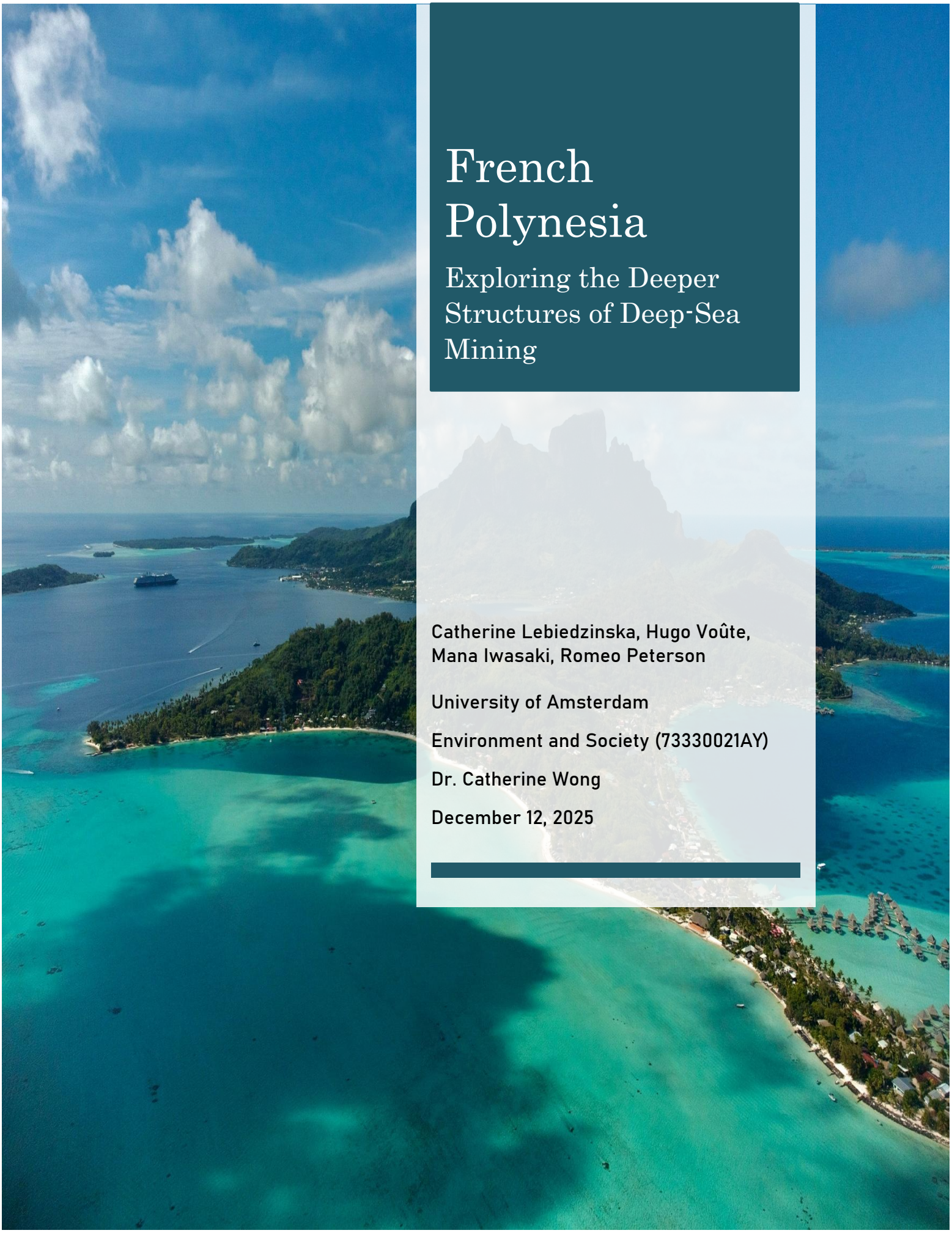

French Polynesia

Exploring the Deeper Structures of Deep-Sea Mining

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TABLE OF CONTENTS

1 INTRODUCTION

As the world races to electrify in response to accelerating climate change, the demand for the metals that underpin renewable energy systems, from copper to manganese, is rising sharply. By 2050, global demand for these transition minerals is expected to outstrip known land supply, prompting an intensified search for new sources (EIA, 2025). Yet, the existence of an enormous, alternative mineral frontier has been known since the 1970s: the deep seabed. Vast fields of polymetallic nodules, each roughly the size of a potato, blanket the abyssal plains of the Pacific at depths of 4,000 to 6,000 meters (Betters, 2025). Geological estimates suggest that more than 21 billion tons of these nodules lie scattered across the ocean floor, containing concentrations of cobalt, nickel, copper, and manganese that rival, and in some cases vastly exceed, global land-based reserves (Deng et al., 2024).

