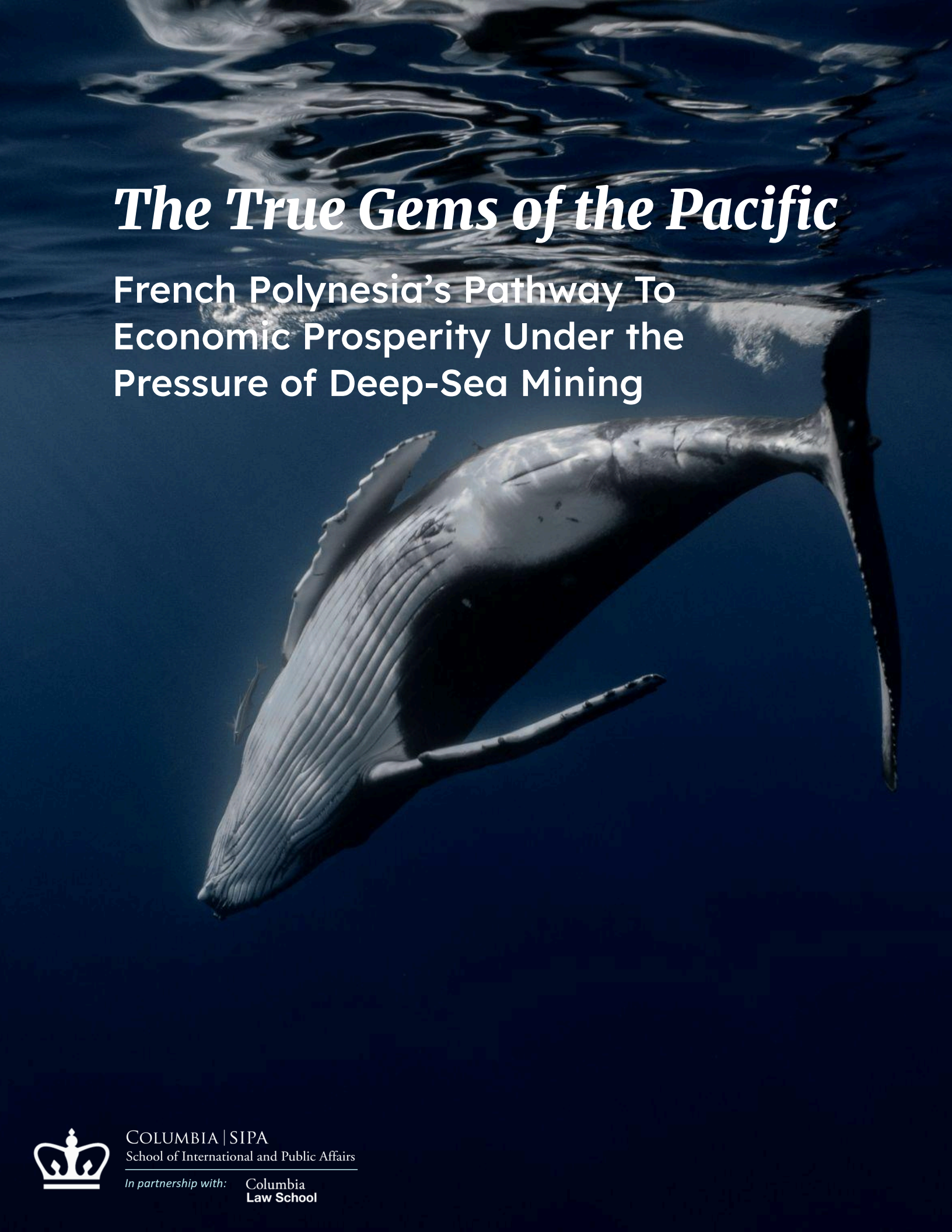

The True Gems of the Pacific

French Polynesia's Pathway To Economic Prosperity Under the Pressure of Deep-Sea Mining

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Māuruuru roa.

Executive Summary

French Polynesia is a nation whose identity, economy, and sovereignty, are inseparable from the ocean. Its 118 islands and atolls hold extraordinary natural and cultural assets, yet it faces structural constraints familiar to many small island economies: geographic isolation, high import dependence, limited diversification, brain drain, and high exposure to global shocks. These pressures intensified with the nuclear testing of the late 1960s-1990s, which disrupted industries and left the economy more vulnerable. French Polynesia now faces a new uncertainty: deep-sea mining is promoted as an economic lifeline, but its unknowns and risks threaten the backbone of the ocean economy. This report argues that French Polynesia's pathway to a more resilient future lies in scaling sectors with natural advantages and unlocking new opportunities for its people and islands.

Five economic pillars can build the economic strength that French Polynesia needs for the next decade. Together, they aim to create jobs for all Polynesians, especially youth and outer archipelagos communities, lower the cost of living, strengthen self-reliance, and generate higher revenue from abroad:

- ***Made in Fenua* exports**: Reprioritize sustainable pearls, reclaim global surf leadership as a brand, and scale premium aquaculture for cosmetic and bio-based products.
- **Tourism**: Expand world-class surfing and diving anchored in local ownership, and convert cultural legitimacy and heritage into internationally recognised labels.
- **Food self-sufficiency**: Grow commodity aquaculture and local production systems to reduce import dependence and strengthen food security across the archipelagos.
- **Digital economy**: Build a digital sector led by public-service digitization in the outer islands, and define key priority sectors for education and private investments.
- **Clean energy security**: Position the Sea-Water Air Conditioning (SWAC) and Ocean Thermal Energy Conversion (OTEC) industries as international champions in ocean energy.

Several Pacific islands are considering deep-sea mining as a shortcut to economic growth. This report lays out five reasons why deep-sea mining is not the answer: speculative profitability, uncertain and marginal royalties, lower expected mineral grades, irreversible environmental damage spreading beyond national borders, and lacking security for workers. It puts at risk the fisheries, tourism, and export sectors that sustain GDP, food security, and livelihoods. As a response, Pacific island governments need to deploy counter-strategies grounded in Indigenous advocacy, market pressure, and legal action. After the recent U.S. unilateral move toward licensing outside international governance, legal avenues should be pursued as the primary line of defense:

- **Regional coordination:** Build a unified Pacific position to reduce fragmented licensing approaches and increase collective bargaining power over environmental standards and benefit-sharing.
- **Strategic alliances:** Strengthen coordination between French Polynesia, France, and Pacific Island States, alongside civil society actors, to improve influence in the International Seabed Authority (ISA).
- **Biodiversity Beyond National Jurisdiction (BBNJ) Agreement implementation:** Advance early designation of MPAs, embedding precautionary and ecosystem-based management.
- **Legal protection of ocean spaces:** Deploy area-based management tools under BBNJ to pre-emptively limit or constrain future deep-sea mining in ecologically sensitive zones.
- **Litigation capacity:** Expand French Polynesia's ability, with France, to engage in domestic and international litigation on environmental harm and seabed resource governance.
- **French mining law and delegation of powers:** Align with France on the scope and list of strategic minerals, to clarify French Polynesia's delegated powers over resource governance.

