would like to make 2 brief comments.

Firstly: we notice, in paragraph 5, that the report has not identified any instances of alleged non-compliance by contractors in relation to their operations at sea or in the conduct of their plans of work for exploration. DOSI questions why the report only refers to 'operations at sea or in the conduct of their plans of work' and questions whether this implies that other instances of alleged non-compliance, for example with data reporting, annual reports, periodic reports, payments, have not been included in the report.

Secondly, we note that the secretariat is continuing its scientific work and interpretation from DeepData, with the assistance of experts from developing countries. DOSI is grateful for any update on any improvements to DeepData Since its launch in 2019, DeepData still has limited functionality. We stress that the database is only useful if the data is accessible and usable for management and policy decision-making. As shown in a recent research article presented in the side event hosted by DOSI and PEW last Wednesday, in spite of recent improvements, such the publication of DeepData records in the OBIS ISA node, DeepData still has deficiencies that compromise the Findability, Accessibility, Interoperability, and Reusability of the data The accessibility of oceanographic and biological data collected by contractors in the Area is essential for independent analyses that for example, will guide REMPs. We hope DeepData will be improved to resolve these matters, including a data quality control system, a better integration of this platform with global observing efforts and adoption of best practices, interoperability, and accessibility.

DOSI remains ready to assist to explore these issues further.

Thank you M. President.

**Intervention # 11 - Regulation 8 - Area covered by an application - delivered (in Spanish) on 18/07/2023 by Sergio Cambronero**

Thank you Co-Facilitators.

As this is the first time DOSI takes the floor in this working group, allow me to thank you both for your remarkable work. Likewise, we recognize the great importance of Nelson Mandela International Day and his commitment to protecting the environment.

Regarding Paragraph 3 alt, DOSI supports its incorporation into the text and shares what is stipulated by France regarding the application area must be linked and preceded by an exploration contract. In this sense, DOSI requests further clarification on the meaning of 'adequate and satisfactory environmental baseline data'. To ensure coherence with other relevant instruments of the Mining Code, we suggest including in this Regulation a direct reference to a Standard or Guideline for the establishment of baseline environmental data, instead of using terms such as 'adequate' or 'satisfactory'. Available criteria to further evaluate the quality of environmental baseline data is discussed in a 2022 peer-reviewed publication, the reference of which DOSI is happy to share with members of the Council who are interested.

Further, we seek clarification on the meaning of 'publicly available' and ask whether this refers to the data available via DeepData.

Finally, DOSI welcomes the addition of paragraph 5 to assist the Authority in identifying where there may be areas designated or managed under other regimes, which is especially important when considering other marine uses. Such provision is also an opportunity to reaffirm the importance of cooperation in marine scientific research under article 143 paragraph 3 of the Convention.

Thank you.

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Muchas gracias distinguidos Co-Facilitadores.

Como esta es la primera vez que DOSI toma la palabra en este grupo de trabajo, permítanme agradecerles a ambos por su ardua labor. Así mismo, reconocemos la gran importancia del Día Internacional de Nelson Mandela y su compromiso con la protección del medioambiente.

Con respecto al Párrafo 3 alt, DOSI apoya su incorporación al texto y comparte lo estipulado el día de ayer por Francia respecto a que el área de la aplicación debe estar ligada y precedida por un contrato de exploración. Con respecto al texto sugerido, DOSI solicita más aclaraciones sobre el significado de "datos ambientales de referencia adecuados y satisfactorios". En este sentido, para garantizar la coherencia con otros instrumentos relevantes del Código de Minería, sugerimos incluir en este Reglamento una referencia directa a una Norma o Directriz (Standard or Guideline) para el establecimiento de datos ambientales de referencia o de línea base, en lugar de utilizar términos como "adecuado" o "satisfactorio". Los criterios disponibles para evaluar más a fondo la pertinencia y calidad de los datos ambientales de referencia se analizan en un artículo científico publicado en 2022, cuya referencia DOSI se complace en compartir con los miembros del Consejo que estén interesados.

Además, solicitamos que se aclare el significado de "disponible públicamente" y preguntamos si esto se refiere a los datos disponibles a través de la plataforma DeepData.

Finalmente, DOSI recibe positivamente la adición del párrafo 5 para ayudar a la Autoridad a identificar dónde pueden haber áreas designadas o administradas bajo otros regímenes. Esto es especialmente importante cuando se consideran otros usos en el contexto marino. Tal

disposición es también una oportunidad para reafirmar la importancia de la cooperación en la investigación científica marina en virtud del artículo 143, párrafo 3, de la Convención.

Muchas gracias.

**Intervention # 12 - Regulation 11 - Publication and review of the Environmental Plans [and Environmental Management Systems] - delivered by Sergio Cambronero on 18/07/2023**

Thank you Co-facilitators

On paragraph 1(a), DOSI supports the amendment to extend the duration of publishing the Environmental Plan on the ISA's website to 90 or more days, as scientists are often at sea for months at a time and thus, this longer publication time is necessary for an inclusive public participation process. Also to ensure a fair process in light of the importance of the common heritage of humankind, DOSI welcomes the inclusion of notifying "the general public" of an Environmental Plan.

DOSI acknowledges the suggestion to include "**relevant** adjacent coastal states" and we note this is the subject of an intersessional working group. DOSI wishes to point out that deep seabed mining in a designated site in the Area may have far-reaching effects in the water column above, which may impact numerous coastal states, therefore making them **relevant** adjacent coastal States. The CCZ area is a good example of the profound connectivity in the oceans. Major currents and gyres determine oceanographic dynamics and not only influence mineral deposition rates but also connect biological communities across extensive geographical ranges. In this regard, we should consider the circulation of different water masses in the CCZ and adjacent areas, and the likely disruption of the Oxygen Minimum Zone of the Eastern Tropical North Pacific by the discharge plumes. We should further consider the close connection to important oceanographic features such as the Costa Rica Thermal Dome, which is recognized as an EBSA under the framework of the CBD, and proposed to be one of the first MPA's in areas beyond national jurisdiction. In light of this, DOSI thus wishes to draw the attention of the Council to the importance of these processes in defining what is a **relevant** adjacent coastal State.

Finally, DOSI supports paragraph 1(c) over 1(c) alt, as we believe there should always be a review of the Environmental Plan by independent experts, and not only in the case the Commission evaluates that there are aspects of the Environmental Plans that are not covered entirely by its own internal expertise. We further suggest clarification on what is meant by a 'competent expert', by including specific fields of expertise, for example, but not limited to, biology, ecology, microbiology, physical oceanography, geology, and geo-chemistry. Such an inclusion will ensure greater quality control and consistency across reviews. Relying on a range of competent independent experts, in the form of a subsidiary committee and a roster, will also provide more procedural consistency and transparency.