For some Pacific territories, deep-sea mineral wealth hints at the possibility of economic transformation. French Polynesia, whose 4.8-million-km² EEZ, as seen in figure 1, lies within a geological province known to host polymetallic nodules, is a striking example (Nouema, 2024). Although exploration has been limited, its nodules fields are expected to have world-class potential, similar to those in the better-studied Cook Islands and Clarion–Clipperton Zone (Arndt et al., 2016). No valuation exists, but the sheer scale of French Polynesia's maritime domain means that any substantial nodule resource could far exceed its seven-billion-dollar GDP, underscoring the geopolitical and economic stakes in its waters (FRED, 2023).

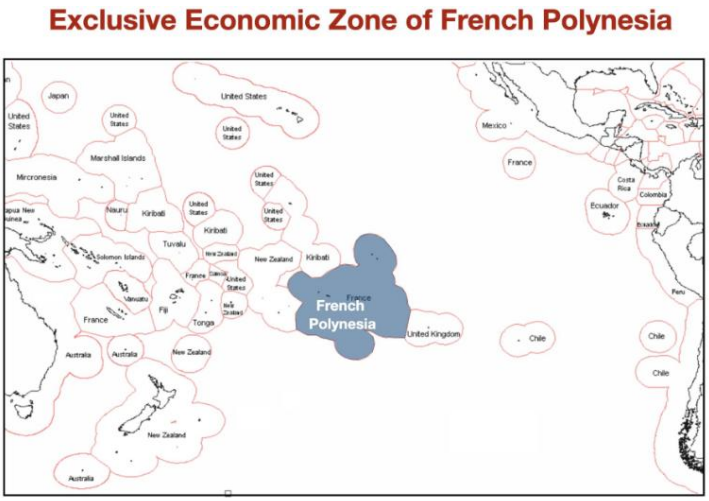

Figure 1. Lewis (2022)

Yet despite this apparent promise, deep-sea mining (DSM) for polymetallic nodules remains technically and commercially unproven. The closest the world has come was The Metals Company's 2022 trial in the Clarion–Clipperton Zone, as shown in Figure 2, in which a prototype collector recovered about 4,500 tons of nodules from 4,200 meters below the surface (The Metals Company, 2022). Even so, repeated mechanical failures and operational disruptions underscore how far the technology remains from viability. And the technical barriers are only one part of the controversy. The ecological uncertainties run far deeper. The abyssal plains targeted for mining are among the least well-understood ecosystems on Earth, and existing research suggests that disturbance from collectors and the sediment plumes they generate could inflict long-lasting or irreversible harm. In this context, the promise of deep-sea mining is inseparable from its ecological uncertainty.

These concerns were echoed by scientists, NGOs, and the public of French Polynesia, whose mounting criticism placed pressure on local authorities to act. In response, the government adopted a moratorium on DSM within its EEZ in 2022 (Fotheringham, 2025). But this political decision sits uneasily within French Polynesia's constitutional reality. Although it enjoys internal autonomy, it is not a sovereign state. France retains control over foreign policy, defense, and strategic natural resources, including the seabed of the vast EEZ of French Polynesia. Consequently, the 2022 Polynesian moratorium on deep-sea mining has no binding legal effect on decisions made by the French state, and Paris could, in principle, authorize or sponsor mining activities regardless of local opposition (Le Meur & Muni Toke, 2025).

Figure 2. Map in Clarion-Clipperton Zone. IAS GYAN (2025)

This rift between French Polynesia's ecological stance and France's sovereign authority reflects a deeper theoretical tension that Malcolm Ferdinand (2022) terms a double fracture: the historical separation between struggles against colonial domination and struggles against environmental destruction. He argues that modern environmentalism often ignores colonial histories, while anticolonial movements have frequently overlooked ecological devastation. The result is a split that allows both forms of violence to persist. Overcoming the double fracture requires bringing these struggles together to create what Ferdinand (2022) terms decolonial ecology.

