The Common Goods of the Deep Sea

Knot, Inge

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Inge Knot - s2795329

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Instructor: Dr. Rutger Hagen

Second reader: Dr. Cynthia van Vonno

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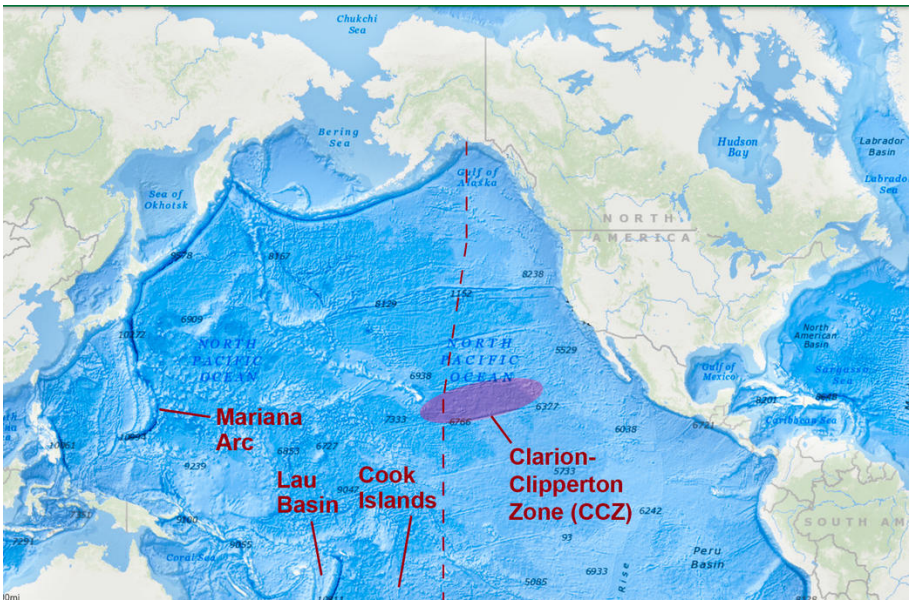

The Clarion-Clipperton Zone (CCZ)
(Coastal and Marine Hazards and Resources Program, 2018)

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Abstract

The Clarion-Clipperton Zone (CCZ) in the Pacific Ocean holds significant reserves of polymetallic nodules, making it a potential exploitation area for deep sea mining. However, the exploitation of this shared natural resource poses challenges in terms of sustainability and resource management. This thesis examines the governing framework of the International Seabed Authority (ISA) for the management of deep sea mining in the CCZ. The study draws upon the design principles for governing the commons proposed by Elinor Ostrom to analyze the policies and draft regulations of the ISA. By examining to what extent the policies and regulations of the ISA are aligned with Ostrom's principles, this research aims to evaluate the current governance framework for the management of the CCZ and its resources.

Keywords: Clarion-Clipperton Zone, deep sea mining, polymetallic nodules, International Seabed Authority, UNCLOS, sustainability, Elinor Ostrom, design principles, governance, CPR, global commons.

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List of abbreviations

CPR: Common pool resource

CCZ: Clarion-Clipperton Zone

ISA: International Seabed Authority

UNCLOS: United Nations Convention of the Law of the Sea

DSCC: Deep Sea Conservation Coalition

Introduction

The Clarion-Clipperton Zone (CCZ) is located in the Pacific Ocean. This seabed contains highly valuable polymetallic nodules. These nodules look like rocks and contain materials such as cobalt, gold, and manganese which are essential for the production of various technologies and 'green energy' (Hein et al., 2020). The CCZ is located in international waters beyond national jurisdiction and thus constitutes a global common good (Vogler, 2012). The international seabed authority (ISA) has been established under the United Nations Convention on the Law of the Sea (UNCLOS) to manage mining projects in the international seabed (Lodge et al., 2014).

In 2021, the island state Nauru triggered the two-years rule of the United Nations (Blanchard et al., 2023). This means they would be allowed to start mining under the regulations which are in place mid-2023. Even though there are no concrete starting plans as of now, this could change any moment as it is almost halfway through 2023. Therefore, it is of interest to assess to what extent the current regulatory framework is devised in a way to sustainably manage the resources of the deep seabed. There are various gaps in the literature of the emerging field of deep sea mining. This thesis addresses the knowledge gap regarding the governance frameworks for deep sea mining (Folkerson, 2019).

Deep sea mining in the CCZ constitutes a collective action problem in the sense that it involves the management and use of shared natural resources. Exploitation of these nodules can have negative consequences for marine life and biodiversity as the mining projects can cause damage and produce sediments at the sea bed which can kill species in the ocean (Jones et al., 2017; Washburn et al., 2019). Mining could also lead to the depletion of these resources as it takes millions of years for the polymetallic nodules to form (Turner, 2019). In order to prevent the occurrence of a tragedy of the commons, the resources have to be carefully managed. The ISA manages the resources at the seabed as the common heritage of all humankind (*About ISA – International Seabed Authority*, n.d.).

For now, the contractors of the ISA are solely exploring the CCZ and its resources. The actual exploitation has not started (yet). As mining in the CCZ can have negative consequences, it is of importance to assess to what extent the ISA has adopted a sustainable approach to deep sea mining in the CCZ. A commons lens is applied to analyze the governing framework of the ISA to manage the CCZ. Therefore, the design principles for governing the commons by Elinor Ostrom (McGinnis & Ostrom) form the basis of this research to analyze the policy papers and

the draft regulations of the ISA. So, the research question for this thesis is "*to what extent are the policies of the ISA in line with the design principles proposed by Elinor Ostrom?"*

To investigate this, a qualitative content analysis is conducted. With the use of this method, the policy documents and the draft regulations of the ISA, which governs the CCZ as a global common good, are examined. These draft regulations of the mining code provide the most recent body of regulations for the governance of the CCZ. The policy briefs provide more context for these regulations as these are written during the drafting process of the regulations. This approach is adopted to identify the extent to which these documents align with the design principles for governing the commons. It is focused on analyzing the policies and regulations of the ISA based on the design principles proposed by Elinor Ostrom (Ostrom, 1990; McGinnis & Ostrom).

Literature review

Deep sea mining is a complex and multifaceted issue that has gained increasing attention from governments, companies, and researchers (Ma et al., 2022). It holds promise for the extraction of valuable minerals from the ocean floor, but also poses significant risks to the marine environment. In this literature review, deep sea mining in the CCZ will be explored. The actors involved consist of the ISA and its member states, companies and contractors, researchers, non-governmental organizations, fishers organisations, and coastal states and communities.

Deep sea mining

Deep sea mining is the practice of collecting materials from the ocean floor (Leng et al., 2021). These materials can be found in polymetallic nodules. These nodules are rock-like elements at the deep seabed which contain highly valuable materials such as cobalt, copper, gold, silver, zinc, manganese, and rare earth elements (Hein et al., 2020). These materials are necessary for various technologies such as electric vehicles and renewable energy systems. The nodules are naturally formed at the seabed of the ocean and it takes millions of years for them to form with an average growth rate of one to three mm per a million of years (Turner, 2019). The CCZ is an area which is rich in these nodules.

The ISA is an intergovernmental organization established by the United Nations Convention on the Law of the Sea (UNCLOS) to regulate and manage the exploitation of minerals in the deep seabed beyond national jurisdiction (Lodge et al., 2014). Its mandate is to govern the CCZ on behalf of all humankind (*About ISA – International Seabed Authority*, n.d.). The ISA plays a vital role in balancing the economic development of the deep seabed while ensuring the protection and preservation of the marine environment (Tladi, 2014). The functions of the ISA include the promotion and regulations of the exploration and exploitation of the deep seabed, the protection of the marine environment, and ensuring the equitable distribution of benefits among all ISA members. The organization is responsible for granting exploration and exploitation licenses and provides technical and scientific advice to member states.

The organization has developed a regulatory framework for deep seabed mining and promotes international cooperation among member states. However, the ISA faces some

challenges including the issues of equitable benefit-sharing, the management of environmental risks, and a lack of transparency (Durden et al., 2018; Niner et al., 2018).