Thank you Co-facilitators

**Intervention #13 - Regulation 13 Assessment of Applicants [and applications] - delivered by Sergio Cambronero on 19/07/2023**

Thank you madame co-facilitator

In paragraph 1(g)(iii), DOSI supports the reference to 'intense fishing activity' in line with UNCLOS. Yet as this is neither defined nor explained in the Regulations, DOSI agrees with Norway in the need of a definition of the term 'intense fishing activity', and suggests providing guidance to the LTC about what it means and how this could be assessed. For example, fishing intensity can be measured as the number of vessels, fishing hours, catch, or other criteria. The criteria and methods to assess 'intense fishing activity' can be included in a Standard or Guideline. These should outline what would be acceptable levels of interactions between mining activities and fishing and what is not. Additionally, these Standards or Guidelines should be developed in consultation with fishing organizations. This would also be in line with the obligation under the Convention to have reasonable regard for other marine uses.

Thank you.

**Intervention #14 - Preamble - Delivered on 19/07/2023 by Patricia Esquete**

Thank you Mr President,

DOSI supports the intervention of Costa Rica, Russia, Bangladesh, Chile, France and others in retaining the original text of the preamble and including the mention of "Ensuring the effective protection of the Marine Environment..." in accordance with Article 145 of the Convention. This should be the principle guiding the regulations, and we consider that it should be added to the preamble

We also support Portugal and PEW in using the term "humankind" instead of "Mankind", as it has been adopted in BBNJ agreement

Thank you Mr President

**Intervention #15 - Regulation 28 Maintaining Commercial Production - Delivered on 20/07/2023 by Sergio Cambronero**

Thank you Mr. President and good morning delegates,

Regarding Regulation 28 paragraph 3, we strongly support the use of "immediately" instead of "temporarily" in relation to suspending production whenever such reduction or suspension is required to protect the Marine Environment, as this promptly response could be critical to avoid further impacts to the ecosystem services and the biological communities living in the seafloor and the water column.

Thank you

**Intervention #16 - Regulation 31 Reasonable regard for other activities [and infrastructure] in the Marine Environment - Delivered on 20/07/2023 by Sergio Cambronero**

Thank you Mr President,

On paragraph Alt. 1 - 1.bis, DOSI suggests the addition of scientific research as another example of ocean use and scientific equipment as an example of infrastructure. In this regard,

oceanographic observation systems such as benthic or midwater moorings could be present and are important for collecting long-term environmental data. It is therefore important to coordinate these activities in order to avoid interference with the quality of data acquisition and the integrity of such equipment.

Thank you Mr President

**Intervention #17 -Regulation 94 Adoption of Standards - Delivered in spanish on 20/07/2023 by Sergio Cambronero**

Thank you Mr. President,

On paragraph 1, DOSI reiterates the importance of considering independent experts whether they are "competent" or "recognized", as this is essential to secure objective criteria. In this regard we support the position of the Costa Rican delegation and Pew, to achieve consistency across the text of regulations in the use of "competent independent experts" or "recognized independent experts".

Thank you Mr. President

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Gracias Sr. Presidente,

En el párrafo 1, DOSI reitera la importancia de considerar expertos independientes, ya sean "competentes" o "reconocidos", ya que esto es esencial para asegurar criterios objetivos. En este sentido, apoyamos la posición de la delegación de Costa Rica y Pew, para lograr coherencia en todo el texto de las regulaciones en el uso de "expertos independientes competentes" o "expertos independientes reconocidos".

Gracias Sr. Presidente.

**Intervention #18 - Item 17 Cooperation with other relevant international organizations. - Delivered on 20/07/2023 by Patricia Esquete**

Thank you Mr. President,

DOSI acknowledges the work done to develop cooperation with international organizations.

DOSI would like to suggest that the Authority continues engaging in discussions to develop similar arrangements with Regional Fisheries Management Organizations, such as the Inter-American Tropical Tuna Commission that covers a large part of the Clarion Clipperton Zone. In light of the recent fisheries study published by the ISA and discussed at the side event last Friday, and even more so in light of a peer-reviewed study published in 2021 and a new peer-reviewed study published last week, highlighting the overlaps of waters above the Area and fisheries, DOSI highlights the importance of developing cooperation with RFMOs.

Thank you Mr. President.

**Intervention #19 - Item 14, LTC Report - Delivered by Patricia Esquete on 20/07/2023**

Thank you Mr President,

(Me gustaría comenzar agradeciendo a CR su reconocimiento al trabajo y esfuerzo de los científicos. En efecto, la intención de los científicos formamos parte de DOSI no es otra que ayudar al consejo en la toma de decisiones.

The Deep-Ocean Stewardship Initiative wishes to thank and commend the Chair of the Legal and Technical Commission on the work of the Commission.

(Part II B)

DOSI is concerned about the statement that some contractors continue to fail to carry out their agreed exploration activities, and that this also seems to be largely without consequence. We note to the Council that without these exploration activities, the necessary environmental baseline data is not generated.. We urge the Council to take action for these situations, which may require more detailed reporting from the LTC, so that the Council can discharge its duties under UNCLOS effectively.

With regards to contractor's requirement of reporting of data, DOSI notes that there continues to be a lack of data on interannual variability which is required under the regulations. DOSI notes that while crucial data are being collected and analyzed with regards to the impacts of mining tests, this has yet to be fully published, or shared in a way that can inform the ISA's ongoing negotiations. Such studies have also been concentrated on the seafloor. We are aware that no water column analyses that include organisms larger than microbes have been studied.

(Part III A)

With regard to the working groups for environmental threshold values, DOSI strongly encourages once again, and like other delegations, the LTC to increase the number of experts permitted in each subgroup, given the complexity of the issues, and the need to capture diverse expertise. We also encourage sufficient time to be allowed for careful and thorough work on these thresholds. In this regard, we would like to add an additional concern: Ideally, the working groups would be formed with leading experts in these topics, who will have to sacrifice time from their obligations or add working hours to already busy agendas to rush a process that needs careful scientific rigor with no additional remuneration. we wonder what leading experts we would miss out on if they cannot make this sacrifice. We further would like to remind the council that, as stated by the Netherlands, these three working groups are only the start of developing thresholds, and that more will be needed. For example, we will need thresholds on acceptable levels of habitat loss, biodiversity loss, and connectivity. Further subgroups may be identified in the process of establishing environmental threshold values. Without these thresholds, contractors and the LTC will not know whether states accept biodiversity loss from seabed mining. We want to be clear, present level of scientific knowledge tells us that seabed mining WILL result in biodiversity loss. That is certain. Given state's obligations under UNCLOS and the Convention on Biological Diversity, it is therefore important to have threshold limits on biodiversity factors.