Pacific islands need a development path that protects the ocean sustaining their lives and economy, supported by a regional alliance that safeguards collective interests and prevents any one jurisdiction's decisions from endangering the future of all. "*We are one, we are the ocean*" is the message carried by our campaign video "*Nous sommes l'Océan*", brought to life through the voices and stories of French Polynesian people, showing why these choices matter to families, communities, and their relationship with the ocean. The voices we heard across French Polynesia speak from the *fenua*, yet their message reaches far beyond it. It speaks to the Pacific and to all who depend on the same ocean they fight to protect: a healthy ocean is for all of us, for the world.

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1 The French Polynesian Culture, Economy, and Sovereignty: A People Tied to the Ocean

1.1 Inside the History, Culture, and Values that Guide Economic Development

Faatura, Faaora, Faatupu — *To respect, To support, To develop*

French Polynesia has strong traditional ties to the ocean, and it is a key priority to sustainably manage the oceans and marine resources. Similar to other Pacific societies, indigenous communities of French Polynesia believe that life originated from the ocean.[1] Humans are not just connected to the environment; they are a part of it. Polynesian ancestors believe in the idea of ecological parentage, with Earth as the mother figure, the sky as the father.[2] They also believe in a spiritual force that connects gods, ancestors, and the living world.[3]

These cultural principles guide French Polynesia's livelihood and resource use. Local communities have long used marine resources with care, supporting sustainable activities such as fisheries, tourism, small-scale aquaculture, and traditional pearl farming.[4] The ocean is not seen as a barrier, but as a pathway that links islands, families, and opportunities. This belief is reflected in generations of seafaring skills, where people learned to read stars, swells, and winds to travel across vast distances.[5] For French Polynesians, the ocean is the route through which life moves and communities stay connected, shaping how they work, trade, and protect the environment today.[6]

1.2 Economic Strengths and Structural Challenges

French Polynesia is a major Pacific economy built on ocean-driven industries. French Polynesia has a small, aging but stable population of around 279,000 inhabitants, heavily concentrated on Tahiti and Moorea.[7] Economically, it ranks third compared to amongst Pacific economies, behind Papua New Guinea and Fiji, generating €5.41 billion in GDP in 2023.[8] As a result, its €20,000 GDP per capita is roughly seven times the average of Pacific Small Island Developing States (PSIDS).[9] This relative prosperity is anchored in a service-dominated economy, where over 80% of salaried employment is concentrated in tourism and marine sectors.[10]

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[1] NGO representative for island conservation, personal communications, March 4, 2026.
[2] Tuuhia, Tiare. "Rāhui and the Art of Marine Conservation." Hakai Magazine. Accessed March 6, 2026. https://hakaimagazine.com/features/rahui-and-the-art-of-marine-conservation/.
[3] Bora-Bora. "People and Culture." Bora-Bora.Org, March 2, 2022. https://bora-bora.org/french-polynesia/people-culture/.
[4] Marianna Cavallo, Pascal Raux, Elodie Martinez, "A Holistic Approach to Evaluating Climate Vulnerability of French Polynesia Pearl Oyster Farming: Bridging Communities and Scientific Knowledge", *Environmental and Sustainability Indicators*, https://doi.org/10.1016/j.indic.2026.101202, 8-9.
[5] M Walker, "Navigating Oceans and Cultures: Polynesian and European Navigation Systems in the Late Eighteenth Century," *Journal of the Royal Society of New Zealand* 42, no. 2 (2012), https://doi.org/10.1080/03036758.2012.673494, 95-6.
[6] Pierre-Yves Le Meur and Valelia Muni Toke, "Competing Knowledges and Sovereignties in the French Pacific Oceanscapes," *Ocean and Society* (March 2025), https://doi.org/10.17645/oas.9321, 3-4.
[7] IEOM Banque Centrale du Franc Pacifique, *Le Rapport Annuel Économique de La Polynésie Française* (2024), https://www.ieom.fr/IMG/pdf/rapport_annuel_polynesie_2024_ieom_bd_-2.pdf, 11.
[8] *Ibid.*
[9] *Pacific small island developing states* (PSIDS). (n.d.). Department of Economic and Social Affairs. Retrieved April 18, 2026, from https://sdgs.un.org/statements/pacific-small-island-developing-states-psids-11452, UN Conference on Trade and Development. (2023). *Digital Economy Report Pacific Edition 2022: Towards Value Creation and Inclusiveness*. UN Trade and Development. https://unctad.org/system/files/official-document/dtlecdc2022d4_en.pdf
[10] IEOM Banque Centrale du Franc Pacifique, *Le Rapport Annuel Économique de La Polynésie Française* (2024), https://www.ieom.fr/IMG/pdf/rapport_annuel_polynesie_2024_ieom_bd_-2.pdf, 36.

While French Polynesia has a strong regional economy, the country faces a high trade deficit, and deep structural vulnerabilities. French Polynesia's coverage ratio (i.e., exports over imports) is less than 5% in 2024, and 94% of its consumer goods are imported.[11] Pearls and fish, sold as raw or minimally processed products, account for almost 80% of export value,[12] with over 95% of shipments going to just four destinations, respectively Hong-Kong, Japan, the United States (U.S.), and France. This narrow, low-value export base generates limited industrial development, constrains local employment, and exposes the economy to external shocks. These structural constraints are combined with persistent socio-economic challenges: average workforce participation stands at just 62%, and at 49% in rural areas, well below mainland France's 72%. Youth unemployment reaches 18% among 14 to 24-year-olds, three to six times higher than for older age groups and a major driver of youth leaving the territory.[13] When including discouraged workers (i.e., people who want to work but are not actively looking, not counted in unemployment statistics), the overall unemployment rate rises to 17%, far above the official 7.5%.[14] Poverty and education gaps remain significant, with over half of households on the most populated islands living on less than $1,150 USD per month[15] and fewer than 20% of students completing elementary school in some outer islands.[16]

1.3 Governance, Powers, and Responsibilities as a French Overseas Territory

As a French Overseas territory, French Polynesia is constrained when shaping its economic and regulatory policy. It operates within a shared governance framework in which it exercises autonomy over areas such as economic development, infrastructure, and environmental policy, while the French State retains control over core sovereign functions, including foreign affairs, defense, justice, currency, and international legal representation.[17] Although local authorities may negotiate or participate in international engagements in specific circumstances, this occurs under delegation and oversight from France and within the bounds of France's national and international commitments.[18]