In French Polynesia, the two fractures intersect but do not fully converge. The territory's lack of sovereign power reflects an ongoing colonial structure, while debates over deep-sea mining mobilize concerns about ecological harm. Although local actors occasionally acknowledge the looming possibility that France could overrule the Polynesian moratorium, this structural vulnerability remains more implicit than central in the anti-DSM discourse. As a result, environmental protection and anticolonial critique appear alongside one another yet remain only partially connected.

This report argues that DSM in French Polynesia is less a technical choice rather than a political project shaped by colonial power, global mineral demand, and financial interests. The report explores how these structures allocate responsibility, reproduce injustices, and constrain future pathways.

1.1 STAKEHOLDERS

The story of DSM in French Polynesia does not unfold solely between the territory and France. It is shaped by a wider cast of actors, each carrying their own interests, authority, and imagined future for the ocean. As expected, mining companies such as TMC and French-linked industrial actors strongly support DSM and would play an instrumental role in any future extraction. Their narratives contrast with those of regional Pacific movements, Indigenous organizations, and global NGOs, which frame DSM as a continuation of extractive and colonial patterns, amplifying calls for a precautionary global moratorium.

Financing also constitutes a critical yet often overlooked dimension. DSM's immense capital requirements mean that any project in French Polynesia would rely on external investors, as domestic financial institutions lack the scale to participate. French banks might appear obvious candidates, given their political and economic ties to France. Yet since 2024, major French banks, such as BNP Paribas, have pledged not to finance DSM, citing the sector's inherent environmental and social risks.

2 RESPONSIBILITY AND HISTORICAL ENTANGLEMENTS

When considering who is "responsible" for the deep-sea mining (DSM) controversy in French Polynesia, the answer is not limited to a single perpetrator. Although the act has not yet occurred, responsibility remains distributed across a chain of actors, given the institutional, historical, and legal structures that shape decision-making. When assigning responsibility, a layered system emerges in which accountability is dispersed and sometimes intentionally concealed.

2.1 DISTRIBUTION OF RESPONSIBILITY

Crucially, France retains legal authority over French Polynesia's EEZ, a status that is deeply rooted in its colonial past (Le Meur & Muni Toke, 2025). This means responsibility for potential DSM harm cannot be attributed solely to local authorities; it is inseparable from French state decisions that constrain French Polynesia's autonomy.

At the same time, responsibility does not only fall on states. It also extends to actors like consumers and industries in the Global North, whose demand for transition minerals drives commercial interest in DSM. Reports indicate that the pressure to power transport, battery manufacturing, and scale digital infrastructure are primary reasons for considering DSM, driven by demand for cobalt, nickel, and manganese available on the seabed (Li & Wang, 2025; Ashford et al., 2025). In this sense, DSM is not a response to the needs of Pacific locals but to global consumption trends.

Simultaneously, scholars and activists assign responsibility to colonial and corporate actors who promote DSM as part of a broader "blue economy" agenda and argue that it can deliver economic growth, jobs, and innovation with supposedly lower social and environmental footprints than terrestrial mining (Hallgren & Hansson, 2021). They argue that DSM follows the same logic of extractivism that historically appropriated Pacific resources for external benefit, presenting this as evidence that DSM is another chapter in already longstanding resource colonialism (Clark & Andrés Cisneros-Montemayor, 2024). In this framing, colonial powers like France, along with other corporate actors, are blamed for exploiting the vulnerability of Small Island Developing States (SIDS) like French Polynesia and turning their waters into a new potential supply zone for minerals.

2.2 DIFFICULTY OF ASSIGNING RESPONSIBILITY

Even when it is clear who would benefit most from DSM, assigning responsibility is complicated by the technology's governance structure. Regulation is distributed among the International Seabed Authority, flag states, sponsoring states, private companies, and scientific institutions. Each actor controls only part of the process, which disperses responsibility across multiple layers, making accountability for DSM deployment and its potential harms extremely difficult to assign.

A second challenge is scientific uncertainty, as deep-sea ecosystems remain poorly understood and few long-term impact studies exist. Powerful actors often invoke this excuse of unpredictability to argue that strict regulations or moratoria are premature. This use of knowledge gaps allows them to proceed while maintaining plausible deniability about future damage (EASAC, 2023).

Finally, responsibility is obscured by the colonial legal framework that governs French Polynesia. Even though the territory has elements of self-government, France retaining authority over defence and strategic resources creates a situation where decisions may be legally viable under international law but unjust for the affected communities.