When in place, thresholds will be an essential part of the regime, But will be challenging, if not impossible to develop in the current situation of data scarcity. We would also suggest that where there is scientific uncertainty, the thresholds must be set at highly precautionary levels - even at natural environmental baseline conditions. - DOSI would like to reiterate that bad thresholds

would be a worse situation than no threshold at all. DOSI is a large global network of deep ocean scientists, and stands ready to assist on this.

(Part IV A)

While DOSI is encouraged to hear the ongoing work on developing REMP, we would like to urgently see the standardized approach to REMP finalized to assist with guiding such workshops

(Annex I)

Last, DOSI notes the report of the completion rates of several strategic directions, including direction 3 on the protection of the marine environment, and direction 9 on committing to transparency. With regards to direction 3, DOSI would like to know what items were included for this evaluation and specifically which are deemed to have been achieved. With regards to direction 9, we would like to remind the Council that the issue of transparency in the decision making of the LTC has been repeatedly questioned by many delegates and stakeholders, as well as the Council and Assembly.

Thank you, Mr President

**Intervention #20 - Item 8a&b SG report & UN Ocean Decade- Delivered by Eulogio Soto on 26/07/2023**

Thank you Mr President,

Since this is the first time the Deep-Ocean Stewardship Initiative has been given the floor during this Assembly, we would like to congratulate the president for the election.

DOSI would like to thank the Secretary-General for this detailed Report, and appreciates the progress made by the Secretariat from 2022 to 2023. Specifically, DOSI appreciates progress made on Strategic Direction 3 – Protect the marine environment and Strategic direction 4 – promote and encourage marine scientific research in the Area, reported in the Annexes. DOSI particularly welcomes initiatives such as the Sustainable Seabed Knowledge Initiative, the new AREA2030 disclosure of bathymetric data, and close collaboration with the World Register of Marine Species.

We note that the same report confirms that only 64% of high level actions for the protection of the environment are considered complete. This report acknowledges, therefore, that we are far from being able to attempt the effective protection of the marine environment. Indeed, the numerous initiatives presented in the Implementation of the action plan of the International Seabed Authority in support of the United Nations Decade of Ocean Science for Sustainable Development envision research initiatives that will require time. It will take 10 years at the very least, to start gathering such information. Advancing scientific knowledge and understanding of the deep-sea ecosystems and functions is essential to support informed decision-making processes, and the application of the precautionary approach. We share the view that only through collaborative efforts and ambitious joint initiatives like those outlined in the report will it be possible to gather the knowledge that could inform measures that allow effective protection of the marine environment. Thus far, the data available from Contractors has demonstrated to be insufficient to understand ecosystems, their functioning or their services. In addition, a similar scientific effort has not occurred for existing APEIs in the Clarion Clipperton Zone, which will be



an even larger challenge to gather, meaning that the function of APEIs as protected areas for biological communities, cannot even be verified.

The scarcity of information on how marine biological communities and ecosystems vary over time constitutes another important aspect for which there is barely any information, while that is necessary to understand ecosystems, their capacity of recovery, and to inform effective decisions to ensure protection.

We are deeply concerned to read the feedback of COP27 workshop participants stating that deep-sea minerals present a valuable opportunity to satisfy the increasing demand for critical minerals, and constitute an opportunity for African countries to engage in the blue economy. It demonstrates that the issue was not accurately represented if the aim of such a side event was to claim deep-sea mining as part of the solution for climate change. We underline in the strongest possible terms that there is no evidence for such a claim. Furthermore, the United Nations Environment Programme Finance Initiative (UNEP 2022) observed that financing of deep-sea mining activities cannot be viewed as compatible with the spirit and intent of the Sustainable Blue Economy. We are further concerned by the numerous claims that this potential new industry can be developed in a sustainable way. Mining, both on land and in the sea, is not a sustainable industry because resources will not return in our lifetime.

DOSI is also surprised to learn about the results of the study commissioned by the Secretariat on the spatial overlap between deep-sea fisheries in mining contract areas. This study did not go out for tender, nor the existing literature on the topic used, and the focus was on deep-sea fisheries while it is well established that mining impacts are not restricted to these fisheries. The latest peer reviewed scientific studies demonstrate that not only there is a significant overlap between fisheries and mining contract areas, but that overlap will increase with the effects of climate change.

Based on our current scientific understanding of the ocean, deep-seabed mining will result in biodiversity loss and irreversible harm to deep-sea ecosystems, including changes to the functions and services they provide. Scientists have just begun to understand biodiversity, ecosystem function, oceanographic processes and resilience in the areas targeted for mining, with many gaps still to be filled. Thus, the international community is currently not in a position to reliably predict the extent and severity of expected impacts from commercial mining, including the plumes, contaminant release and toxicity, noise, vibration and light, how this would affect marine life, and any direct or indirect effects on ecosystem services like genetic resources, climate regulation, commercially important fisheries or other ocean users. Available tools, such as scientific models that can help to predict impact, require baseline data that are not yet adequately available, and small-scale in situ tests to verify these models' accuracies only go so far. Scientific approaches like these take time, and so does the incorporation of the necessary scientific research to inform best environmental practices.

In short, from a scientific point of view, we know there is much to be lost; what we don't know yet, is how to protect it. We are just starting to gather the scientific information required to ensure the effective protection of the marine environment. It will take, at the very least, a decade of the best and collaborative ocean science.

Thank you

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(sp)

Gracias señor presidente,

Dado que esta es la primera vez que DOSI toma la palabra en esta Asamblea, nos gustaría felicitar al presidente por la elección.

DOSI desea agradecer al Secretario General por este Informe detallado y aprecia el progreso realizado por la Secretaría de 2022 a 2023. En concreto, DOSI agradece el progreso realizado en la Dirección estratégica 3: Proteger el medio ambiente marino y la Dirección estratégica 4: Promover y alentar la investigación científica marina en el Área. DOSI aprecia particularmente a iniciativas como la Iniciativa Sskii, para el conocimiento sostenible de los fondos marinos, la nueva AREA2030 para recabar datos batimétricos y la estrecha colaboración con el Registro mundial de especies marinas (WoRMS, por su sigla en inglés).