This structure has direct implications for French Polynesia's international and economic strategy. The territory is not recognized as a subject of international law and cannot independently enter into treaties, engage in dispute settlement, or assert claims at the international level.[19] France remains the ultimate authority over external relations. Under Article 39 of the Organic Law, however, French Polynesia may negotiate agreements within its areas of competence if France is informed and does not object, and may receive delegated signature authority.[20] Even with this limited capacity, French Polynesia cannot unilaterally negotiate trade or investment treaties in strategic sectors, constraining its ability to secure tailored economic arrangements. Additionally, because France has sovereign ownership over migration policy, French Polynesia has limited ability to design visa or residency regimes to attract investment and skilled labor.[21]

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[11] *Ibid*, 43.
[12] *Ibid*, 41.
[13] Unemployment "halo" to compare with 13% in mainland France. *Ibid*, 35.
[14] *Ibid*, 35.
[15] Chukur, Y. (2024, January 31). *Living conditions and poverty in French Polynesia*. The Borgen Project. https://borgenproject.org/poverty-in-french-polynesia/
[16] Webmanager, "Education in French Polynesia - Evanelia Tahiti," Evanelia Tahiti - The Online Home of Evanelia Tahiti, January 25, 2022, https://evanelia.org/2022/01/25/education-in-french-polynesia/.
[17] France. 1958. *The French Constitution, adopted by referendum on September 28, 1958 and promulgated on October 4*, 1958, arts. 72–75. Organic Law No. 2004-192 of February 27, 2004 on the Autonomy Statute of French Polynesia (Fr.).
[18] République Française, (2017), Loi organique n° 2004-192 du 27 février 2004 portant statut d'autonomie de la Polynésie française, Articles 38-39, https://www.legifrance.gouv.fr/loda/id/JORFTEXT000000435515
[19] Constitution du 4 octobre 1958 art. 74 (Fr.); Organic Law No. 2004-192 of 27 Feb. 2004 on the Autonomy Statute of French Polynesia (Fr.); James Crawford, Brownlie's Principles of Public International Law 447–49 (9th ed. 2019); James Crawford, State Responsibility: The General Part 113–18 (2013).
[20] *Ibid*, 18,19 and 20.
[21] Organic Law No. 2004-192 of 27 Feb. 2004 on the Autonomy Statute of French Polynesia (Fr.). Article 14. The authorities of the State have jurisdiction only in the following matters: 5°. Entry and residence of foreigners, except for access to employment by foreigners; Dung Doan,

This constraint extends to maritime governance. While French Polynesia may participate in the management of marine resources, sovereignty over maritime zones, including its Exclusive Economic Zones (EEZ) and respective seabed resources, lies with France. Enforcement capacity, particularly offshore, is also largely centralized. This creates a system in which local institutions are involved in implementation, but key decisions and international positioning remains with France.[22]

This tension between French Polynesia autonomy and France sovereignty has real economic impacts, as shown through the consequences of France's nuclear testing.

1.4 Nuclear Testing and the Rupture in French Polynesia's Economic Trajectory

French Polynesia's increasing quality of life in the 1950s depended heavily on maritime industries and regional trade, placing the country on an upward trajectory toward economic autonomy. This trajectory was abruptly interrupted in 1963, when France's *Centre d'Expérimentation du Pacifique* (CEP) started nuclear tests in an effort to develop equivalent power to the U.S. and USSR.[23] The 193 nuclear tests took place on Moruroa and Fangataufa, two isolated atolls selected for secrecy and without the consultation or approval of the French Polynesian government.[24]

Soldier onlooking the nuclear test on Moruroa

Throughout the 30-year testing period which ended in 1996, France concealed the health and environmental impacts associated with nuclear testing.[25] In 2021, a study found that about 110,000 French Polynesians were impacted by the radioactive fallout, nearly the entire population at the time of the nuclear tests. Yet, as of 2021, only 63 citizens have received compensation.[26]

The CEP disrupted French Polynesia's growing economy in ways that France did not foresee. Massive military spending created a temporary, state-driven boom that drew labor away from local industries, inflated wages and prices, and crowded out productive and food-producing sectors. When testing ended, this artificial economy collapsed, leaving no substitute industries to absorb workers or sustain growth.[27] The result was a long-term structural dependency on public transfers and external support that continues to constrain French Polynesia's economic autonomy today. The challenge is now to rebuild a modern pathway back to resilience and self-sufficiency, an ambition at the core of the government's strategy for the next decade.

Matthew Dornan, Jesse Doyle, and Kirstie Petrou. Migration and labor mobility from Pacific Island countries. Background Paper for the World Development Report 2023: Migrants, Refugees, and Societies (2023), pg.5.

[22] *What is the "EEZ"?* (2020, July 29). NOAA Ocean Exploration. https://oceanexplorer.noaa.gov/ocean-fact/useez; République Française, (2017), *Code minier (nouveau) [New Mining Code]*, Available at: https://rmis.jrc.ec.europa.eu/uploads/legislation/FranceConsolidatedMiningCode_English.pdf; République Française, (2017), *Loi organique n° 2004-192 du 27 février 2004 portant statut d'autonomie de la Polynésie française* (1).

[23] Anna Schumann, "Fact Sheet: France's Nuclear Inventory," Center for Arms Control and Non-Proliferation, March 27, 2020, https://armscontrolcenter.org/fact-sheet-frances-nuclear-arsenal/.

[24] Renaud Meltz, "Associer et Dissimuler. Les Essais Nucléaires En Polynésie Française, Un « deuxième Contact » Entre Secret et Mensonge," *Revue d'histoire Moderne & Contemporaine* 703, no. 3 (Sept. 15, 2023)): 88 - 116, https://doi.org/10.3917/rhmc.703.0090.

[25] CNN, "French Polynesia: 28 Years after the End of France's Nuclear Tests, These Women Are Still Fighting for Compensation and Care," CNN, n.d., accessed March 24, 2026, https://www.cnn.com/interactive/asequals/french-polynesia-nuclear-tests-compensation-as-equals-intl-cmd/.

[26] BBC News, "French Nuclear Tests Contaminated 110,000 in Pacific, Says Study," BBC News, March 9, 2021, https://www.bbc.com/news/world-europe-56340159. Jamie Tahana, "The Battle Continues, 50 Years after First Test at Mururoa," RNZ, July 2, 2016, https://www.rnz.co.nz/news/pacific/307804/the-battle-continues,-50-years-after-first-test-at-mururoa..

[27] Meltz, "Linking and concealing. Nuclear tests in French Polynesia".