2.3 REPERCUSSIONS FOR RESPONSIBLE ACTORS

Historical patterns in the Pacific show that powerful states rarely face meaningful consequences for environmental harm. France's nuclear testing programme in Polynesia caused decades of environmental and health damage, yet the process of acknowledging responsibility has been extremely slow and partial. This raises doubts about whether states or contractors would ever be held accountable for DSM-related harm (BBC, 2021).

Meanwhile, Pacific Island governments often become scapegoats, even when they operate under severe structural constraints. The Asian Development Bank (2011) has documented how Pacific economies face long-term vulnerabilities, including dependence on imports, exposure to climate shocks, and limited diversification. These conditions reduce the range of viable development options and can push governments towards extractive decisions. When outcomes are negative, the same governments (rather than external actors that shaped the conditions) are blamed. The current DSM debate highlights this asymmetry. High-income countries can delay or reverse DSM plans without major consequences, while Pacific states risk accusations of "blocking development" if they reject extraction.

2.4 HISTORICAL EVENTS & COLONIAL LEGACIES

Unfortunately, DSM cannot be separated from the broader history of colonial extraction in the Pacific. French Polynesia is still listed by the United Nations (2024) as a Non-Self-Governing Territory, and its long history as a nuclear testing ground illustrates how metropolitan powers have repeatedly used Pacific spaces for strategic experimentation with limited local consent. DSM and the blue economy agenda also reproduce older patterns in which oceans were portrayed as empty, exploitable spaces. They were once routes for the transport of spices and enslaved people, later for waste disposal, and now for the extraction of transition minerals (Helle Herk-Hansen & U. Rashid Sumaila, 2025). The economic vulnerabilities of SIDS, such as dependence on tourism, narrow export sectors, and susceptibility to external shocks, also originate in colonial and postcolonial economic arrangements. These structural legacies help explain why DSM appears to some actors as a necessary or inevitable course of action (Asian Development Bank, 2011).

2.5 ECONOMIC AND POLITICAL STRUCTURES AT PLAY

Several institutions shape the debate surrounding deep-sea mining (DSM). The EEZ regime under UNCLOS gives France jurisdiction over marine resources in French Polynesia, allowing Paris to maintain final authority over resource decisions (United Nations, 2019). The blue economy model further complicates this by reframing extractive activities as "sustainable", which allows governments and companies to pursue climate-finance opportunities while maintaining the logic of extractivism. This framing is widely criticized for obscuring power-relations and environmental

risk (Ozeanien-Dialog, 2019). Furthermore, French Polynesia is positioned within a broader geopolitical and economic network, involving France, the USA, and China. Trade, security, and investment agreements often steer development options towards externally defined priorities, reinforcing DSM as a strategic decision (Geneva Environment Network, 2025).

2.6 CONTESTED NARRATIVES

Supporters of DSM argue that seabed minerals are essential to the global energy transition and that technological innovation can mitigate environmental risks. They present DSM as a necessary step to secure critical minerals for renewable technologies and economic competitiveness (Li & Wang, 2025; IEA, 2021). Opponents, particularly affected local communities, reject the DSM, with recent polling indicating that more than 90% of French Polynesians support the creation of new highly protected marine areas. Respondents emphasised safeguarding ocean resources for current and future generations and prioritised management tools rooted in cultural practices, including rāhui, the traditional Polynesian method of temporarily closing areas to allow ecological regeneration (Hutchins, 2025). This complicates pro-DSM narratives that frame extraction as a pathway to development.

3 DEEPER EXAMINATION OF SYSTEMIC AND COLONIAL PATTERNS

This section directly engages with the deeper theoretical tension that Malcolm Ferdinand (2022) describes as the double fracture between environmental protection and anticolonial struggle by examining how potential deep-sea mining (DSM) in French Polynesia reproduces environmental harm and colonial domination. By examining colonial legacies, injustices, and dominant social paradigms, this section analyzes DSM through a decolonial ecological lens that links ongoing colonial power structures to environmental harm.

3.1 COLONIAL LEGACY

The prospect of deep-sea mining (DSM) in French Polynesia cannot be separated from ongoing colonial patterns that continue to shape and structure the country's political, economic, and environmental governance. But with the global demand for minerals, such as nickel and cobalt, which are essential to renewable energy technologies (*Do We Need Deep Sea Mining for the Energy Transition? - Zero Carbon Analytics*, 2024), a power imbalance becomes clear between France and French Polynesia, reflected in historical patterns of extraction established during French Colonial rule in the 19th Century (Tracey, 2024). This ongoing colonial pattern manifests in several interconnected dimensions.