The deep sea mining debate

In the literature on deep sea mining, there is a fundamental debate between the possible advantages of exploiting the ocean floor's mineral resources and the unknown, but potentially serious, environmental risks that it poses (Hallgren & Hansson, 2021; Krutilla et al., 2021; Sorensen & Mead, 1968). On the one hand, it could provide economic benefits for the contractors of companies and countries (Krutilla et al., 2021; Niner et al., 2018; Wang et al., 2023). The nodules at the seabed contain valuable elements which are essential for "growing populations, urbanization, high-technology applications and the development of a green-energy economy" (Hein et al., 2020, p. 158). It has also been pointed out that mining on land often comes with significant social and environmental costs. Due to spill-over effects, deep sea mining could help to mitigate the impacts of land mining. However, due to the differences between the mining processes and environmental conditions in terrestrial and deep-sea mining, comparing the two is difficult (Koschinsky et al., 2018).

On the other hand, the consequences of deep sea mining are unknown and could have devastating consequences for marine ecosystems and biodiversity. (Hallgren & Hansson 2021; Jones et al., 2017; Niner et al., 2018). These ecosystems are not fully discovered yet and new species are still getting discovered. Damaging these could thus have unknown consequences. This would add to the already existing pressures from human activities, such as overfishing and climate change. It has been pointed out that the plumes of sediment and other materials created by mining activities could travel long distances and have substantial impacts on marine organisms, including those that live in the deep sea (Jones et al., 2017; Washburn et al., 2019). There are also concerns about the potential release of toxic substances from the sediments (Koschinsky et al., 2018). Due to these environmental concerns, the deep sea conservation coalition (DSCC), which consists of over a hundred non-governmental organizations, fishers organizations and law and policy institutes, is calling for a moratorium on deep sea mining in order to investigate deep-sea ecosystems and the potential impact of mining more thoroughly (*Challenging Deep-Sea Mining - Deep Sea Conservation Coalition*, 2022).

In addition to these environmental concerns, there are also social implications of deep sea mining to be considered (Koschinsky et al., 2018). Many coastal states and communities rely on fishing and other marine-based industries for their livelihoods. Deep sea mining could affect the access to marine resources, local fishing practices, cultural practices, and damage culturally important coastal or deep sea sites (Roche & Bice, 2013, p. 78). Furthermore, the economic feasibility of deep sea mining is still uncertain. Therefore, it is unclear whether the benefits of the mining will outweigh the costs in the long run due to the potential negative externalities (Folkersen et al., 2019).

While the literature on deep sea mining provides valuable insights, there are still gaps in the understanding of this emerging field. For instance, additional research is required on the ecological effects of deep sea mining and the potential and efficiency of mitigation measures. Additionally, there is a need for more social research on the impacts of deep sea mining on coastal communities and indigenous peoples. Also, it is of importance to investigate governance structures to control the deep sea mining activities (Folkersen et al., 2019).

Theoretical framework

The mandate of the ISA is to govern the CCZ and its resources on behalf of all humankind and act in all humankind's interest (*About ISA – International Seabed Authority*, n.d.). This entails that it should be governed as a common pool resource (CPR). Therefore, in this thesis, a commons lens is applied by drawing on the design principles of Ostrom (McGinnis & Ostrom; Ostrom 1990). Based on these principles, the governing framework of the ISA is analyzed. These principles have been reviewed, and have been tested for their generalizability (Cox et al., 2010) and have been applied to various common goods, on both the local and the global level (Buck, 1998; Epstein et al., 2014; Fleischman et al., 2014; Ostrom et al., 1999). In this chapter, first, the CCZ and its resources are conceptualized as a global CPR. Then, the reasoning behind the design principles is explained.

A common goods approach

Collective action problems, or social dilemma's, are situations where individual maximization of self-interest leads to a situation where all participants are worse off than when they would have cooperated (Ostrom, 1998). Collective action problems arise in the provision of public goods and the management of common goods. Public goods are goods that are non-excludable (Kaul, 2012). These goods can be non-rival in nature (pure public) or rival in nature (impure public). International problems tend to be addressed as public goods problems. This results in a top-down governance strategy. However, this is not always effective as they might be better governed as a commons in a bottom-up manner. Common goods, also called common pool resources (CPR), are man-made or natural goods which are rival in consumption and non-excludable (Ostrom & McGinnis, 1996). CPR's on the global level, global common goods, are areas and resources beyond sovereign jurisdiction (Vogler, 2012). Examples include Antarctica, outer space, the ozone layer, and the deep seabed (Wijkman, 1982).

The distinction between public goods and common goods is important as they require a different governance approach (Brando et al., 2019). By understanding the specific challenges posed by common goods, policymakers and stakeholders can develop effective strategies to ensure their sustainable and equitable use. A classic example of a common goods problem is the "tragedy of the commons" (Hardin, 1968). This problem arises when a group of individuals share

a common resource, such as a fishery. Each individual has an incentive to exploit the resource to maximize their personal gain. However, if everyone does so, the resource becomes depleted, and everyone suffers a loss. This scenario highlights the tension between individual incentives and the common good. Ostrom has argued that the tragedy of the commons can be prevented by governing CPR's in a sustainable manner (Ostrom, 1990).

Deep sea mining can be conceptualized as a common goods problem. The CCZ and its resources constitute a CPR. The polymetallic nodules in the seabed are natural goods which are rival in consumption, and non-excludable. These nodules are naturally formed at the seabed of the ocean and it takes millions of years for them to form with an average growth rate of one to three mm per a million of years (Turner, 2019). These nodules are rival in nature as they contain minerals that are necessary for various technologies such as electric vehicles and renewable energy systems (Hein et al., 2020). The nodules are non-excludable as the CCZ is located in international waters beyond national jurisdiction. Therefore, no sole actor possesses property rights of the CCZ. Thus, the CCZ and its resources form a global CPR (Wijkman, 1982).

To overcome common goods problems, Ostrom has designed eight design principles to successfully manage shared resources (McGinnis & Ostrom, 1996; Ostrom, 1990). Cox (2010) has tweaked these principles a little by including sub-principles for the first, second, and fourth principle. Stern (2011) has established an adapted set of these principles, specifically for the management of global common goods.

Design principles for the management of common goods have been applied to investigate global commons. Outer space has been studied as a global common good (Weeden & Chow, 2012) based on the adapted design principles of Stern (2011). The global commons of the Ozone layer (Epstein et al., 2014) and the Arctic (Buck, 1998) have been studied based on the design principles of Ostrom (McGinnis & Ostrom, 1996; Ostrom, 1990). In this thesis, it is investigated to what extent the principles of Ostrom (McGinnis & Ostrom; Ostrom 1990), including the sub-principles of Cox (2010), are present in the management of the CCZ and its resources. All eight principles are applicable to the analysis of global commons, but five of them are particularly useful: clearly defined boundaries, congruence, monitoring, graduated sanctions, and nested enterprises (Buck, 1998, p. 32). Below, the reasoning behind all eight design principles is explained.

1. Clearly defined boundaries

In order to manage a CPR effectively, it has to be clear what is being managed for who. Therefore, the common good itself and its users have to be identified (McGinnis & Ostrom, 1996). This principle consists of two components: clear physical boundaries of the common good and clear social boundaries of its users (Cox et al., 2010). When these are clearly defined, it becomes possible to exclude outsiders. This step is essential because otherwise those outsiders might benefit from the CPR without contributing to its upkeep. This creates a free-riding problem.

To apply this principle at the international level, it is of importance to identify all the actors and/or stakeholders who are involved in the governance, management, and use of the international common good (McGinnis & Ostrom, 1996). Identifying the physical boundaries of a good at the international level can be quite easy or very challenging. The ozone layer, for example, is a common good that is entirely global in scope as it exists outside of national borders. However, due to spillover effects, it is more difficult to define the boundaries when the common good crosses national boundaries such as a river.

2. Congruence between appropriation and provision rules and congruence between provision rules and local conditions

The second principle consists of two parts as well. The first part addresses that the appropriation and provision rules should match (McGinnis & Ostrom, 1996). This means that the rules which govern the distribution of costs and obligations are closely related with the distribution of benefits and rights. The second part emphasizes that the rules have to be devised in a way to match the local circumstances.

The first part is hard to achieve when there is a wide disparity between the interests of involved actors. This is because it is hard to constitute a fair allocation of costs and obligations. For the second part, the bigger the CPR is, the bigger the challenge to match rules to local circumstances. When rules are uniformly devised on the global level, they might not work or even have counter-effective effects when they are implemented on the local level.

3. Collective-choice arrangements

Collective-choice arrangements involve the formation of decision-making processes with the inclusion of all stakeholders (McGinnis & Ostrom, 1996). In order to ensure that the rules governing the use of the CPR are decided upon and implemented in a fair and equitable manner, this principle requires that all stakeholders have a say in the decision-making process. Additionally, the rules and regulations are based on a shared understanding of the CPR and the needs of the community. In the case of large-scale CPRs, this principle overlaps with principle 8 concerning nested enterprises. This means that for this principle, on the global level, the focus is on collective choice arrangements in nested regimes.