Tomamos nota de que el mismo informe confirma que solo el 64% de las acciones de alto nivel para la protección del medio ambiente se consideran completas. Este informe reconoce, por tanto, que estamos lejos de aspirar alcanzar la protección eficaz del medio marino. De hecho, las numerosas iniciativas presentadas en la Implementación del plan de acción de la Autoridad Internacional de los Fondos Marinos en apoyo a la Década de los océanos para el Desarrollo Sostenible de las Naciones Unidas contemplan iniciativas de investigación que requieren tiempo. Tan solo comenzar a recopilar dicha información es una tarea que requerirá al menos 10 años. Avanzar en el conocimiento científico y la comprensión de los ecosistemas y funciones de aguas profundas es esencial para respaldar los procesos de toma de decisiones de manera informada y la aplicación del enfoque de precaución. Compartimos la opinión de que solo a través de esfuerzos de colaboración y de ambiciosas iniciativas conjuntas como las descritas en el informe será posible recopilar el conocimiento que podría informar las medidas que permitan la protección efectiva del medio ambiente marino. Hasta el momento, los datos disponibles de los contratistas han demostrado ser insuficientes para comprender los ecosistemas, su funcionamiento o sus servicios. Además, no se ha producido un esfuerzo científico similar en las APEI existentes en la zona de fractura Clarion y Clipperton, por lo que por el momento, no es posible verificar su función como áreas protegidas. La escasez de información sobre las variaciones de las comunidades biológicas y los ecosistemas a lo largo del tiempo constituye otro aspecto importante para el cual apenas hay información, siendo fundamental para comprender los ecosistemas, su capacidad de recuperación y para informar decisiones efectivas para garantizar la protección.

Nos preocupa particularmente leer que los participantes del taller COP27 afirmaron que los minerales de aguas profundas presentan una valiosa oportunidad para satisfacer la creciente demanda de minerales y constituyen una oportunidad para que los países africanos participen en la economía azul. Subrayamos en los términos más enérgicos posibles que no hay evidencia para tal afirmación. Además, la iniciativa financiera del Programa de las Naciones Unidas para el Medio Ambiente (PNUMA 2022) observó que la financiación de las actividades mineras en aguas profundas no puede considerarse compatible con el espíritu y la intención de la Economía Azul Sostenible. Nos preocupan además los numerosos comentarios afirmando que esta nueva industria potencial puede desarrollarse de manera sostenible. La minería, tanto en tierra como en el mar, no es una industria sostenible dado que los recursos, que además son el sustento de los ecosistemas, no se recuperarán a escala temporal humana .

A DOSI también le sorprenden los resultados del estudio encargado por el Secretariado sobre la sobreposición espacial entre las pesquerías de aguas profundas y las áreas de contratos mineros. Este estudio no salió a licitación, ni hizo uso de la literatura más reciente sobre el tema, y se centró en las pesquerías de aguas profundas, mientras que está bien establecido que los impactos de la minería no se limitan a estas pesquerías. Los últimos estudios científicos

revisados por pares demuestran que no solo existe una superposición significativa entre las áreas de contrato de pesca y minería, sino que ésta aumentará con los efectos del cambio climático.

Recomendamos que la toma de decisiones se base en ciencia sólida. Según los conocimientos científicos actuales, la minería de los fondos marinos provocará pérdida de biodiversidad y daños irreversibles a los ecosistemas de aguas profundas, incluidos cambios en las funciones y los servicios que brindan. Los científicos apenas estamos comenzando a comprender los procesos oceanográficos, la biodiversidad, la función de los ecosistemas, y su resiliencia en las áreas seleccionadas para la minería, habiendo muchas lagunas de conocimiento aún por resolver. Por lo tanto, la comunidad internacional actualmente no está en condiciones de predecir de manera confiable el alcance y la gravedad de los impactos esperados de la minería comercial, incluidos los efectos de las plumas, de la liberación y toxicidad de contaminantes, del ruido, la vibración y la luz, cómo éstos afectarían a la vida marina y cualquier impacto directo o indirectos sobre los servicios de los ecosistemas, como los recursos genéticos, la regulación del clima, las pesquerías de importancia comercial u otros usos de los océanos. Las herramientas científicas disponibles, como son los modelos científicos que pueden ayudar a predecir el impacto, requieren datos de referencia que aún no están disponibles, y las pruebas in situ, a pequeña escala, para verificar la precisión de estos modelos, han demostrado no ser suficientes para extraer conclusiones confiables. Estos enfoques, al igual que la incorporación de la investigación científica necesaria para informar las mejores prácticas ambientales, llevan tiempo.

En definitiva, desde un punto de vista científico, sabemos que hay mucho que perder; lo que aún no sabemos es cómo protegerlo. Apenas estamos comenzando a recopilar la información científica necesaria para garantizar la protección eficaz del medio ambiente marino. Tomará, como mínimo, una década de esfuerzos colaborativos y de la mejor ciencia oceánica.

Gracias

### *What Does the Deep Ocean Do for You?*

## **Polymetallic Nodule-Rich Abyssal Plains and the Water Column**

### **Key Messages**

- Polymetallic nodule fields are an important deep-sea ecosystem and host a great diversity of organisms.
- Most organisms living in nodule fields are small and include animals such as roundworms, bristle-worms and small crustaceans that reside in the soft sediment around and under the nodules.
- Nodules provide a hard substrate for corals, sponges and anemones, as well as habitat for microorganisms and small animals living inside nodule crevices.
- Abyssal plains contribute to the provision of many deep-sea ecosystem services that directly benefit humans, such as nutrient mineralization and carbon cycling, climate regulation, cultural resources, and fisheries in the waters above.
- Threats to abyssal nodule fields include pollution, potential deep-sea mining, and climate change impacts such as ocean acidification, deoxygenation, and temperature anomalies.
- Globally, few abyssal polymetallic nodule fields are protected. However, Areas of Particular Environmental Interest (APEIs), which are closed to mining contracts, have been designated in about 40% of the Clarion-Clipperton Zone (CCZ). Further APEIs are expected in other parts of the global seafloor.



*A deep-sea sponge  
growing on a  
manganese nodule.  
ROV Team, GEOMAR  
(CC BY 4.0, cropped)*

Polymetallic nodules form over millions of years on the surface of abyssal plains around the world in waters between 3,000 and 6,000 m deep. In areas with soft sediment, nodules provide a hard substrate for organisms in need of attachment, such as corals and sponges. Nodules also provide microhabitats for microorganisms and small invertebrates that serve as food for larger animals. Many species that live on or in the nodules would not survive without them. Microorganisms that live on and in nodules are different from those in the surrounding soft sediment or in the water column. Most of these animals and microorganisms live either on the nodules or in the upper 5-10 cm of the surrounding soft sediment. The population density of species inhabiting nodule fields is low, as is biomass. This suggests that species in nodule fields may be rare, making them more vulnerable to local extinction if the seafloor is significantly altered or environmental conditions change.