2 Rebuilding Economic Resilience: Pathways for Diversification and Employment

2.1 Cap 2033: The Pillars of French Polynesia's Economic Future

> *"We do not need people telling us only what not to do. We need people with skills and talent to help us, and work with us, in building a sustainable economy."*
>
> **– President Moetai Brotherson**[28]

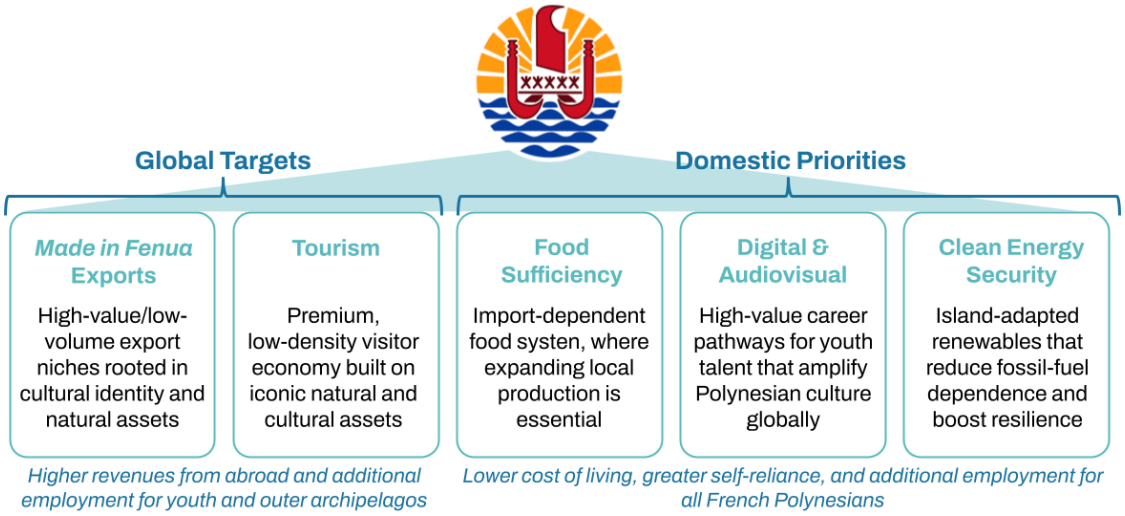
French Polynesia's economic development strategy, *Cap 2033 'A fano rā* (moving forward), defines a ten-year roadmap (2023–2033) to build a more diversified, resilient, and equitable economy. It is designed to tackle the country's toughest structural challenges, such as high living costs, heavy import-dependence on essential goods, and geographic isolation, while leveraging its key strengths of rich biodiversity, young population, and strong cultural identity. As of April 2026, the current government is updating this strategy around four major pillars to reflect today's realities:[29]

1. **Tourism**: Scale sustainable tourism by expanding capacity to meet rising demand, targeting a 60% increase in visitors by 2033 (450,000 per year compared to 280,000 today),[30] supported by 4,100 additional lodging units.
2. **Food self-sufficiency**: Strengthen local food systems to reduce import dependence and build resilience by increasing commercial agricultural output by 30%, expanding 800 hectares of cultivated land, and adding 100 vessels to boost local fish production.
3. **Digital economy and audiovisual**: Position the digital and creative sectors as engines of high-value employment by growing the digital economy to 15% of GDP and creating 3,000 new jobs, with the audiovisual sector structured to generate high-value roles.
4. **Clean energy**: Reduce fossil-fuel dependence and exposure to imported fuel price volatility by reaching 55–60% of renewable energy in the mix by 2030 and cutting overall consumption by 20% through energy efficiency measures.

In addition to these four government priorities, our analysis highlights a fifth strategic opportunity area, focused on French Polynesia's existing and potential high-value *Made in Fenua* exports, such as pearls, vanilla, monoi oil, and premium non-food aquaculture products. While not a formal pillar of *Cap 2033*, it is a natural complement to the government's strategy for diversification, value creation, and sustainable economic development. These export sectors are best positioned for high-value, low-volume export markets, where products are consumed abroad and can drive local industrial capacity, employment, and greater domestic value creation, as shown in Figure 1.

[28] Stanford Law School, "On the Frontlines of Deep-Sea Mining," Stanford Law School, accessed April 24, 2026, https://law.stanford.edu/stanford-lawyer/articles/on-the-frontlines-of-deep-sea-mining/.
[29] Mauij, "Ade," ADE, March 30, 2026, https://www.service-public.pf/ade/strategie-cap-2033-un-nouveau-cap-pour-leconomie-polynesienne/
[30] "Key Statistics and Data," Tahiti Tourisme's Corporate Website, September 3, 2025, https://tahititourisme.org/en-org/our-resources/statistics-markets/key-statistics-and-data/.

Figure 1: Cap 2033's Four Pillars, Complemented by a Fifth High-Value Export Opportunity



While *Cap* 2033 sets the direction for a more resilient and diversified economy, the strategy's success ultimately depends on choosing the right sectors to scale. Our analysis turns to a systematic prioritization of economic opportunities, grounded in data, benchmarks, and stakeholder interviews.

2.2 Prioritizing High-Potential Economic Sectors: Framework, Criteria, and Methodology

Our methodology follows a three-stage process designed to identify, assess, and implement the most relevant economic avenues for French Polynesia:

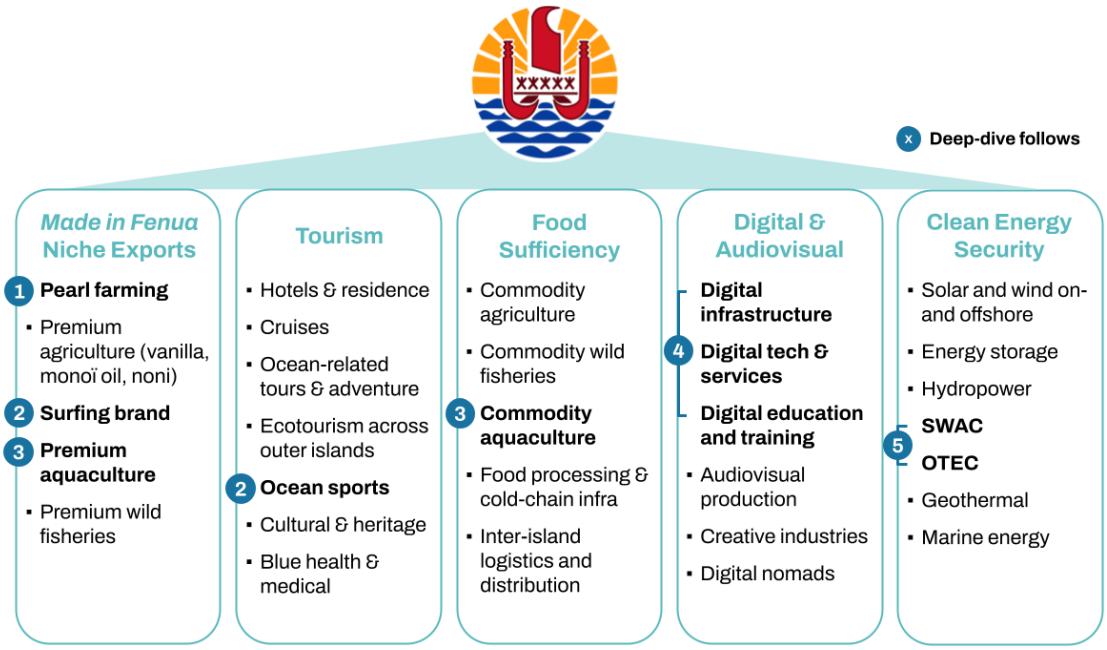
1. **Establish a baseline for the country's economic growth**, employment structure, and sectoral dynamics, benchmark comparable island economies and conduct primary research and expert interviews: the output is a comprehensive list of current and potential economic opportunities, covering sectors that are directly, partially, or not relying on the ocean's resources (full list detailed in Appendix 6.2).
2. **Align with the government on priority sectors from the list of opportunities**: our work is focused on five priority areas, respectively pearl farming, ocean sports, aquaculture, digital economy, and ocean energy. Each priority area is assessed based on a set of criteria, including its current economic value (GDP contribution and employment), economic potential, feasibility to implement (including operational achievability, government support, operational feasibility, and cultural fit), and timeline to implement, as shown in Appendix 6.3.
3. **Benchmark against international leaders and derive implications for French Polynesia**: this work provides a "two-speed" strategy for French Polynesia, focused on (i) strengthening primary sectors (notably aquaculture and fisheries) to reduce import dependence, and (ii) enabling the country to move into higher-value secondary and tertiary sectors, including processing, manufacturing, digital services, and tourism-related activities.