4. Monitoring

The monitoring principle requires a system to monitor the use of the CPR (McGinnis & Ostrom, 1996). This principle consists of two components: (1) the presence of monitors and (2) those monitors belong to the community or are accountable to it. Monitoring is necessary to ensure that the rules and regulations are being followed and that the CPR is used in a sustainable way. The monitoring system should also be transparent and inclusive. The monitoring and sanctioning process can be carried out through a number of actors: government, IGO, corporation, private, or a combination of different actors.

5. Graduated sanctions

Graduated sanctions involve the establishment of a system of penalties for non-compliance with the rules and regulations which govern the CPR (McGinnis & Ostrom, 1996). According to this principle, the sanctions must be graduated. This means that the extent of the penalty rises in proportion to the context and the severity of the violation. The graduated sanctions should be designed in a way that encourages compliance with the rules rather than punishment of non-compliance.

6. Conflict resolution mechanisms

Conflict resolution mechanisms involve the establishment of systems for resolving conflicts that may arise between stakeholders in the use of the CPR (McGinnis & Ostrom, 1996). This principle requires that the conflict resolution mechanisms are designed and implemented in a

way that is fair and transparent, and that they are capable of resolving conflicts efficiently and effectively. Conflict resolution mechanisms should include all stakeholders and encourage cooperation and collaboration rather than competition.

7. Minimal recognition of rights to organize

This principle entails that the actors involved have the right to devise their own rules and not be challenged by external authorities (McGinnis & Ostrom, 1996). These rules can be enforced by the participants themselves when they get at least minimal recognition from external governmental officials, even when these rules lack formal jurisdictions.

8. Nested enterprises

Nested enterprises involve the establishment of multiple levels of governance for the management of the CPR (McGinnis & Ostrom, 1996). Each level of governance has a clearly defined set of responsibilities and decision-making authority. This principle requires that the levels of governance are designed and implemented in a way that is compatible with the first two design principles, thus with clear boundaries and congruence between appropriation and provision rules and local conditions. Nested enterprises should also be set up in a way that stakeholders are included, and cooperation and collaboration is encouraged at all levels of governance. For large-scale CPRs, appropriation, provision, monitoring, enforcement, conflict resolution, and governance are organized in multiple levels of nested systems (p. 19). It is assumed that all international regimes are nested regimes.

Expectations

The mandate of the ISA is to organize and control seabed mining activities in the Area on behalf of, and for the benefit of, humankind as a whole, as well as to ensure that the marine environment is adequately protected from harmful effects of deep seabed-related activities. (*About ISA – International Seabed Authority*, n.d.; Jaeckel, 2020; Lodge et al., 2014).

As the minerals at the seabed are classified as property of all humankind, the resources in the CCZ are approached as a global common good. As it is the goal of the ISA to govern these commons in a sustainable way, it is likely their policies are aligned with the design principles of Ostrom for governing the commons because these principles have been proven to be successful

prerequisites of governing the commons, also on larger scales (Fleischman et al., 2014). Thus, the hypothesis *"the framework for governing the Clarion-Clipperton Zone is in line with the design principles of Ostrom"* can be constructed.

The extent to which these principles are enough for successful management of the CPR of the CCZ, is not very clear. Ostrom addresses some challenges that might arise when the design principles of local commons are applied to global commons. These challenges consist of a scaling-up problem, a cultural diversity challenge, complications of interlinked CPRs, accelerating rules of change, requirements of unanimous agreement as a collective-choice rule, and the fact we have only one globe to experiment with (Ostrom et al., 1999). In the case of the CCZ, the point she makes about having one world to experiment with is highly relevant. There are a lot of marine biologists advocating for a moratorium in the deep sea mining project because of its risks and uncertainties. The Deep Sea Conservation Coalition (DSCC) has taken action against deep sea mining and lobbies for a moratorium. This has already been supported by fourteen countries (*Resistance to Deep-sea Mining: Governments and Parliamentarians - Deep Sea Conservation Coalition*, 2023). So, even when the ISA's policies and regulations are aligned with the principles of Ostrom, this might not be enough to successfully govern the CPR of the CCZ due to its negative externalities and global scope. Therefore, there might be other principles needed to successfully manage the common goods at the bottom of the sea, because as Ostrom already mentioned, we only have one globe to experiment with (Ostrom et al., 1999).

Methods

Research design: qualitative content analysis

This thesis is based on a qualitative research design. An in-depth analysis of the documents is needed to identify meanings, motives, and purposes (Halperin & Health, 2020, p. 319). By doing this, meanings, norms, values, motives, and purposes within texts can be uncovered. Therefore, it becomes possible to identify the presence of design principles in the documents. Thus, the method which is used in this thesis is a qualitative content analysis. With the use of this method, the policy documents and the draft regulations of the ISA, which governs the CCZ as a global common good, are examined. This approach is adopted to identify the extent to which these documents align with the design principles for governing the commons. It is focused on analyzing the policies and regulations of the ISA based on the design principles proposed by Elinor Ostrom (McGinnis & Ostrom, 1996; Ostrom, 1990).

Content analysis refers to the examination of textual data (Halperin & Heath, 2020). There is a wide variety of types of texts which can be analyzed. Three broad categories can be identified: official documents, cultural documents, and personal documents. As this thesis is about the governance structure of the ISA, official documents constitute an appropriate unit of analysis. In order to identify Ostrom's principles in the text, there has to be room for interpretation. Therefore, a qualitative approach is adopted.

Hsieh and Shannon (2005, p. 1278) define qualitative content analysis as: "a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns". Three types of qualitative content analysis can be identified: conventional content analysis, directed content analysis, and summative content analysis (Hsieh & Shannon, 2005). For this thesis, the second approach is adopted which is focused on existing research and theory and is conducted deductively. The design principles of Ostrom form the basis for this (McGinnis & Ostrom, 1996).

The use of Ostrom's design principles as the basis for governance analysis has been supported (Cox et al., 2010). These principles have been applied in various studies about the management of global commons (Buck, 1998; Epstein et al., 2014; Fleischman et al., 2014; Stern, 2011). These studies showed that design principles for the management of common goods provide a useful tool to address the complex governance of global common goods.

Data collection

The data collection process consisted of the identification of a relevant pool of documents on the website of the ISA. The selection of documents was guided by the research question and the aim of the study. The documents selected are those which are about the governance of the CCZ and its resources. This selection of documents is specifically relevant to examine the governance of the CCZ while the other documents on the website contain more technical or very general information. Under the tab 'documents and resources' on the official website of the ISA, all documents can be found (*International Seabed Authority*, n.d.). The documents which are used in this study consist of the most recent draft regulations of the year 2019 and all of the policy briefs of the years 2012-2022. The draft regulations consist of 117 pages and there are 20 policy briefs which vary between 4 and 12 pages each.

The draft regulations are highly relevant as these are the most recent rules which govern the exploration and future mining operations in the CCZ. By analyzing these, it is possible to assess which design principles are present in governance of the commons of the CCZ. These regulations have been developed over a long period of time. Therefore, to get a better insight in how these regulations have been established, the other unit of analysis of this study consists of the policy briefs of the ISA. By analyzing these as well, it is possible to assess which design principles have been present in the creation process of the policies and regulations of the ISA.

The documents were downloaded from the official website of the ISA (*International Seabed Authority*, n.d.). All of the policy briefs which are present on the website are included in the analysis. The policy briefs cover the years 2012-2022, during which the ISA has been actively exploring and developing regulations. The draft regulations are from 2019 and constitute the most recent body of regulations for deep sea mining in the CCZ. By combining the draft regulations and the background information of the policy briefs, a solid pool of data is created. Subsequently all these documents have been analyzed in order to be able to answer the research question of this thesis.

Data analysis: operationalization

The data analysis process involved a qualitative content analysis of the policy briefs and the draft regulations of the ISA. The analysis was conducted based on the design principles of Elinor Ostrom: clearly defined boundaries; congruence between appropriation, provision, and local

rules; collective choice arrangements; monitoring; graduated sanctions; conflict resolution mechanisms; recognition of rights to organize; and nested enterprises (McGinnis & Ostrom, 1996; Ostrom, 1990).