**Media products**  
Inspiration for numerous media products

**Food resources and support**  
e.g., Tuna fisheries in surface waters overlap with parts of the Clarion-Clipperton Zone, with this expected to increase with climate change - tunas (and billfishes) depend on mesopelagic species for foraging

**Genetic resources**  
The high biodiversity may provide opportunities for industry and innovation

**Role in carbon cycling**  
Benthic microorganisms in abyssal nodule fields can take up CO<sub>2</sub> to build new biomass

**Existence value**  
The value of knowledge that a species or habitat exists

**Chemical compounds**  
for industrial and pharma use (biotic materials)

**Minerals**  
i.e., nickel, cobalt, manganese, and copper

**Biomimicry**  
e.g., glass sponges

**Polymetallic nodules**  
grow a few millimeter per million years

**Oral traditions and cosmologies**  
of the high seas and related species (e.g., in the indigenous Pacific cultures the ocean, humans and cultures form a continuum)

**Scientific research**  
Frontier area for fundamental, interdisciplinary, scientific research

**Migratory routes**  
for marine megafauna (e.g., whales, turtles, birds) in surface waters overlap with abyssal nodules areas (e.g., the central Pacific is an ecologically or biologically significant marine area for birds)

**Historical archive**  
Some nodules contain microfossils that might provide information about paleoclimate

**Stewardship and bequest value**  
Maintaining or preserving something to be available to current and future generations

**Role in nutrient mineralization**  
Microorganisms and fauna in nodule fields remineralize phytodetritus and release inorganic nutrients to the seawater

**Archaeological artifacts**  
yet to be discovered

**Habitat**  
including as nursery grounds for some species, e.g., for deep-sea octopuses

- Provisioning services: result in tangible goods and/or products
- Regulating services: contribute to the natural production and resilience of habitats and ecosystem processes
- Supporting services: underlying ecosystem functions that are essential to produce other services
- Cultural services: non-material benefits deriving from nature
- Option-use value: future unknown and speculative benefits of the whole ecosystem

## Human Impacts on Ecosystem Services from Polymetallic Nodule Fields

Climate change, fishing, and deep-sea mining are the main human impacts predicted to affect polymetallic nodule fields and the overlying water column. Climate change affects the productivity of the upper layers of the ocean, which are the source of most food that reaches the seafloor. Warming and loss of oxygen are also predicted to occur in abyssal areas because of climate change; the Equatorial Pacific Oxygen Minimum Zone that currently spans the Clarion-Clipperton Zone may expand.

While commercial mining of polymetallic nodules has not yet begun, the potential effects of mining on abyssal ecosystems and their services are being assessed. Nodule collector vehicles would remove the hard seafloor habitat provided by nodules and disturb the surrounding soft sediment, altering the biogeochemical and physical properties of the seafloor habitat on which most species depend. Since nodules only form over millions of years, the impacts from their removal will be extremely long-lasting. Options for nodule habitat rehabilitation are being considered, but avoiding or minimising damage is currently the only known option for protecting the biodiversity and function of abyssal polymetallic nodule fields.

Nodule collector vehicles will form a sediment plume above the seafloor as they operate. Independently monitored collector tests show that the majority of suspended sediment settles back on the seafloor within 2 km. Another sediment plume may be caused by the discharge of seawater that has been separated from the nodules. The depth at which this water is discharged will determine which parts of the ecosystem are affected. Studies of potential toxicity effects of the plumes and their extent are ongoing, though research to date indicates that the smothering effect of the sediment itself is more of a concern.

Noise and light produced during mining operations may have further impacts on marine life, though most noise related to deep-sea mining is expected to be caused by support vessels on the ocean surface. Combined, the predicted effects of mining nodules may lead to species extinctions and reduced populations. These changes would disrupt the ecosystem services provided by nodule-rich abyssal plains.

## Protection of Ecosystem Services

A network of 13 Areas of Particular Environmental Interest (APEIs) has been set aside from exploitation in the Clarion-Clipperton Zone polymetallic nodule field by the International Seabed Authority, with the intention to preserve its ecosystem services. No other abyssal polymetallic nodule fields are protected in this way, though APEIs are expected to be included in future Regional Environmental Management Plans such as those for the Indian and western Pacific Oceans. In Areas Beyond National Jurisdiction, existing legal regimes and governance structures confer diffuse responsibility to operators in many regions where nodule fields occur. This creates significant challenges for ecosystem-based management.

### How to Cite:

DOSI (2023). "Polymetallic Nodule-Rich Abyssal Plains" - Information Sheet. Deep-Ocean Stewardship Initiative. <https://www.dosi-project.org/wp-content/uploads/abyssal-plain-info-sheet.pdf>

### About DOSI:

The Deep-Ocean Stewardship Initiative is a global network of experts that integrates science, technology, policy, law and economics to advise on ecosystem-based management of resource use in the deep ocean, and on strategies to maintain the integrity of deep-ocean ecosystems within and beyond national jurisdiction.

### This Information Sheet was prepared by:

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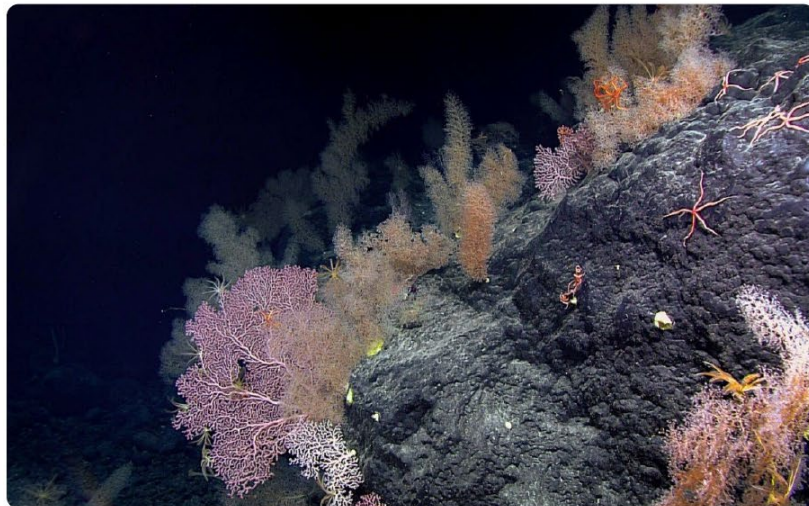
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## What Does the Deep Ocean Do for You? The Seamount Ecosystem

### Key Messages

- Seamounts are underwater mountains found throughout the ocean and are typically formed by volcanic activity.
- Seamounts support abundant and diverse communities above and below the water. For example, their steep rocky sides and shallow peaks offer attachment sites for corals and sponges which in turn provide habitat and food to other animals.
- Seamounts provide numerous ecosystem services, including climate regulation, fishery resources, nutrient cycling and cultural resources.
- Threats to seamounts include pollution, bottom-contact fisheries, potential deep-sea mining and climate change impacts such as ocean acidification, deoxygenation and temperature anomalies.
- Most seamounts are in Areas Beyond National Jurisdiction. This creates challenges for protecting them and the ecosystem services they provide.



A steep-sided coral garden on Sibelius Seamount at a depth of 2,465 meters.