2.3 Targeted Economic Avenues Within the Most Promising Sectors

Based on our assessment of French Polynesia's most promising sectors, we focused on a targeted set of economic avenues with the highest potential for economic activity and local employment. These include **(1) pearl farming**, a historic export pillar with renewed opportunities in branding and

value-added transformation; **(2) ocean sports** such as surfing and diving, where French Polynesia holds a unique global advantage; **(3) aquaculture**, both premium and commodity, as a strategic lever for food security and export diversification; **(4) the digital economy**, spanning infrastructure, technology and services, education and training; and **(5) ocean energy**, with a focus on Sea Water Air Conditioning (SWAC) and Ocean Thermal Energy Conversion (OTEC) as frontier technologies aligned with the country's clean-energy ambitions. Together, this analysis forms the backbone of the actionable roadmap for accelerating sustainable growth, as shown in Figure 2.

***Figure 2**: Unlocking Growth: Deep Dives into Fenua's Most Promising Economic Avenues*



2.3.1 Revalue Pearl Farming and Solve for Pearl Waste

1. The current state of the pearl farming & pearl waste industries in French Polynesia

The cultivation of Tahitian pearls is a cornerstone of French Polynesia's economy. Tahitian pearl farming is deeply rooted in the economic and cultural life of the Tuamotu and Gambier archipelagos. The sector operates through lagoon concessions, production quotas, and a value chain that spans spat collection, grafting, farming, harvesting, and direct export by producers. Its geographic concentration to the remote islands makes it a critical source of local employment and activity.[31]

Pearls represent a pillar of French Polynesia's export economy, generating substantial value despite recent volatility. The pearl sector is one of French Polynesia's most important export engines, generating 7.3 billion XPF in 2024[32] (equivalent to ~$93 million USD)[33] and accounting for more than 60% of total exports and 70% of all locally-produced goods shipped abroad. French Polynesia is the 4th largest exporter of pearls in the world.[34] Its industry is dominated by raw pearls (i.e., limited downstream transformation into jewelry or worked pearls), which make up 95% of

[31] IEOM Banque Centrale du Franc Pacifique, *Le Rapport Annuel Économique de La Polynésie Française* (2024), https://www.ieom.fr/IMG/pdf/rapport_annuel_polynesie_2024_ieom_bd_-2.pdf
[32] *Ibid.*
[33] The Observatory of Economic Complexity, "Pearls in French Polynesia Trade," accessed April 19, 2026, https://oec.world/en/profile/bilateral-product/pearls/reporter/pyf.
[34] *Ibid.*

export value. Its market orientation is heavily concentrated in East Asia (esp. Hong Kong and Japan) making the sector highly sensitive to demand shifts, regulatory changes, and price fluctuations.[35]

Structural pressures are eroding pearl supply and threatening the long-term viability of the sector. The industry faces mounting structural challenges, including the sharp decline of natural pearl-oyster stocks (especially in the Gambier Islands) driven by climate change, overexploitation, and the disappearance of reproductive oysters. Production volumes have fallen well below the levels of the 2010–2019 decade, while a shortage of skilled grafters further constrains output. Environmental pressures further add to the strain, with ocean warming,[36] microplastics accumulating in lagoons from pearl-farming waste (ropes, collectors, buoys, nets, and nacre residues), and costly waste-management needs.[37]

2. Insights from the Australian and Japanese pearl industries

Australia sets global benchmarks in sustainable certification. Its pearl exports reached $156 million USD in 2024, roughly 1.5 times those of French Polynesia.[38] Australia became the world's first Marine Stewardship Council (MSC)-certified sustainable pearl fishery in 2017, earning a globally recognized ecolabel for sustainable stock management, habitat protection, and near-zero ecological impact.[39] This certification was achieved through strict stock-assessment, harvest quotas, habitat-impact monitoring, and independent audits.[40] While the exact commercial impact of sustainability labeling is not known, it is a true commercial differentiator, and viewed as the second-most important factor for export markets after pearl quality, particularly in Europe and the U.S.[41]

Japan leads the global shell-waste circular-economy. As the world's largest exporter of pearls totalling $332 million USD,[42] Japan generates around 130,000 tons of oyster shell waste annually.[43] To face rising disposal costs and environmental pressure, the country has built a mature recycling industry that converts shells into a large variety of applications, including sand substitutes, road construction materials, concrete aggregate, feed, and fertilizers.[44] Hiroshima Prefecture alone produces 80,000 tons of shells each year, now repurposed as industrial input instead of discarded waste.[45] Japan's success comes from its waste laws that treat shells as a resource rather than waste, mandatory local pre-processing, and diversified industrial applications.[46]