For the analysis, the principles "clearly defined boundaries", "congruence between appropriation and provision rules and local conditions", and "monitoring", are divided into sub-principles as proposed by Cox et al. (2010). The "clearly defined boundaries" principle is divided in the physical boundaries of the common good itself and the social boundaries of the users of the common good. The "congruence between appropriation and provision rules and local conditions" principle is divided into an appropriation and a provision principle. The "monitoring" principle is divided into (1) the presence of monitors and (2) the condition that these monitors belong to the community or are accountable to it. The other five principles are approached as one-dimensional.

For the analysis of the documents, a coding frame has been developed based on the design principles, its sub-categories, and its definitions. This coding frame is presented in table 1. With the use of this coding frame, all the texts were analyzed in a systematic and clear manner. This coding frame was constructed before the actual coding process started. The recording unit consists of (parts of) sentences which are extracted from the various texts. The coding process involved identifying and extracting sentences or parts of sentences from the selected policy documents and draft regulations that correspond to the design principles and their sub-categories.

These sentences were recorded in a table which includes the design principle, the sub-category, to what extent the principle is present, and the sentences where the principle is present. The extent to which the (sub-)principle is present in the documents is classified as 'not present (-)', 'moderately present (+/-)' or 'present (+)'. This classification type is derived from the work of Lacroix and Richards (2015) who also looked at the application of Ostrom's principles on the management of common goods. The outline of the table to record these sentences is presented below in table 2. By completing this table, it can be assessed to what extent the governing framework of the ISA is aligned with the individual design principles of Ostrom. The coding is conducted by one coder and carried out by hand. The data analysis process involved multiple rounds of coding and analysis to strengthen the reliability and validity of the findings. In the next chapter, the results will be presented and interpreted.

Table 1

Coding frame

Design Principle	Sub-category	Definition
Clearly defined boundaries	Physical boundaries common good	Clear definition of the scope and scale of the physical boundaries of the common good.
	Social boundaries users	Clear definition of the social boundaries of the users of the common good.
Congruence appropriation, provision, and local rules	Appropriation	The rules which govern the distribution of costs and obligations; devised in a way to match the local circumstances.
	Provision	The rules which govern distribution of benefits and rights; devised in a way to match the local circumstances.
Collective choice arrangements		Decision-making processes with the inclusion of all stakeholders to ensure that the rules governing the use of the CPR are decided upon and implemented in a fair and equitable manner
Monitoring	The presence of monitors	Actors that monitor the rules.
	Monitors belong to the community or are accountable to it	The accountability of the monitors.
Graduated sanctions		A system of penalties for violations of the rules, the severity of the penalty rises in proportion to the context of the violation.
Conflict resolution mechanisms		Systems for resolving conflicts that may arise between stakeholders in the use of the CPR
Minimal recognition of rights to organize		Actors involved have the right to devise their own rules without being challenged by external authorities
Nested enterprises		Inclusion of multiple levels of governance for the management of the CPR

Table 2

Recording table

Design principle	**Sub-category**	**Not present (-)**	**Moderately present (+/-)**	**Present (+)**	**Sentences where the principle is present**
Clearly defined boundaries	Physical boundaries common good				
	Social boundaries users				
Etc…					

Empirics

This chapter presents the results of the qualitative content analysis of the policy briefs and the draft regulations of the ISA. The analysis is aimed to provide empirical evidence regarding the presence of these design principles in the policy briefs and the draft regulations (mining code) of the ISA. These draft regulations of the mining code provide the most recent body of regulations for the governance of the CCZ. The policy briefs provide more context for these regulations as these are written during the drafting process of the regulations. First, the results will be presented in summary tables, these tables provide condensed versions of the coding results to create a clear overview. The full coding tables can be accessed in the appendices. Then, the results of each principle will be presented and analyzed. Subsequently, the limitations of the study will be discussed. Lastly, the results are discussed and compared to existing research. Overall, the design principles are mostly well-represented in the regulatory framework of deep sea mining in the CCZ.

Results

For clarity, the results of the qualitative content analysis are condensed in summary tables for both the policy briefs (table 3) and the draft regulations (table 4). These tables are presented below. By combining insights from both the policy papers and the draft regulations, a holistic understanding of the alignment of the regulatory framework of the CCZ and the design principles of Ostrom can be constructed.

Table 3

Summary table policy briefs

Design principle	Sub-category	Not present (-)	Moderately present (+/-)	Present (+)	Found in
Clearly defined boundaries	Physical boundaries common good			+	2
	Social boundaries users		+/-		15, 17
Congruence appropriation, provision, and local rules	Appropriation			+	3, 11, 14, 18
	Provision			+	5, 6, 9
Collective choice arrangements				+	2, 4, 5, 6, 8, 10, 11, 12, 13, 14, 18, 19
Monitoring	The presence of monitors		+/-		2, 5, 9, 11, 16
	Monitors belong to the community or are accountable to it		+/-		10, 11, 16
Graduated sanctions			+/-		15
Conflict resolution mechanisms			+/-		7, 8, 15, 20
Minimal recognition of rights to organize		-			n/a
Nested Enterprises				+	2, 3, 6, 11, 12, 13, 14, 15, 18, 19

Table 4

Summary table draft regulations

Design principle	Sub-category	Not present (-)	Moderately present (+/-)	Present (+)	Found on
Clearly defined boundaries	Physical boundaries common good			+	pp. 8, 100
	Social boundaries users			+	pp. 9, 21, 98
Congruence appropriation, provision, and local rules	Appropriation			+	pp. 9, 68
	Provision			+	pp. 9, 10, 46, 82
Collective choice arrangements				+	pp. 9, 10, 11, 60, 68
Monitoring	The presence of monitors		+/-		pp. 11, 33, 36, 37, 38, 65, 90
	Monitors belong to the community or are accountable to it		+/-		pp. 10, 26
Graduated sanctions				+	pp. 10, 65, 66
Conflict resolution mechanisms				+	p. 67
Minimal recognition of rights to organize		-			p. 16
Nested Enterprises				+	pp. 10, 11

Findings and Analysis

Below, the results are presented and analyzed for each design principle. Based on this analysis, it can be concluded that the hypothesis "the framework for governing the CCZ is in line with the design principles of Ostrom" is mostly supported. Therefore, the governance of the ISA seems to provide a robust framework to manage the common resources in the CCZ.

Clearly defined boundaries

The boundaries of the common good are well defined. In the policy briefs, the sub-principle of the physical boundaries is 'present (+)' and the social boundaries are 'moderately present (+/-)'. In the draft regulations, both the physical boundaries and the social boundaries are present (+).

Concerning the physical boundaries, the boundaries of the CCZ are clearly determined with the use of coordinates (*The Mining Code: Draft Exploitation Regulations – International Seabed Authority*, n.d., p. 100; policy brief 2). The physical boundaries are defined for both the CCZ as a whole and for the sub-areas within which contractors may explore and operate. This is all done with the use of coordinates.

Regarding the social boundaries of the CCZ, it is emphasized that its resources form a common heritage of all humankind (*The Mining Code: Draft Exploitation Regulations – International Seabed Authority*, n.d., p. 8; policy briefs 3 & 15). The ISA acts on behalf of all humankind. Contractors can get the rights to explore and export in specific contract areas from the ISA.

Congruence between appropriation, provision, and local rules

The draft regulations and the policy briefs of the ISA are devised in a congruent manner, and thus this principle is classified as present '(+)'. Appropriation of the rules can be seen in the "orderly, safe and rational management of the Resources of the Area" as stated in the draft regulations (*The Mining Code: Draft Exploitation Regulations – International Seabed Authority*, n.d., p. 9). This can be seen in the emphasis on the participation of the private and public sectors under strong governance arrangements (policy brief 6). Also, the rules are reviewed periodically to ensure they work well in practice (p. 68).

The provision of the rules is also clearly represented in the draft regulations and the policy briefs. Capacity-building is emphasized and the rules are devised in a way to provide opportunities for all participating countries (Policy briefs 14 & 18). Also, the provisions are

applied in a uniform and non-discriminatory manner, and the contractors are treated the same financially (*The Mining Code: Draft Exploitation Regulations – International Seabed Authority*, n.d., p. 46). The rules are also devised in a way to match the local conditions as the descriptions of the ecosystems from megafauna to microbial communities are included (p. 82).

Collective-choice arrangements

Public participation and the inclusion of stakeholders is emphasized in the draft regulations and the policy briefs. Therefore, this principle is classified as 'present (+)'. There is a lot of emphasis on the inclusion of all kinds of stakeholders including experts of different fields, private and public sector bodies, non-governmental organisations, and governmental organs (also from island states, landlocked countries, and developing countries). The aim is to create a "just and equitable international equal order which takes into account the interests and needs of humankind as a whole" (policy brief 15). Also, the encouragement and expansion of participation is clearly emphasized and international cooperation is promoted for the overall development of all countries (*The Mining Code: Draft Exploitation Regulations – International Seabed Authority*, n.d., p. 9).