*Image courtesy of NOAA Ocean Exploration, Deep-Sea Symphony: Exploring the Musicians Seamounts.*

## The Seamount Ecosystem

Seamounts are steep-sided underwater mountains typically formed by volcanic activity. As they tower above the ocean floor – some isolated, some as part of vast underwater mountain ranges – they are an obstacle to ocean currents, creating their own circulation patterns and eddies. Like water provides habitat in oases in the desert, seamounts provide rare solid habitat in the vastness of the ocean for organisms in need of attachment sites. Seamounts can support diverse and abundant coral and sponge grounds, themselves creating further habitat and opportunities for other organisms such as invertebrates, reef fish, sea turtles, forage fish and their predators, like sharks, tunas, dolphins, whales and seabirds. These communities take centuries or more to grow and are home to long-lived animals with complex interdependent relationships.

The ability of seamounts to support so much diverse life is mainly due to the stability they provide to their inhabitants. However, this stability can be compromised by human activities like fishing and potential deep-sea mining. For example, some seamounts in the northwest Pacific and other regions feature cobalt-rich ferromanganese crusts, a rock-hard layer that forms gradually over millions of years. Damaging such crusts and the centuries-old communities that inhabit them could compromise the integrity and function of those seamount communities.

## What Ecosystem Services Are Provided by Seamounts?

Seamounts provide many important ecosystem services from which humans benefit, including habitat and trophic support, genetic and mineral resources, climate regulation and cultural services. All ecosystem services provided by seamounts are depicted in Figure 1 (page 3).

## Human Impacts on Seamount Ecosystem Services

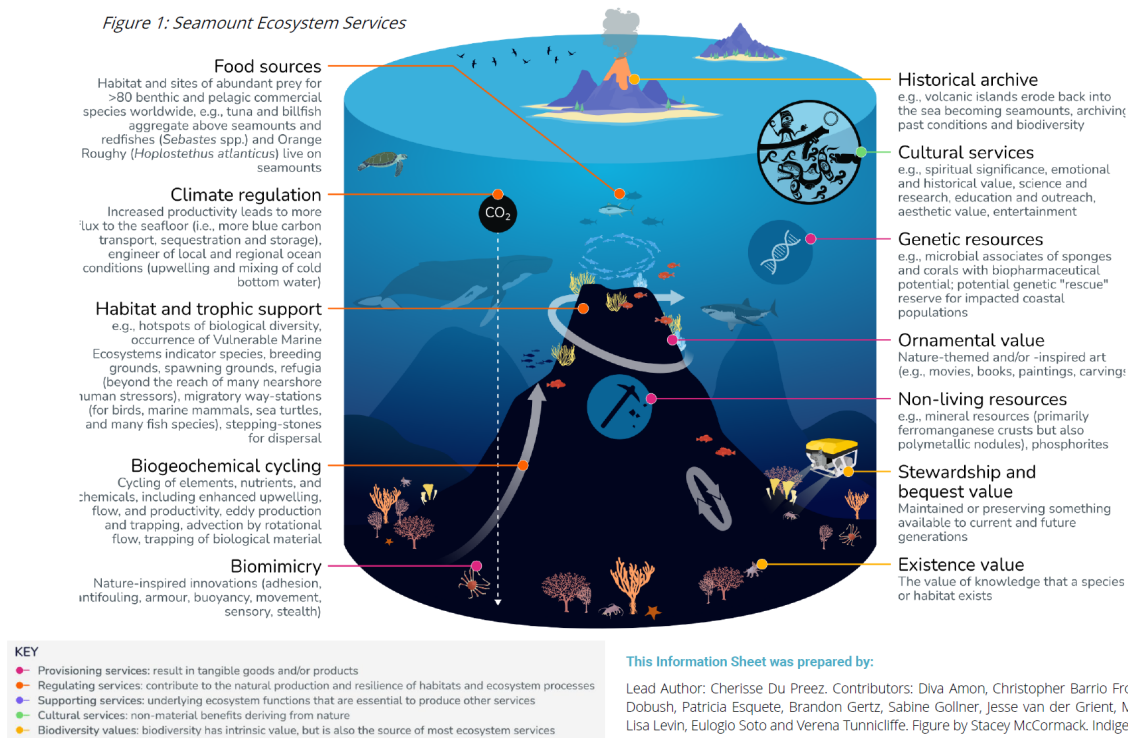
Various human activities impact seamounts and the ecosystem services they provide. Some fishing practices (e.g., trawling) can destroy long-lived, slow-growing coral and sponge species, as well as the habitat they create for others. Limited recovery from such damage can take decades, if it happens at all. Species inhabiting seamounts are relatively isolated, which makes them vulnerable to local extinction from overfishing. Lost or abandoned fishing gears on seamounts can perpetuate fishing impacts indefinitely by trapping animals and damaging their surroundings. The limited dispersal ability of most seamount species also puts them at risk from changes in their surroundings, like water deoxygenation and ocean acidification driven by climate change. Pollution and debris trapped by eddies around seamounts can further threaten the seamount community and the provision of ecosystem services. Finally, potential deep-sea mining of cobalt-rich crusts is predicted to cause significant long-term harm to seamounts and surrounding habitats if it is permitted. Mining would involve crushing and removing the surface crust along with all its inhabitants, creating noise and light pollution, and smothering adjacent areas with sediment. Potentially toxic sediment plumes could disperse over a wide area of ocean, significantly impacting the pelagic ecosystem.

## Protection of Seamount Ecosystem Services

Seamounts can be protected using a range of area-based management tools in national and territorial waters. In Areas Beyond National Jurisdiction, the situation is more complex. While the recently agreed “Biodiversity Beyond National Jurisdiction” Treaty is an important step towards an overarching framework for protection of biodiversity, seamounts in these areas are currently overseen by organisations managing only a single type of activity (fishing, mining, conservation). Such organisations rarely take a holistic view of seamount ecosystem services, which is crucial for their protection. Maintaining the services seamounts provide for humans will require ecosystem-based management tools that consider the cumulative impacts of all the activities that threaten seamounts.



Figure 1: Seamount Ecosystem Services



**This Information Sheet was prepared by:**

Lead Author: Cherisse Du Preez. Contributors: Diva Amon, Christopher Barrio Froján, Bobbi-Jo Dobush, Patricia Esquete, Brandon Gertz, Sabine Gollner, Jesse van der Grient, Maïla Guilhon, Lisa Levin, Eulogio Soto and Verena Tunnicliffe. Figure by Stacey McCormack. Indigenous artwork in Figure 1 Cultural Services: "Observing" by Joshua Watts (Hawili-Wayanis).

**How to Cite:**

DOSI (2023). "The Seamount Ecosystem" - Information Sheet. Deep-Ocean Stewardship Initiative. <https://www.dosi-project.org/wp-content/uploads/seamount-info-sheet.pdf>

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**About DOSI:**

The Deep-Ocean Stewardship Initiative is a global network of experts that integrates science, technology, policy, law and economics to advise on ecosystem-based management of resource use in the deep ocean and strategies to maintain the integrity of deep-ocean ecosystems within and beyond national jurisdiction.