3. Implications and policy recommendations for the pearl industry

[35] IEOM Banque Centrale du Franc Pacifique, *Le Rapport Annuel Économique de La Polynésie Française* (2024), https://www.ieom.fr/IMG/pdf/rapport_annuel_polynesie_2024_ieom_bd_-2.pdf
[36] Marianna Cavallo et al., "A Holistic Approach to Evaluating Climate Vulnerability of French Polynesia Pearl Oyster Farming: Bridging Communities and Scientific Knowledge," *Environmental and Sustainability Indicators* 30 (June 2026): 101202, https://doi.org/10.1016/j.indic.2026.101202.
[37] Alexandre Dechelotte, "Pearl Farming and Plastic Pollution in French Polynesia," Plastic Odyssey, April 25, 2024, https://plasticodyssey.org/en/pearl-farming-plastic-pollution-french-polynesia/.
[38] "*Pearls in Australia Trade*," *The Observatory of Economic Complexity*, *accessed April 24, 2026, https://oec.world/en/profile/bilateral-product/pearls/reporter/aus?selector2787id=trade_i_baci_a_12.*
[39] MSC International. "World's First MSC Certified Pearls Confirms Sustainability of Intergenerational Australian Fishery." Accessed May 3, 2026. https://www.msc.org/media-centre/press-releases/press-release/world-s-first-msc-certified-pearls-confirms-sustainability-of-intergenerational-australian-fishery.
[40] "*The World's First Certified Sustainable Pearl Fishery*," *MSC International*, *accessed April 24, 2026, https://www.msc.org/what-we-are-doing/fishers-stories/the-worlds-first-certified-sustainable-pearl-fishery.*
[41] Interview with Officer of the Regional Aquaculture Council, March 11, 2024.
[42] "The Observatory of Economic Complexity," The Observatory of Economic Complexity, accessed April 24, 2026, https://oec.world/en/profile/hs/pearls.
[43] Eun Young Baek, "Oyster Shell Recycling and Marine Ecosystems: A Comparative Analysis in the Republic of Korea and Japan," *Journal of Coastal Research* 114, no. sp1 (2021), https://doi.org/10.2112/jcr-si114-071.1.
[44] *Ibid.*
[45] The Yomiuri Shimbun, "Okayama: Firm Turns Oyster Shell Surplus into Sustainable Building Material," The Japan News, February 24, 2024, accessed on Apr. 18, 2026, https://japannews.yomiuri.co.jp/features/japan-focus/20240224-170657/.
[46] Eun Young Baek, "Oyster Shell Recycling and Marine Ecosystems".

The French Polynesia pearl and pearl waste industry should focus on three initiatives:

- **Develop a MSC-type model to elevate the global positioning of Tahitian pearls** that will help strengthen premium branding through stricter grading and traceability, and address core pressures on the sector (e.g., declining oyster stocks, lagoon degradation, pollution). A shift to higher quality, branded, and certified pearls can improve the industry's resilience.[47]
- **Unlock new value by industrializing shell-waste recycling into productive applications**, by converting crushed shells into eco-concrete and aggregates, and using finer powders for cosmetics, bioceramics, and tiles, diversifying income while reducing lagoon pollution.[48]
- **Move up the value chain by developing a high-end pearl transformation ecosystem** that shifts the industry from raw pearl exports at low margin to higher value finished or semi-finished jewelry products, capturing the final retail value domestically. Australia illustrates the payoff of this strategy, as its highly vertically integrated industry, from fishing and hatcheries to jewelry production, enables far greater domestic value capture.[49]

The government should support the modernization and professionalization of the pearl sector through tightening governance, restoring lagoon health, and capturing more value locally:

Recommendation #1: Create a dedicated Department for Pearls, separate from the *Direction des Resources Marines* (DRM), to structure the sector's rules and ensure long-term political support:

- Set and enforce Tahitian grading standards (size, luster, surface, color, shape), certification, authenticity and traceability standards for all pearls exported from French Polynesia (farm ID, lagoon of origin, batch tracking, digital certificates).
- Oversee stocks, deliver grafting quotas, and monitor lagoon-health and lagoon carrying capacity to protect oyster populations against disease and saturation.
- Introduce clear rules and controls on plastic use, recycling, and end-of-life management, including limits on importing highly polluting pearl-farming equipment; make lagoon-cleanup mandatory for concessional renewal, with monitoring of waste abandonment and a compliance registry requiring corrective actions before renewal.
- Support waste-recovery programs, including initiatives to remove lines, collectors, buoys, nets, and nacre waste (e.g., Odewa); coordinate with municipalities to develop clean-up and waste logistics jobs in outer archipelagos.
- Provide subsidies or shared infrastructure for sustainable hatcheries and support farms in shifting to eco-responsible, biodegradable materials (coconut fiber, biosourced nucleus).

Recommendation #2: Provide support to the development of a pearl-waste circular economy:

- Recognize shell waste as a usable resource for agriculture (fertilizers), construction (bus stops)[50], cosmetics, lagoon equipment, and high-value uses (micronized nacre, biosourced nuclei, mabés, and shell-based connectors to replace plastic).
- Support centralized shell-processing facilities (crushing, grinding, calcination) for local industries and existing initiatives investing in the sector (e.g., Polynacre).
- Update public-works standards so shell-based aggregates can be used in roads, concrete, and coastal works.

Recommendation #3: Support the development of a vertically-integrated pearl industry and the international recognition of the "Tahitian Pearl: *Made in Fenua*" brand:

[47] Marine research center official, personal communication, March 10, 2026
[48] Pearl-recycling start-up representative, personal communication, March 18 2026
[49] Regional Aquaculture Council official, personal communication, March 11, 2024
[50] "Présidence de La Polynésie Française (via Public) / Le Nouvel Arrêt de Bus d'Outumaoro, plus Accessible et Connecté, a Été Inauguré." Accessed April 23, 2026. https://www.publicnow.com/view/3BDF47A361E368986D6A3964FE502A59E1E96617?1765856919=.

- Develop local talent pipelines for grafters, graders and essential farm workers, by creating accredited training and retention programs to reduce dependence on foreign labor, and offering scholarships for youth from outer archipelagos to train and return home.
- Strengthen jewelry-making and design skills through workshops, apprenticeships, and partnerships with French and international luxury houses, and certify local practitioners to ensure consistent quality and traceability.
- Build on the grading and traceability standards by launching a national label combining quality, authenticity, and sustainability, partnering with luxury houses and tourism actors to position the pearl as a flagship symbol of French Polynesia.
- Run coordinated international campaigns and fairs to link pearls to French Polynesia's identity, culture, and craftsmanship, rebuild global visibility, and secure premium pricing.

2.3.2 Claim Global Leadership in Surfing and Diving

1. The current state of the surfing and diving industries in French Polynesia

Surfing and diving sit at the heart of French Polynesia's tourism identity. Both are deeply tied to its natural and cultural heritage and central to its international reputation.

Surfing, or *Horue* in Tahitian, is rooted in the *mana*, the spiritual energy connecting living beings, land and ocean.[51] French Polynesia is known for the annual Tahiti Pro Teahupo'o, a major event of the World Surf League (WSL) Championship Tour directly generating 190 million XPF annually,[52] and the Paris 2024 Olympics with the victory of local surfer Kauli Vaast. Yet, the region has not converted this cultural legitimacy into a homegrown international brand: the value chain remains extractive, with global brands benefiting from the Teahupo'o image through sponsorships, media rights, and brand association, while the local economic benefits are largely confined to tourism.

Diving is equally emblematic as French Polynesia is recognised as one of the premier dive destinations in the world.[53] It builds on exceptional marine biodiversity, warm clear water, and strong ecosystem preservation policies, sustaining around sixty dive centers across the territory.[54] The activity naturally aligns with the government's strategy to drive a decentralized blue-economy: diving's economic value is directly tied to the health of marine ecosystems and 80% of dive operator employees are local or national residents.[55] As of now, most centers are small, human-scale operations, but the sector faces a structural risk: international capital consolidating the value chain and eroding the share of tourism spending captured by local communities.