Additionally, seminars, workshops, and forums are organised to include views from experts and stakeholders from a wide range of geographical regions (policy brief 11). Examples of such stakeholders are representatives of contractors, international organisations, non-governmental organisations, and (developing) countries (policy briefs 5, 6, 8 & 11). Another important aspect of the draft regulations which aligns with this principle is the promotion of public participation procedures and the possibility for stakeholders to comment on proposed revisions of the regulations (*The Mining Code: Draft Exploitation Regulations – International Seabed Authority*, n.d., pp. 9-10, 68).

Monitoring

The monitoring principle is 'moderately present (+/-)' in both the policy briefs and the draft regulations. The policy briefs stress the need for robust monitoring procedures (policy briefs 2, 5, 11 & 16). However, there are no concrete procedures yet. Therefore the presence of the monitoring principle in the policy papers is classified as moderately present. The draft regulations however, address this principle by outlining the requirements for environmental monitoring and reporting. They emphasize the collection, assessment, and analysis of

environmental parameters and the integration of monitoring into the exploitation activities. The regulations also encourage cooperation with stakeholders and the sharing of monitoring results. The monitoring results are an important aspect of the annual report of the mining projects (*The Mining Code: Draft Exploitation Regulations – International Seabed Authority*, n.d., p. 33). The contractors are mostly responsible for the monitoring procedures. Coastal states can also take part in monitoring efforts and issue complaints to the Secretary-General when there is (a risk of) harm to the coastline or the marine environment (p. 11). However, the contractors might have the incentive to underreport due to economic interests and coastal states may not have the capability to monitor effectively. Therefore this principle is still classified as 'moderately present (+/-)'.

Graduated sanctions

The principle of graduated sanctions is 'moderately present (+/-)' in the policy briefs and 'present (+)' in the draft regulations. The policy briefs highlight the application of compensable damages and the corresponding thresholds (policy brief 15). However, there is no clear framework of sanctions yet and it is not clear if these compensable damages would be graduated. Therefore, the policy briefs show a moderate presence of the graduated sanctions principle.

The draft regulations, however, do establish a clear sanctioning system which includes compliance notices, remedial actions, suspension or termination of exploitation contracts, and monetary penalties for violations. This strong incorporation of enforcement mechanisms enhances the regulatory framework's effectiveness. There are clear regulations on how violations are sanctioned (*The Mining Code: Draft Exploitation Regulations – International Seabed Authority*, n.d., p. 66). First, when a contractor is in breach with the terms and conditions of its exploitation contract, the Secretary-General will issue a compliance notice which requires the contractor to take action. Then, if the contractor fails to implement the required measures, the council Council may suspend or terminate the exploitation contract. Another option of the council is to impose monetary penalties proportionate to the seriousness of the violation. This can be done instead or in addition to suspension.

Conflict resolution mechanisms

Both the policy briefs and the draft regulations address the need of a way to settle disputes. The draft regulations address the settlement of disputes. Here the principle of conflict resolution

mechanisms is 'present (+)'. When disputes arise concerning the interpretation or application of the regulations of the ISA and an exploitation contract, this will be settled in accordance with the UNCLOS (*The Mining Code: Draft Exploitation Regulations – International Seabed Authority*, n.d., p. 67). This entails that the dispute settlement can be done through the International Tribunal for the Law of the Sea, the International Court of Justice, or an arbitral tribunal.

Any final decisions on the dispute can be enforced in all of the territories of the member states of the UNCLOS. In the policy briefs, the need for provisions on dispute resolution is discussed, but it is not clear yet which mechanisms should be implemented (policy briefs 8, 15 & 20). Therefore, this principle is classified as 'moderately present (+/-)' in the policy briefs.

Minimal recognition of rights to organize

Stakeholders have the right to submit written comments and guidelines from their perspective on issues which may arise (*The Mining Code: Draft Exploitation Regulations – International Seabed Authority*, n.d., p. 16). However, it is nowhere mentioned that those stakeholders have the right to organize and enforce their own rules. Therefore, this principle is classified as 'not present (-)' in both the policy papers and the draft regulations.

Nested enterprises

The principle of nested enterprises is present in both the policy briefs and the draft regulations. As seen already with the 'collective-choice arrangements' principle, a wide range of stakeholders is included. Cooperation and participation of a wide scope of actors is present on the international, national, and local levels as well as on the technical, legal, and social levels (*The Mining Code: Draft Exploitation Regulations – International Seabed Authority*, n.d., p. 11; policy briefs 2, 3, 6, 11, 12, 13, 15 & 18). Thus, various tiers of governance are included in the management of the CCZ. This becomes clear in both the policy papers and the draft regulations. Therefore, this principle is classified as 'present (+)'.

Limitations

While the qualitative content analysis approach employed in this thesis provides valuable insights into the governance structure of the ISA and its alignment with the design principles proposed by Elinor Ostrom, it is important to acknowledge certain limitations. These limitations

may impact the generalizability and robustness of the findings, and should be taken into consideration when interpreting the results.

Firstly, qualitative content analysis involves the subjective interpretation of textual data (Hsieh & Shannon, 2005). The identification and classification of design principles in the policy documents and draft regulations of the ISA are subject to the coder's interpretation. To limit the subjective interpretation, the definitions of the design principles are followed and the coding process consists of multiple rounds of coding and analysis to strengthen the reliability and validity of the findings.

Second, the findings of this thesis are specific to the ISA and its governance of the CCZ as a global common good. Therefore, the results may not be directly applicable to other governance contexts or common pool resources. The unique characteristics of the CCZ and the specific policies and regulations of the ISA limit the generalizability of the findings. However, it does contribute to the literature on global common goods beyond national jurisdictions.

Third, the analysis relies solely on official documents available on the ISA's website. This approach has been taken to specifically evaluate the governance of the ISA. However, it does not consider other sources of information, such as stakeholder interviews or field observations. This reliance on official documents may limit the depth and comprehensiveness of the analysis.

Despite these limitations, the qualitative content analysis provides valuable insights into the alignment of the ISA's governance framework with Elinor Ostrom's design principles. When the mining projects actually start to take place, it is of interest to reevaluate the regulations of the ISA and assess the implementation of the regulations in practice. Then, it is also relevant to broaden the research methods to include independent interviews with stakeholders to evaluate the successfulness of the governance of the ISA.

Discussion

The expectation of this study was that the framework for governing the CCZ would be in line with the design principles of Ostrom. The reasoning behind this is that the resources of the CCZ are to be governed as a global common good. The design principles of Ostrom have proven to be successful for the management of commons goods and thus it would make sense if the governance of the ISA is aligned with the design principles. As seen in the empirics chapter, these expectations are met and the hypothesis is mostly supported.

Concerning the clearly defined boundaries of the CCZ the results are similar to the case of Antarctica. Both the physical and social boundaries of the CCZ are clearly identifiable in the policy briefs and the draft regulations of the ISA. This can also be seen in the case of Antarctica where both the boundaries of the resource domain and the pool of users are clearly defined: the pool of users consists of the participating organisations and countries and the actual users such as scientists (Buck, 1998). This is similar to the pool of participants and users of the CCZ.

The results of the congruence principle are partly as expected. As there is a governing entity on behalf of all humans, the ISA, it was to be expected that it would provide clear rules on how to deal with the common heritage. It has been argued however that the ISA lacks equitable benefit-sharing (Niner et al., 2018). But, examining the draft regulations and the policy papers shows the opposite as there is a strong emphasis on fair and equal resource allocation and benefit-sharing, especially for developing countries. Therefore, this principle is classified as present.

Collective-choice arrangements are hard to establish on a global scale. Stern (2011, p. 221) has addressed how "most users" can participate meaningfully when there are so many of them on the global level. In the case of the CCZ, this is addressed well as the participation of all stakeholders is emphasised and stimulated through workshops and meetings all over the world. Therefore, this principle is classified as present in both the policy papers and the draft regulations.

Monitoring is as important for global commons as for local, but much more difficult to implement (Stern, 2011). There is a conflict of interest between the major appropriators, who are in the best position to monitor resource-use but also have the incentive to underreport. Due to these incentives, it is of importance to instate independent monitors. In the case of the CCZ, this

could be established by providing coastal states with the means to monitor the contractors effectively or by letting the secretariat of the ISA act as a "social monitor" as seen with the ozone secretariat in the case of the ozone layer (Epstein et al., 2014, p. 352).