## What Does the Deep Ocean Do for You?

# Hydrothermal Vent Ecosystems

### Key Messages

- Active hydrothermal vents are small, globally rare sites where emergent hot fluids sustain unique ecosystems designated as Vulnerable Marine Ecosystems.
- The abundant, mostly endemic, life around active vents provides many ecosystem services in most categories such as novel marine genetic resources and inspiration for space exploration.
- Inactive hydrothermal vents are home to long-lived, vulnerable animals, such as corals and sponges; this habitat and associated ecosystem services are poorly studied.
- Influences of these ecosystems reach across the seabed and upwards into the water column.
- Disturbance of inactive hydrothermal vents may affect nearby active venting.

### Hydrothermal Vents

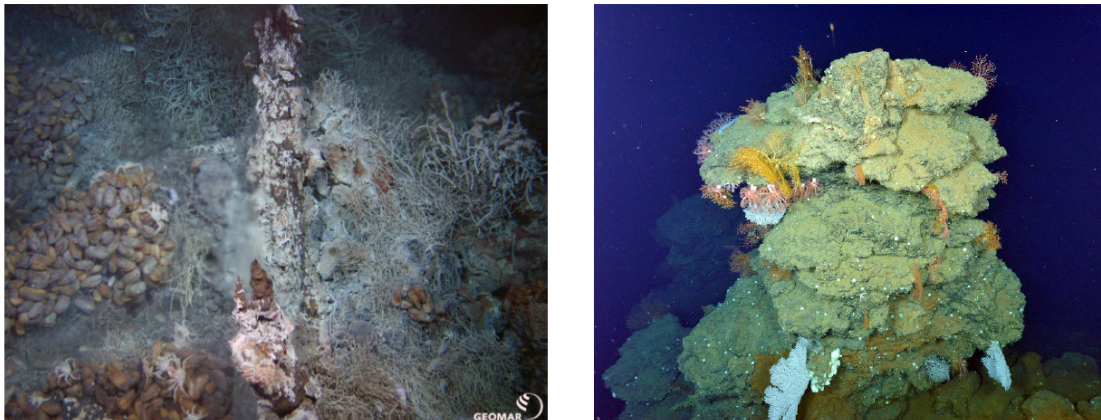
Active vents support unusual ecosystems dependent on chemical energy from fluids emerging from the seafloor. Where this fluid exceeds ~130°C, 'black smoker' chimneys can form where metals from the fluid precipitate. Over time, large deposits of polymetallic sulphides may accrete. Vents are clustered in vent fields and separated by surrounding seafloor. While a vent field may encompass an area of several soccer fields, active venting is typically confined to a few square meters of seabed; *globally, the habitat is estimated to occupy only about 50 km<sup>2</sup>.*

Many vent inhabitants are 'extremophiles' that thrive in extreme conditions of heat, acidity, low oxygen and toxic compounds. They can create very high biomass and abundance (Figure 1), such as smokers covered with dense swarms of shrimp and aggregations of snails piled high over venting cracks. However, most vent species live only in this ecosystem. The 'sphere' of vent influence can reach far beyond the field area. If fluid venting eventually ceases, the vent becomes temporarily inactive or extinct. Active and inactive vents within a vent field are interconnected via subsurface conduits and by currents at the seabed.

Inactive and extinct vents are polymetallic sulphide deposits no longer venting. Inactive vents may reactivate whereas extinct vents likely will not. Inactive vents are often located near active vents within the same vent field. Both deposits can be home to unique microbial communities and fauna such as aggregations of corals and sponges (Figure 1) that benefit from access to the enhanced currents and food supply from the nearby active vents. These ecosystems are rarely studied but appear to comprise animals that are often poorly known and/or new to science.

## Hydrothermal Plumes

Plumes from vigorous fluid emissions rise from active vents spreading large distances from their source. Distinctive physical seawater layers harbour unique microbial communities, form connectivity highways for animal larvae, and export nutrients to the broader ocean, sometimes with links to surface waters enhancing productivity. The global cycling of some elements (e.g., iron, sulphur) is largely affected by these plumes and microbes.



**Figure 1:** Left: Active vent with mussels, tubeworms and crabs clustered around a small chimney at 1870 m depth off Vanuatu (credit GEOMAR). Right: Inactive vent deposit with corals and sponges at Endeavour site, Juan de Fuca Ridge (credit Tunnicliffe, CSSF).

## Ecosystem Services Provided by Hydrothermal Vents

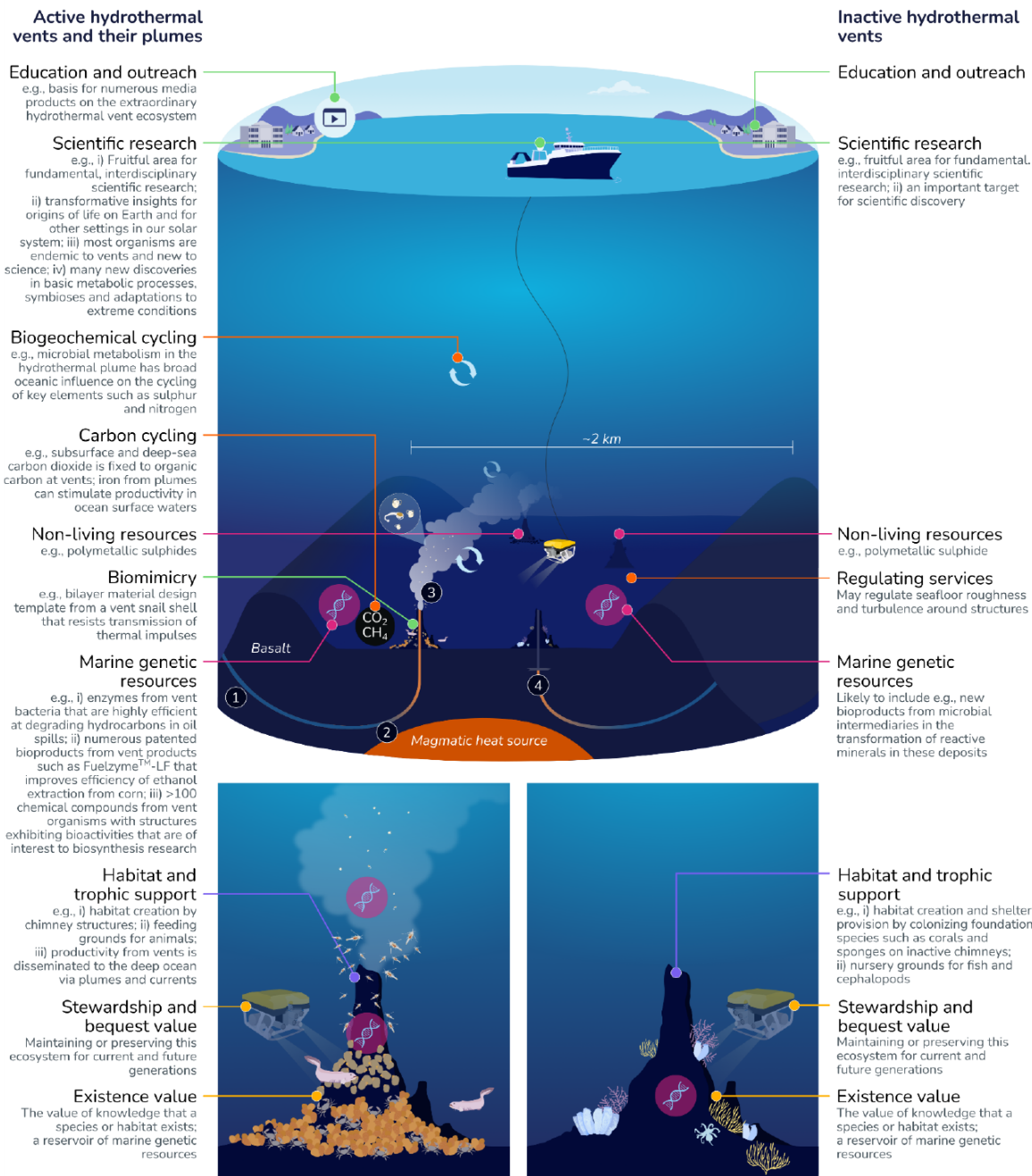
Vent ecosystems provide four categories of ecosystem services – provisioning, regulating, supporting and cultural. Figure 2 presents a cross-section of a mid-ocean ridge seafloor to illustrate how active vents, inactive deposits and plumes can be situated. The ecosystem services depicted have a major impact on humans. For example, the discovery of life at vents has stimulated the search for life elsewhere in the solar system where volcanic activity is present. The search continues for genetic resources such as Fuzyme™-LF isolated from a vent microbe; it is used in ethanol extraction from corn.