The first dimension is colonial ecology, which Ferdinand (2021, p. 115) defines as "an ecology whose function it is to preserve colonial inhibition and the forms of human and non-human domination that come with it." This would represent France's framing of an overseas territory as a resource frontier serving strategic and economic interests, positioning French Polynesia's seabed as an underused space rich in minerals, reproducing the mindset that views the ocean as extractable rather than as a culturally embedded and relational space for Polynesians (Aguon et al., 2019).

Despite French Polynesia's autonomy, the concept of coloniality of power continues to shape decision-making structures. Its authority over seabed resources remains embedded in broader colonial power structures, as evidenced by France's ultimate jurisdiction over strategic minerals, including seabed minerals (Guardian staff reporter, 2025), as well as environmental assessments and standards (French Polynesia Country Brief, n.d.; Sauerborn, 2025). This coloniality of power and asymmetries reproduces 'environmental colonialism', in which external agents, such as France, determine what is acceptable for local communities and ecosystems in French Polynesia, often resulting in burdens and the exploitation of natural resources (Duquette, 2020).

Finally, the layer of neo-colonialism needs to be uncovered: an ongoing relationship between a former colony and an imperial power, in which the former colony is dependent on, or influenced by, the former colonial power through political, cultural, or economic means (A. Nwachuku, 2016). This is reflected in the promise DSM offers as a development pathway and financial dependency. However, DSM risks repeating colonial patterns of dependency through extractive activities by linking local economies to global mineral production chains, in which benefits are unequally distributed to foreign industries (Abe et al., 2025).

Overall, this analysis demonstrates that the debate and controversy surrounding DSM are not merely technical or economic issues but are shaped by deeper, broader colonial patterns and structures that continue to influence French Polynesia to this day. It is also determined by whose knowledge counts and who is prioritized, thereby shaping the future of the ocean.

3.2 Injustice in French Polynesia's DSM Future

The potential for deep-sea mining (DSM) in French Polynesia reveals multiple layers of injustice. Environmental justice is a significant concern through its distributive, procedural, and recognition dimensions (Delivering Justice in Sustainability Transitions, 2024). Distributive injustice arises from unequal exchange of benefits, with France and foreign industries receiving the benefits of the minerals, while French Polynesia bears the environmental, social, and cultural costs (Kaufman, 2012), thereby highlighting 'spatial injustice' (Goncalves et al., 2025). Procedural injustice arises because decision-making and governance are dominated by French authorities, with France holding ultimate jurisdiction over seabed minerals, resulting in unequal representation of Polynesian stakeholders perspectives and voices (Sustainability Directory, 2025; Guardian staff reporter, 2025). Recognition injustice arises from the marginalization of cultural relationships with the ocean and the traditional knowledge of local communities (Leire Urkidi & Walter, 2018), thereby making epistemic injustice a reality by ignoring and dismissing other ways of knowing (Sultana, 2025). Besides environmental justice, value injustice arises from the undermining of Polynesian' local sovereignty and from externalizing recourse decisions due to the colonial structures and power that France still holds (Aguon et al., 2019). These injustices reflect dominant norms and values that stem from colonial-era patterns and still govern global decision-making. They should not be treated as inevitable; instead, they should be challenged, questioned, and reflected upon to move beyond colonial patterns of injustice and toward a future in which French Polynesia and other territories in this position are respected.

An evident divide is shown between winners and losers surrounding this controversy, with the winners including France, mining companies and corporate contractors (such as TMC), foreign investors, and global industries, and the losers compromising of local communities in, e.g., French Polynesia, other Pacific Island communities, small-scale fishers and other ocean-dependent livelihoods who bear significant burdens of injustice and costs, such as deep-sea and coastal ecosystems, cultural heritage, and future generations. DSM is not solely mining for minerals in the deep sea; it also perpetuates colonial patterns of inequity, marginalization, and environmental burdens.

3.3 Dominant Social Paradigms

DSM in French Polynesia is shaped by several dominant social paradigms that frame how development, oceans, and sustainability are understood. A primary paradigm is extraction as development, in which DSM is presented as a necessary pathway for economic growth in small island developing states (Ozeanian-Dialog, 2019).

A second paradigm is green growth and techno-fix thinking, where environmental crises are portrayed as solvable through new technologies powered by minerals sourced from the seabed.

Corporate and state actors frequently position DSM as essential to achieving the UN 2030 Agenda and the energy transition, a narrative that obscures the socio-ecological costs of extraction and reproduces the belief that technological expansion can substitute for systemic change (Klimašauskaitė et al., 2024).