The principle of graduated sanctions is present in the management of the CCZ as there is a clear sanctioning mechanism in place in the draft regulations. However, this might work better if the monitoring mechanism is improved. This result differs from other global commons studies. In the case of the ozone layer, this principle is absent in the Montreal protocol (Epstein et al., 2014). In the case of Antarctica, the sanctioning principle is not present either (Buck, 1998). Partly because it is hard to break the rules and also because the community tends to be self-disciplined. Because of this, sanctioning that does occur in Antarctica is informal.

Minimal recognition of rights to organize is absent. However, this does not necessarily weaken the support for the hypothesis as this principle is seen as the least important principle for the governance of global commons (Buck, 1998, p. 32).

The principle of nested enterprises is well-presented in the governing framework. This was to be expected as Ostrom already emphasized that "all international regimes must be nested regimes" (McGinnis & Ostrom, 1996, p. 19). The presence of this principle can also be seen in the successful governance of the ozone layer (Epstein et al., 2014).

Conclusion

In conclusion, deep sea mining in the Clarion-Clipperton Zone (CCZ) presents a common goods problem. As the two-year ultimatum of the UN is reaching its end, and thus the mining operations in the CCZ could start very soon, it becomes crucial to assess the extent to which its policies and regulations are ready to be implemented. This thesis has applied a commons lens, drawing on the design principles proposed by Elinor Ostrom, to analyze the governing framework of the ISA. This has been done by carrying out a qualitative content analysis of the policy papers and the draft regulations of the ISA. By doing this, it is assessed to what extent the policies and regulations of the ISA are aligned with the design principles of Ostrom.

Six out of eight principles are well-presented in the governing framework of the ISA. Therefore, to answer the research question: the governing framework of the ISA is mostly aligned with the design principles of Ostrom. And thus, the hypothesis that the framework for governing the CCZ is in line with the design principles of Ostrom is mostly supported. Building on this, the ISA seems to provide a robust framework to manage the global commons of the CCZ. The principle of the minimal recognition of rights to organize is absent. However, this does not necessarily weaken the results as this principle is considered to be the least important principle for global commons (Buck, 1998). The monitoring mechanisms however are important for global commons and could be improved by including an independent monitor such as the secretariat of the ISA. The results of this study are comparable with other global commons studies where most principles are met as well (Buck, 1998; Epstein et al., 2014). The work of Stern (2011) also adds to the clarification of the results of this study.

So, if the exploitation of the deep sea bed actually starts, the current framework provides a robust body of regulations to avoid the occurrence of a tragedy of the commons. However, as Ostrom already mentioned, “we only have one globe to experiment with” (Ostrom et al., 1999). Further research could therefore address the question on whether it is worth it to start mining without the knowledge of its (long-term) consequences. In the coming years, the outcome of the debate on whether deep sea mining should start, or if there should be a moratorium on deep sea mining, is to be awaited. If it starts, at least, the framework to govern the resources at the deep seabed is mostly well-designed in regards to the design principles of Ostrom.

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Appendix A: Policy Briefs

Recording table of the policy briefs 2012-2022

There are 20 coding briefs. From which one the sentence is extracted from is put in parentheses. 1 being the first policy brief of 02/2012 and 20 the current last policy brief of 02/2022.

Design principle	**Sub-category**	**Not present (-)**	**Moderately present (+/-)**	**Present (+)**	**Sentences where the principle is present**
Clearly defined boundaries	Physical boundaries common good			+	"To date, the greatest concentrations of nodule deposits have been found in this region. The CCZ is defined for this study as the area between 110°‑160° W Longitude and 0°‑ 20° N Latitude." (2)
	Social boundaries users		+/-		"The issue of liability is a question of who, among the parties involved, should be held ultimately liable for damage arising from a particular activity. Clear attribution rules are important to limit the possibility of liability gaps arising" (15) "Liability rules will address harm from "activities in the Area", but legal certainty will require careful delineation of the boundaries of any liability scheme." (15) "Given the complex constellation of actors involved in deep seabed mining, liability rules will need to establish rules on attribution, including consideration of: whether channeling of liability should be adopted, and if so, whether

					liability would be channeled exclusively to contractors; whether channeling would provide for a full exclusion from liability from some or all other actors, or would recourse by the contractors against other responsible parties be permitted; whether channeling would need to be accompanied by other features, such as strict liability and mandatory insurance; and treatment of subcontractors and other potentially responsible actors, including how allocation of liability may be privately arranged between those parties." (15) "give applicants the option to either contribute a reserved area, or to offer a future equity interest in a joint venture with the Enterprise." (17)
Congruence appropriation, provision, and local rules	Appropriation		+/-		"exploited under the rules and regulations of the ISA to ensure that undeveloped countries would have fair participation of these natural resources that are the common heritage of mankind". (3) "Planning mechanisms should consider, where applicable, cumulative effects, multi-sectoral uses and alternatives (location, technique and conceptual) in accordance with the Convention;" (11) "Consider linkages of mining practices to the bottom-line and developing education,

					knowledge-building and capacity building in the field of deep seabed mining;" (14) "capacity-building programmes, that ensure the fully integrated participation of developing States in activities in the Area at all levels. Strategic direction 5 (Build capacity for developing States) and strategic direction 6 (*Ensure fully integrated participation by developing States)* are aimed at accomplishing this objective" (18)
	Provision		+/-		"Providing guidelines and procedures to be utilized by contractors, prospectors and the marine scientific research community in applying the standardized nomenclature" (5) "sustainable deep sea mining, should include a clear legal framework, sustainable technology and the participation of the private and public sectors under strong governance arrangements" (6) "ensure that deep sea mining will be done under well regulated conditions, as well as to ensure that developing countries will be able to secure a fair and equitable share of the resources." (6) "In view of the increasing commercial interest in the resources of the Area, participants in the workshop recognized the need for a

					classification system for the mineral resources of - the Area. They considered that existing resource and reserve classification systems designed for land-based minerals would provide a useful basis for a system to enable contractors with the Authority to standardize the classification of, and reporting on, polymetallic nodule resources into proven, probable and possible reserves of metals." (9)
Collective Choice Arrangements				+	"Sensitization seminars are organized by the International Seabed Authority (ISA) in partnership with the hosting country and experts from various scientific and legal institutions" (2) "The workshop comprised a series of lectures by taxonomic and technical experts, together with hands‐on sessions, where the representatives of each of the contractors representatives discussed their images of morphotypes with each of the other taxonomists (Figure 1). In this meeting, eight contractors participated actively in the workshop and each gave a presentation on the work they were doing and the sampling they were undertaking. Contractors present were: BGR, DORD, G‐TEC, COMRA, IOM, IFREMER, TOML, and UKSRL" (4) "representatives of contractors and experts exchanged and

					discussed the collected specimen" (5) "The seminars are organized by the ISA in partnership with the host country and with the participation of experts" (6) "A total of 108 participants from 12 South African Developing Community (SADC) countries attended the seminar, including representatives from the private sector, governments and non-governmental organizations." (6) "The objective of the Workshop was to canvas the main perspectives and concerns of stakeholder groups, continue the process of stakeholder participation in the development of a regulatory framework for mineral exploitation" (8) "There was a clear consensus on the urgent need for a regulatory code for mineral exploitation to be adopted as soon as possible so that a sustainable deep sea mining industry will develop" (8) "need for clear provisions on the enforcement of security, dispute resolution, and the desirability of an adaptive and evolutionary legal framework" (8) "The 60 participants at the seminar included representatives from the Ministry of Mining, Economy and Environment, Comisión