## Human Threats to Vent Ecosystem Services

The main threats to hydrothermal vent ecosystems are from deep-sea mining and climate change. Deep-sea mining will focus largely on inactive or extinct vents where there is little baseline knowledge from which to predict impacts. Where long-lived, vulnerable species, such as corals and sponges, inhabit inactive or extinct vents, the impacts on ecosystem services could be high.

Excavation will destroy local habitats and could reactivate venting at inactive vents by re-connecting to the subsurface conduits. Consequences for nearby active vents could include changes in flows and heat that alter community composition and extent. Mining plumes smother fauna and release toxins from crushed rock. Since most vent animals disperse as larvae in the water column, plumes (and possibly noise) may impact vent organisms during their dispersal stages.

Figure 2: Ecosystem Services



#### KEY

- Provisioning services: result in tangible goods and/or products
- Regulating services: contribute to the natural production and resilience of habitats and ecosystem processes, and often derive from export of vent influences
- Supporting services: underlying ecosystem functions that are essential to produce other services
- Cultural services: non-material benefits deriving from nature
- Biodiversity values: biodiversity has intrinsic value, but is also the source of most ecosystem services



**Figure 2 Description:** The hydrothermal vent ecosystem and associated ecosystem services at active (left) and inactive (right) vents. Active vents are characterised by hot metal-rich venting fluids that fuel microbial productivity in the deep ocean. Fluids derive from ocean water that (1) percolates through the Earth's crusts, (2) is heated by the magmatic heat source and enriched in metals, and (3) exits through conduits in the seafloor, precipitating metals when it contacts cold seawater. Inactive vents (4) can occur within an active vent field, where fluid conduits are blocked. Disturbance at inactive vents may affect nearby active vents if reactivated. Extinct vents (not illustrated) are severed from the heat source and do not reactivate. Ecosystem services at inactive and extinct vents are likely similar but poorly documented. Ecosystem services at active vents are well described.

## Human Threats to Vent Ecosystem Services (Continued)

A key concern to consider for hydrothermal vent ecosystems is the unintended consequences of mining that may eliminate or alter the habitat of vent animals. Extinction is a distinct possibility as most species are highly limited in the locations they occupy; vent populations depend on the connectivity among isolated sites.

Climate change is leading to a warmer, more acidic, deoxygenated and more stratified ocean. These changes will have unknown consequences for vent species, including the larvae of some species that use shallower oceanic currents for dispersion.

## Protection of Vent Ecosystem Services

The high natural value of active vents is globally recognised. These ecosystems meet criteria that identify vulnerable, sensitive, and ecologically or biologically significant ecosystems in need of protection. Such criteria were developed by intergovernmental organisations, including Food and Agriculture Organization (FAO) for VMEs (Vulnerable Marine Ecosystems), Convention on Biological Diversity (CBD) for EBSAs (Ecologically or Biologically Significant Areas), IMO (International Maritime Organization) for PSSAs (Particularly Sensitive Sea Areas), and OSPAR's "Texel-Faial criteria".

### How to Cite:

DOSI (2023). "Hydrothermal Vent Ecosystems" - Information Sheet. Deep-Ocean Stewardship Initiative. <https://www.dosi-project.org/wp-content/uploads/vents-ecosystems-info-sheet.pdf>

### About DOSI:

The Deep-Ocean Stewardship Initiative is a global network of experts that integrates science, technology, policy, law and economics to advise on ecosystem-based management of resource use in the deep ocean, and on strategies to maintain the integrity of deep-ocean ecosystems within and beyond national jurisdiction.

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## What DeepData can tell us about biodiversity in the CCZ



Please join the United Kingdom Natural History Museum, the Deep-Ocean Stewardship Initiative and The Pew Charitable Trusts for a deep dive into two recent papers, authored by Muriel Rabone, examining the data in the ISA's DeepData platform and what it can tell us about the benthic biodiversity in the Clarion-Clipperton Zone (CCZ).

THE JAMAICA PEGASUS HOTEL, 81 KNUTSFORD BLVD

12 JULY 2023

7:30PM REFRESHMENTS AND SNACKS

8:00PM PRESENTATION





## Headline findings\* include:

- The first checklist for CCZ benthic metazoan fauna with 438 named species, and estimates of species richness ranging from >6,000–>8,000.
- An estimated 88%–92% of species in the CCZ are undescribed (~5,142 unnamed species).
- Many of the CCZ's known species have only been sampled once and most have not been sampled in any of the Areas of Particular Environmental Interest (APEIs) .
- At least 20% of the records in DeepData were found to be duplicates and significant inconsistencies across contractor datasets were detected limiting the useability of DeepData.

*\*Summary of findings from: "A review of the ISA database DeepData from a biological perspective: challenges and opportunities in the UN Ocean Decade" (Database Journal) and "How many metazoan species live in the world's largest mineral exploration region?" (Current Biology Journal).*