2. Insights from the Hawaiian and Portuguese surfing and Indonesian diving industries

The North Shore in Oahu, Hawaii, represents the most mature surf economy in the world, with 2.9 million visitors, generating 1.1 billion USD of visitor spending in 2023.[56] Once faced with rising rents and community displacement, driven by foreign surfers and sponsors in the 1970s, the

[51] loureibel, "Tahiti, Cradle of Surfing: History, Culture and the Legacy of the Pacific." *Moemoea*, August 18, 2025, https://www.moemoeaviajes.com/en/post/tahiti-cradle-of-surfing-history-culture-and-the-legacy-of-the-pacific.
[52] "Tahiti Pro : La WSL a Ouvert Une Filiale à Tahiti" Radio1 Tahiti - La Première FM de Tahiti. July 24, 2025. https://www.radio1.pf/tahiti-pro-la-wsl-a-ouvert-une-filiale-a-tahiti/
[53] Alexandros Pantazaras, "Tahiti, French Polynesia," *GSTC Destination Assessment*, December 2023, https://www.gstc.org/wp-content/uploads/Tahiti-GSTC-Destination-Assessment-Report-final.pdf
[54] Tahiti Tourisme, "*Découvrez Les Clubs de Plongée à Tahiti*," *Tahiti Tourisme*, *August* 25, 2023, *https://www.tahititourisme.fr/activites/plongee/clubs-de-plongee/*
[55] Guibert, Sophie. "*New Study: Scuba Diving Generates Up to $20 Billion Globally Per Year.*" Ocean Decade, July 30, 2025. https://oceandecade.org/news/new-study-scuba-diving-generates-up-to-20-billion-globally-per-year/.
[56] Y, Kamita, Rene. *Visitors to the North Shore*. July 2024. https://files.hawaii.gov/dbedt/economic/reports/north_shore_visitors_report_final_sept_2024.pdf

government intervened on multiple fronts: urban planning codes to preserve the coast's character and protect it against uncontrolled development, co-sponsorsing WSL events to secure their position, and the creation of the Hawaii Tourism Authority (HTA). This dedicated tourism bureau is funded by an accommodation tax for short-term visitors that generates a self-sustaining investment fund independent of fluctuating budgets and political priorities. In 2024, the HTA deployed $7.5 million to 163 community organisations to sustain cultural preservation and local economic outcomes. For French Polynesia, it demonstrates the value of building institutions that can drive long-term investment without depending on annual budget cycles.

Ericeira, Portugal evolved from a fishing village into Europe's premier surf destination through community-led coastal protection. The Ericeira Surf Clube, founded in 1993, provided the organizational backbone that advocated for coastline protection,[57] ultimately formalized through its World Surfing Reserve (WSR) in 2011. This WSR designation created reputational pressure against overdevelopment channeling growth toward a high-value, low-volume model built on surf camps, coaching, and boutique accommodation rather than mass tourism infrastructure. Economic outcomes were significant: overnight stays nearly tripled between 2011 and 2019, licensed surf schools quadrupled, and real estate revenues grew well above the national average. Yet local purchasing power stagnated, with capital likely flowing outside.[58] For French Polynesia, Ericeira shows that conservation certification can guard against overdevelopment, but is not sufficient to ensure locals capture the benefits.

Raja Ampat, Indonesia, built one of the world's largest examples of dive tourism designed to protect rather than extract.[59] Situated at the heart of the Coral Triangle, its 1,500-island archipelago hosts the most biodiverse marine environment on the planet. From the outset, Raja Ampat's development was paired with a formal conservation and community benefit framework. In 2007, when the government created 7 Marine Protected Areas (MPAs), it introduced a mandatory visitor conservation tax, legally split into community development, conservation and enforcement, and MPA administration. This tax is managed by a body of community leaders, government officials, non-governmental organizations (NGOs), and private operators.[60] Despite the fee, visitor numbers grew 30-fold and reef biodiversity recovered.[61] Yet distribution of benefits has been slow, and communities near dive sites have struggled to feel a direct financial impact.[62] For French Polynesia, Raja Ampat demonstrates that dedicated, mandated conservation taxes can fund meaningful marine protection while maintaining visitor growth, but that equitable community benefit requires robust governance structures.

3. Implications and policy recommendations for the surfing and diving industry

The French Polynesia surfing and diving industries should focus on three initiatives:

- **Develop dedicated, self-funded financing mechanisms to support ecosystem, business and community development** across both surfing and diving sectors. A stable, independent

[57] Surfer, Independent. "How Ericeira Became Europe's Most Popular Surfing Destination." December 23, 2024. ttps://independentsurfer.com/blog/how-ericeira-became-europes-most-popular-surfing-destination/.
[58] Murua, J., Avelar-Rosa, B., Maia, J., Félix-Bernardes, L., Toscano, M., Barata-de-Almeida, M., Farías-Torbidoni, E. & O'Hara, K., (PDF) Impact Study: 10 Years of Ericeira's World Surfing Reserve." ResearchGate. Accessed April 21, 2026. https://www.researchgate.net/publication/361474143_Impact_Study_10_Years_of_Ericeira's_World_Surfing_Reserve.
[59] Travel The World. "Raja Ampat Marine Park: Crown Jewel of the Coral Triangle." Accessed April 21, 2026. https://travel-the-world.blog/raja-ampat-marine-park-crown-jewel-of-the-coral-triangle/.
[60] Raja Ampat Eco Resort. "Raja Ampat as a Marine Park." August 4, 2020. https://rajaampatbiodiversity.com/raja-ampat-as-a-marine-park/
[61] Ery Atmodjo, Machiel Lamers, Arthur Mol, Financing marine conservation tourism: Governing entrance fees in Raja Ampat, Indonesia, Marine Policy, Volume 78, 2017, Pages 181-188, ISSN 0308-597X, https://doi.org/10.1016/j.marpol.2017.01.023.
[62] Ampat, Stay Raja. "Raja Ampat Entry Fees: The Official and Local Fees Levied on Visitors." Stay Raja Ampat, February 17, 2016. https://www.stayrajaampat.com/ultimate-raja-ampat-guide/information/raja-ampat-entry-fees/.

financing architecture, isolated from shifting annual budget cycles, can drive the long-term investment needed.

- **Protect local ownership ahead of industry development** to avoid extraction of economic value by foreign investors.
- **Expand community economic benefits beyond tourism** by shifting French Polynesia from consuming surf products made by others to reclaiming and exporting its own surf culture through locally-owned brands and experiences.

The government should dedicate stable funding, protect local ownership, and build internationally recognised labels so that the surfing and diving industries benefit local communities first.