					Chilena del Cobre (COCHILCO), Chilean Navy, Shoa, Dirección General del Territorio Marítimo y de Marina Mercante (DIRECTEMAR), Mining Commission, Mining Council, Chilean National Congress, Valparaiso University, ANEPE, SONAMI, WWF, the British High Commission, other private and public sector bodies, and non-governmental organizations." (10) "The 100-plus experts and stakeholders came from a wide range of geographical regions. Their professional backgrounds and interests ranged from academia, science, law, environmental management, civil society, contractors, ISA staff and members of the Legal and Technical Commission (LTC). The forum facilitated the exchange of views and provision of feedback from multidisciplinary perspectives on various issues in connection with the design and development of the environmental provisions of the Mining Code. (11) "The definition of 'Interested persons' in the Draft regulations was viewed as being too narrow and limited to "directly affected persons" in the opinion of the ISA. The definition of "interested persons" and the stakeholder engagement process should match the standards of

					other international frameworks.” (11) “An integrated, multi-stakeholder process for the development of environmental standards was seen as an effective and reasonable approach. These environmental standards should have scientific considerations as their primary basis.” (11) “We need deep-ocean stewardship as a transdisciplinary, multi-sectoral and multi- stakeholder endeavour within and beyond national jurisdictions” (12) “emphasized the overall goal pursued by UNCLOS in the realisation of “a just and equitable international economic order which takes into account the interests and needs of humankind as a whole, in particular, the special interests and needs of developing countries, whether coastal or landlocked”. (13) “It brought together over 60 participants from government mining ministries, international organizations, partner institutions, universities and other mining stakeholder groups.” (14) “The session also emphasized capacity building as a means to achieve responsible deep seabed mining activities.” (14)

					"Organize a stakeholders' meeting involving potential investors, collaborators (research) and States to present a way forward for the development of African marine mineral endowments." (14) "The duty of the International Seabed Authority (ISA) to design and implement mechanisms to *build capacity for developing States*," (18) "The United Nations Convention on the Law of the Sea (UNCLOS) establishes the principle that all activities in the Area, including recovery of minerals, must be carried out for the benefit of all humanity, irrespective of the geographic location of States. In pursuance of this principle, UNCLOS requires ISA to provide for the equitable sharing of financial and other economic benefits on a non-discriminatory basis." (19) "equitable sharing of financial and other economic benefits." (19) "A possible alternative to a simple financial distribution could involve a qualitative distribution of the net financial benefits from recovery of deep-sea minerals through establishing a global fund to invest in knowledge and competence related to the Area. This would also include basic and applied research, capacity-building, and fostering

					other public goods related to the deep sea. Here, financial benefits would be used to invest in people and preserve and develop the Area sustainably to maintain its value for future generations." (19) "A resource fund of this type could also provide a mechanism for addressing intergenerational equity by smoothing out the flow of disbursements, delinking disbursements from the dynamics of resource revenue (such as price and revenue pro-cyclicality) and minimizing uncertainty over the overall wealth to be shared." (19)
Monitoring	The presence of monitors		+/-		"The International Seabed Authority is an autonomous international organization established under the 1982 United Nations Convention on the Law of the Sea and the 1994 Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea. The Authority is the organization through which States Parties to the Convention shall, in accordance with the regime for the seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction (the Area) established in Part XI and the Agreement, organize and control actvities in the Area, particularly with a view to administering the resources of the Area." (2)

					"establish a sound and defined protocol for reporting biodiversity to the authority" (5) "The Regulations (Sections 9 and 11) stipulate that each contractor, upon expiration of its contract, is required to submit to the Authority: (i) annual reports covering its programme of activities; (ii) all data and information; and (iii) copies of geological, environmental, geochemical and geophysical data acquired in the course of its programme of activities among other specifications." (9) "The ISA must have the capacity to effectively control and assess the activities of contractors in a timely manner, and to ensure that the rules are effectively enforced." (11) "Monitoring is necessary for future decision-making. Thus, this has to be organised and funded;" (11) "perform monitoring from initiation of IRZs and PRZs designations, including post mining monitoring as part of closure plans and contractor commitment." (16) "Impacts predicted in the EIA should be monitored at sites using stratified sampling design within IRZs to assess impact across all habitat types" (16) "The contractor should monitor IRZs and PRZs for at least, the

					duration of any mining activity.” (16) “Comprehensive environmental baselines and the environmental impact assessment should be the basis for monitoring programmes to assess effects of mining activities on the marine environment.” (16) “The contractor should ensure that the PRZs are sufficient in size, e.g., covering 10-20% of the total claim area with stable communities and ecological functions” (16)
	Monitors belong to the community or are accountable to it		+/-		“Not only did methodological challenges exist, there was the lack of man power, specifically taxonomists to analyze the collected biological samples, evaluate loss of diversity and describe and record species levels.” (10) “The three pillars of transparency - access to environmental information, public participation and access to justice - were seen to be essential. Further consideration is needed on how to “operationalise” all three pillars, including access to justice in the context of the common heritage of mankind.” (11) “PRZs could be shared between and among contractors, consistent with any sponsoring State obligations.” (16)

Graduated Sanctions			+/-		"The scope of compensable damages should be clearly identified and should reflect the particular features of the marine environment of the Area, and the status of the Area and its resources as the common heritage of humankind. Key issues in determining the scope of compensable damages include: whether, in order to require compensation, damages must exceed a threshold, such as "serious" or "significant" harm;" (15)
Conflict Resolution mechanisms			+/-		"Given the absence of provisions on the resolution of conflict of uses, participants considered best strategy to avoid disputes and define procedures to reduce risk" (7) "need for clear provisions on the enforcement of security, dispute resolution…" (8) "Assessment of the adequacy of existing dispute settlement mechanisms and the potential for a multiplicity of proceedings or lack of an available forum for claims." (15) "possible establishment of an Environmental Compensation Fund (ECF) in connection with activities in the international seabed area (the Area)" (20) "States could be eligible to seek compensation from the ECF for the damage suffered in areas within their national jurisdiction or sovereignty" (20)

					"eligible entities will be determined by the type of compensable damage on a case-by-case basis." (20)
Minimal recognition of rights to organize		-			
Nested Enterprises				+	"the Authority, together with its contractors and scientists, joined forces with a group of technical experts to establish and develop a Geological Model of polymetallic nodule deposits in the Clarion‐Clipperton Fracture Zone" (2). "Dr. José Meade, stated that sustainable deep sea mining activity should include clear legal framework, sustainable technology and the participation of the private and public sector under strong governance." (3) The UN Division for Ocean Affairs and the Law of the Sea (DOALOS) presented the scope of the UNCLOS and its institutional bodies: ISA, Jamaica; International Tribunal for the Law of the Sea (ITLOS), Germany; and the Commission on the Limits of the Continental Shelf (CLCS) in the United States of America. (3) "Deep sea mining initiative, must be done responsibly and as a joint effort among scientists, miners and the public governance of member States" (3)

					"collaborative efforts at the technical, legal and social levels." (6) "an important avenue for developing countries to be able to participate in deep sea mining" (6) "There was support for a tiered approach to ocean environmental management, including environmental objectives and data collection, from an overarching and strategic scale, through the regional level down to project -specific level." (11) "broaden the scope of interdisciplinary reflection (natural and social sciences) requires participation of local governments and populations (including local knowledge) in the decision- making process." (12) "The contribution of ISA also included its participation in three side events, which attracted high-level representatives of Member States, UN Agencies, international organizations, private sector representatives and civil society organizations." (13) "Raise awareness of the importance and impact of deep seabed mining, using established networks of institutions, experts, initiatives and organizations in the

					domestic and regional arena;" (14) "Develop international cooperation for activities in the international seabed areas." (14) "Harmonizing domestic state practices is one possible approach to generate greater consistency and ensure the availability of adequate compensation." (15) "Participants included representatives of members3 and observers4 of ISA, experts from international, regional and national organizations,5 as well as contractors6 and national experts." (18) "Inclusivity is an important objective and suggests that consideration may be given to regional offices hosted by regional institutions, with ISA playing a role as a global coordinator and facilitator of a network." (19) "Nevertheless, it is important that ISA establishes a mechanism for equitable and non-discriminatory sharing of financial and other economic benefits for the current and future generations as required by UNCLOS well in advance of any commercial recovery." (19)

Appendix B: Draft Regulations

Recording table: draft regulations 2019

Design principle	**Sub-category**	**Not present (-)**	**Moderately present (+/-)**	**Present (+)**	**Sentences where the principle is present**
Clearly defined boundaries	Physical boundaries common good			+	"the Area and its Resources are the common heritage of mankind" (p. 8) "Contract Area" means that part of the Area allocated to the Contractor for Exploitation, defined by the coordinates listed in schedule 1 hereto. (p. 100)
	Social boundaries users			+	"Recognize that the rights in the Resources of the Area are vested in mankind as a whole, on whose behalf the Authority shall act" (p. 9) "An exploitation contract shall confer on a Contractor the exclusive right to: (a) Explore for the specified Resource category in accordance with paragraph 7 below; and (b) Exploit the specified Resource category in the Contract Area in accordance with the approved Plan of Work, provided that production shall only take place in approved Mining Areas. 2. The Authority shall not permit any other entity to exploit or explore for the same Resource category in the Contract Area for the entire duration of an exploitation contract." (p. 21)