The third paradigm is the ocean as unused or empty space, which enables DSM by casting remote marine ecosystems as extractable zones rather than inhabited, culturally embedded, or ecologically complex spaces (Hallgren & Hansson, 2021). This view legitimizes governance arrangements that prioritise mineral access overprotection, as reflected in blue economy frameworks and seabed exploration contracts overseen by institutions such as the International Seabed Authority (Blanchard et al., 2023).

These dominant paradigms are increasingly challenged by community resistance, Indigenous stewardship practices such as rāhui, and growing calls for moratoria grounded in environmental precaution and blue justice (IUCN NL, 2024; Karibu Foundation, 2020). Alternative narratives reframe the ocean as a living space of cultural, ecological, and ancestral value rather than as a resource-extraction frontier. These perspectives open the possibility for French Polynesia and the wider Pacific to articulate development pathways rooted in autonomy, restoration, and care rather than extractive logics.

4 PATHWAYS & PROPOSITIONS

Using a foresight-oriented approach, we can examine not only the current debate around DSM, but also the future risks and unseen pathways that today's framing obscures. The dominant discourse focuses on ecological uncertainty and precaution, which positions DSM primarily as an environmental issue. However, this framing leaves unasked questions about political power, colonial dependency, and financial interests. French Polynesia is not politically or economically emancipated, with its ability to shape the future of its seabed dependent on France's decisions. Similarly, French banks publicly reject DSM on environmental grounds, yet this position may reflect financial aversions more than genuine ecological concern. Environmental guidelines can be revised, but unprofitability cannot.

This raises a crucial counterfactual: what would happen if DSM became economically viable and environmental regulations were softened or politically reinterpreted? Such a scenario exposes how strongly future outcomes depend on France's strategic interests regarding the autonomy of French Polynesia, revealing a deeper structural vulnerability that is insufficiently discussed in current debates. For French Polynesian partners and storytellers, a key question is therefore how to lock in protections and alliances now, before DSM becomes financially attractive enough to override current environmental commitments.

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6 APPENDIX

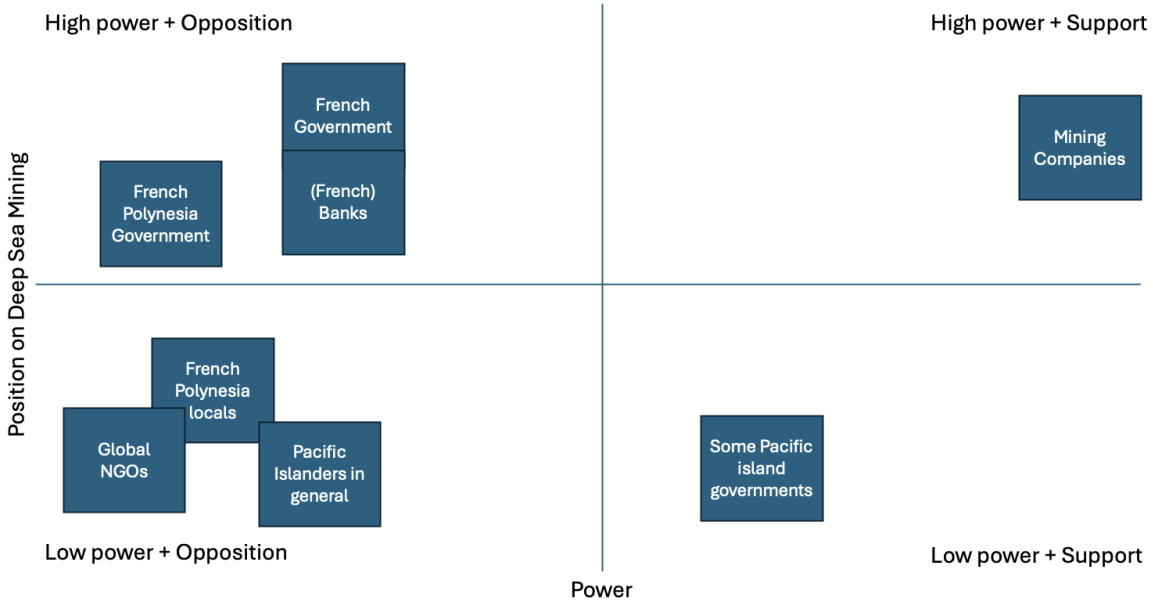

Figure 3. Stakeholder Map