					“the Authority hereby grants to the Contractor the exclusive right to Explore for and Exploit [specified Resource category] in the Contract Area in accordance with the terms and conditions of this contract.” (p. 98)
Congruence appropriation, provision, and local rules	Appropriation			+	“Orderly, safe and rational management of the Resources of the Area, including the efficient conduct of activities in the Area and, in accordance with sound principles of conservation, the avoidance of unnecessary waste effective management and regulation of the Area and its Resources in a way that promotes the development of the common heritage for the benefit of mankind as a whole” (p. 9) “Recognize that the rights in the Resources of the Area are vested in mankind as a whole, on whose behalf the Authority shall act; (b) Give effect to article 150 of the Convention by ensuring that activities in the Area shall be carried out in such a manner as to foster the healthy development of the world economy and the balanced growth of international trade, and to promote international cooperation for the overall development of all countries, especially developing States, and with a view to ensuring” (p. 9). “Review of these regulations

					1. Five years following the approval of these regulations by the Assembly, or at any time thereafter, the Council shall undertake a review of the manner in which the regulations have operated in practice." (p. 68)
	Provision			+	"enhancement of opportunities for all States Parties, irrespective of their social and economic systems or geographical location, to participate in the development of the resources of the Area and the prevention of monopolization of activities in the Area" (p. 9) "protection of developing countries" (p. 9) "Provide for the prevention, reduction and control of pollution and other hazards to the Marine Environment, including the coastline" (p. 10) "The Council shall, based on the recommendations of the Commission, apply the provisions of this Part in a uniform and non-discriminatory manner, and shall ensure equality of financial treatment and comparable financial obligations for Contractors" (p. 46) "Address diversity, abundance, biomass, community-level analyses, connectivity, trophic relationships, resilience, ecosystem function and temporal variability. Any work

					on ecosystem models and appropriate ecosystem indicators, etc., should also be presented here. This section should span the size range from megafauna to microbial communities. The description of the fauna is structured by depth range, as this enables a direct linkage to the source and location of an impact. For each depth zone, there should be a description of the main taxonomic/ecological groups (e.g., plankton, fish, marine mammals, benthic invertebrates, demersal scavengers), using the Authority's Guidelines" (p. 82).
Collective Choice Arrangements				+	"Balanced growth of international trade, and to promote international cooperation for the overall development of all countries" (p. 9) "The expansion of opportunities for participation" (p. 9) "Participation in revenues by the Authority and the transfer of technology to the Enterprise and developing States" (p. 9) "Encouragement of effective public participation" (p. 10) "Incorporate the Best Available Scientific Evidence into decision-making processes" (p. 10) "The Authority shall develop, implement and promote effective and transparent

					communication, public information and public participation procedures" (p. 10) "Collaborating with the scientific community to identify and develop best practices and improve existing standards and protocols with regard to the collection, sampling, standardization, assessment and management of data and information" (p. 11) "The Commission or the Secretary-General shall, from time to time, issue Guidelines of a technical or administrative nature, taking into account the views of relevant Stakeholders. Guidelines will support the implementation of these regulations from an administrative and technical perspective." (p. 60) "The Council shall establish a process that gives relevant Stakeholders adequate time and opportunity to comment on proposed revisions to these regulations, save for the making of an amendment to these regulations that has no more than a minor effect or that corrects errors or makes minor technical changes" (p. 68)
Monitoring	The presence of monitors		+/-		"Any coastal State which has grounds for believing that any activity under a Plan of Work in the Area by a Contractor is likely to cause Serious Harm or a threat of Serious Harm to its coastline or to the Marine

					Environment under its jurisdiction or sovereignty may notify the Secretary-General in writing of the grounds upon which such belief is based. The Secretary-General shall immediately inform the Legal and Technical Commission, the Contractor and its sponsoring State or States of such notification" (p. 11) "Such annual reports shall include: [...] The actual results obtained from environmental monitoring programmes, including observations, measurements, evaluations and the analysis of environmental parameters, reported against, where applicable, any criteria, technical Standards and indicators pursuant to the Environmental Management and Monitoring Plan, together with details of any response actions implemented under the plan and the actual costs of compliance with the plan" (p. 33) "Monitoring procedures;" (p. 36) "The purpose of an Environmental Monitoring and Management Plan is to manage and confirm that Environmental Effects meet the environmental quality objectives and standards for the mining operation. The plan will set out commitments and procedures on how the mitigation measures will be implemented, how the effectiveness of such measures will be monitored, what the

					management responses will be to the monitoring results and what reporting systems will be adopted and followed." (p. 37) "A Contractor shall, in accordance with the terms and conditions of its Environmental Management and Monitoring Plan and these regulations: (a) Monitor and report annually under regulation 38 (2) (g) on the Environmental Effects of its activities on the Marine Environment, and manage all such effects as an integral part of its Exploitation activities as set out in the Standards referred to in regulation 45" (p. 38) "Secretary-General shall issue a compliance notice pursuant to regulation 103 or direct an inspection of the Contractor's activities" (p. 65) "Provide an overview of the envisaged monitoring programme (further detail will be provided in the Environmental Management and Monitoring Plan)" (p. 90)
	Monitors belong to the community or are accountable to it		+/-		"Accountability and transparency in decision-making" (p. 10) "Where, as part of a revised Plan of Work, the Contractor delivers a revised Environmental Impact Statement, Environmental Management and Monitoring Plan and Closure Plan" (p. 26)

Graduated Sanctions				+	“application of “the polluter pays” principle through market-based instruments” (p. 10) “Enforcement and penalties At any time, if it appears to the Secretary-General on reasonable grounds that a Contractor is in breach of the terms and conditions of its exploitation contract, the Secretary-General shall issue a compliance notice to the Contractor requiring the Contractor to take such action as may be specified in the compliance notice.” (p. 65) “Require the Contractor to take remedial action or other such steps as the Secretary-General considers appropriate to ensure compliance within a specified time period.” (p. 65) “fails to implement the measures set out in a compliance notice and continues its activities in such a way as to result in serious, persistent and wilful violations of the fundamental terms of the contract, Part XI of the Convention and the rules, regulations and procedures of the Authority, the Council may suspend or terminate the exploitation contract by providing written notice of suspension or termination to the Contractor in accordance with the terms of the exploitation contract.” (p. 65)

					"In the case of any violation of an exploitation contract, or in lieu of suspension or termination under paragraph 5 above, the Council may impose upon a Contractor monetary penalties proportionate to the seriousness of the violation." (p. 66)
Conflict Resolution mechanisms				+	"Settlement of disputes Disputes concerning the interpretation or application of these regulations and an exploitation contract shall be settled in accordance with section 5 of Part XI of the Convention." (p. 67) "In accordance with article 21 (2) of annex III to the Convention, any final decision rendered by a court or tribunal having jurisdiction under the Convention relating to the rights and obligations of the Authority and of the Contractor shall be enforceable in the territory of any State party to the Convention affected thereby." (p. 67)
Recognition of rights to organize	-				"Place the Environmental Plans on the Authority's website for a period of 60 Days, and invite members of the Authority and Stakeholders to submit comments in writing, taking account of the relevant Guidelines" (p. 16).

					"The applicant shall consider the comments and may revise the Environmental Plans or provide responses in reply to the comments and shall submit any revised plans or responses within a period of 30 Days following the close of the comment period." (p. 16)
Nested Enterprises				+	"Members of the Authority and Contractors shall use their best endeavours to cooperate with the Authority to provide such data and information as is reasonably necessary for the Authority to discharge its duties and responsibilities under the Convention" (p. 10) "The Authority shall consult and cooperate with sponsoring States, flag States, competent international organizations and other relevant bodies as appropriate, to develop measures" (p. 10) "Contractors, sponsoring States and members of the Authority shall cooperate with the Authority in the establishment and implementation of programmes to observe, measure, evaluate and analyse the impacts of Exploitation on the Marine Environment, to share the findings and results of such programmes with the Authority for wider dissemination and to extend such cooperation and collaboration to the implementation and further development of Best

					Environmental Practices in connection with activities in the Area" (p. 10) "Members of the Authority and Contractors shall use their best endeavours, in conjunction with the Authority, to cooperate with each other, as well as with other contractors and national and international scientific research and technology development agencies" (p. 11) "Contractors shall take all measures necessary to ensure that their activities are conducted so as not to cause Serious Harm to the Marine Environment" (p. 11)