Recommendation #1: Build a dedicated, self-funded destination management authority with independent financing mechanisms:

- Redefine the Tourism Ministry (*Service du Tourisme*) as a true strategic authority with a clear list of priorities, dedicated budget and action plan tied to measurable outcomes.
- Legally define a share of the harmonized tourism value-added tax (VAT) into a Tourism Fund, managed jointly by the *Service du Tourisme* and Tahiti Tourism, emulating the HTA model.
- Deploy the fund across co-investments into international events, beginning with the Tahiti Pro Teahupo'o (instead of relying on budget decision), and a community grant mechanism for locally-owned surf & diving schools, camps, and artisan shapers.
- Introduce a per-diver Conservation Tax across the Tainui Atea MPA, dedicated to community development, conservation, and administration, governed by a body of community representatives, dive operators, NGOs, and the local government.

Recommendation #2: Enact protection frameworks and local ownership conditions before commercial interest consolidates the value chain:

- Establish formal community consultation and coastal development standards around Teahupo'o village and other critical spots to include communities in infrastructure development decisions.
- Introduce preferential licensing and ownership conditions for surf and diving-related businesses to ensure local communities retain economic benefits.
- Cap the number of sites any single dive operator may hold across the territory, preventing further consolidation beyond Top Dive's current ten-site network.

Recommendation #3: Create international certification labels rooted in Polynesian culture:

- Establish a *Made in Fenua* surf label combining cultural authenticity, wave heritage, and sustainability credentials, applicable to locally designed surfboards, apparel, accessories, and surf experience packages.
- Legislate a "*Tainui Atea Certified Diver*" label as a mandatory prerequisite for diving in Class I and II protected MPA zones, rooted in Polynesian ocean culture to position diving in French Polynesia as a values-aligned, high-end experience.
- Structure international campaigns for these labels, culturally-rooted in Polynesian ocean tradition, leveraging post-Olympic recognition and the MPA announcement.

2.3.3 Expand Commodity and Premium Aquaculture

1. The current state of the aquaculture industry in French Polynesia

Aquaculture is a small but long-established sector in French Polynesia. Aquaculture began in the 1970s and today focuses primarily on shrimp and platax (*paraha peue*) fish farming, and giant clam

cultivation for the aquarium trade. Shrimp farming remains the dominant activity and relies on a single species, the Pacific blue shrimp (*Litopenaeus stylirostris*). Producers are organized under the Cooperative of Aquaculturists of French Polynesia (CAPF), which manages government-funded hatcheries located at the Vaia Aquaculture Hub in Vairao. Other species have been trialed over the years, including tropical seabass (1980s–2000s), platax (first farmed in 2008), and sea cucumbers, but most face biological, ecological, or economic constraints that have limited their scale.[63] [64]

Aquaculture currently serves niche, high-income markets and only partially meets domestic demand. In 2024, shrimp production generated 276 million XPF, but has declined due to larval mortality linked to degraded imported feed,[65] with local supply covering 41% of demand (down from 75% in the late 2010s), driving a surge in frozen imports. Platax production remains modest (~16 tons/year) due to slow growth, high feed requirements, and early-stage mortality, while giant clam exports from Reao (~5 tons/year) face volatile demand and competition from Asia and Europe.[66] To expand production, the government is developing the Faratea biomarine zone, intended to host new farms and diversify into species such as sea cucumbers, bivalves, and algae.[67] [68]

Structural constraints and biological vulnerabilities continue to limit growth and highlight the need for stronger resilience and diversification. The sector relies heavily on imported intermediate feed, algae, and larval diets, which limits hatchery capacity. Production remains fragile, with 20-40% shrimp mortality linked to feed quality, warming waters, and power outages.[69] Diversification is limited by capacity, as it is expanding faster than the available human and financial resources needed to support it. Overall sector efficiency is low, and high operating costs prevent farms from supplying fish at accessible prices for the domestic market. The Formaqua project aims at developing local processing and value-added products and exploring more resilient species such as milkfish to support sector diversification and food security.[70]

2. Insights from the Taiwan and the Philippines aquaculture industries

Taiwan is a regional leader in high-value, low-volume tropical aquaculture. As of 2023, Taiwan's aquaculture industry was valued at ~$1.2 billion USD and accounted for nearly 41% of the country's total fisheries output industry.[71] Taiwan developed advanced hatchery capacity for premium species such as sea cucumbers, groupers, marine ornamentals, and edible algae like green caviar, supported by small but efficient processing units that convert limited volumes into high-margin products.[72] Its expertise also extends to selective-breeding programs for sensitive tropical species.[73] [74] Taiwan's

[63] IEOM Banque Centrale du Franc Pacifique, *Le Rapport Annuel Économique de La Polynésie Française* (2024), https://www.ieom.fr/IMG/pdf/rapport_annuel_polynesie_2024_ieom_bd_-2.pdf
[64] Direction Des Ressources Marines. "Les Filières de L'aquaculture En Polynésie Française." Accessed April 19, 2026. https://www.ressources-marines.gov.pf/aquaculture/aquaculture-filieres/les-filieres-de-laquaculture-en-polynesie-francaise/#toc_La_spiruline_Arthrospira_platensis.
[65] Aquaculture private company and aquaculture cooperative, personal communication, March 18, 2026.
[66] IEOM Banque Centrale du Franc Pacifique, *Le Rapport Annuel Économique de La Polynésie Française* (2024), https://www.ieom.fr/IMG/pdf/rapport_annuel_polynesie_2024_ieom_bd_-2.pdf
[67] Direction Des Ressources Marines. "Zone Biomarine de Faratea." Accessed April 19, 2026. https://www.ressources-marines.gov.pf/aquaculture/zone-biomarine-de-faratea/.
[68] "Faratea Biomarine – Un Projet Polynésien Pour L'aquaculture." Accessed April 19, 2026. https://www.farateabiomarine.org/.
[69] Aquaculture private company and aquaculture cooperative, personal communication, March 18, 2026.
[70] hmarquier. "Polynésie – Aquaculture : Une Filière Sous Tension Mais En Quête de Nouvelles Pistes." Produits de La Mer, March 4, 2026. https://www.pdm-seafoodmag.com/regions/outremer/polynesie-aquaculture-une-filiere-sous-tension-mais-en-quete-de-nouvelles-pistes/
[71] Taiwan Smart Agriweek. "Taiwan Aquaculture Market 2025: Smart Farming & Aquavoltaics Opportunities." Accessed April 19, 2026. https://www.taiwanagriweek.com/en/media-detail/636.
[72] Taiwan Today. "Groupers Help Boost Nation's Aquaculture Industry." July 31, 2009. https://taiwantoday.tw/AMP/Economics/Top-News/8625/Groupers-help-boost-nation%27s-aquaculture-industry.
[73] Chiu, Shieh-Tsung, Tsung-Chih Chang Chien, Li-Chao Zhuo, Man-Ting Chiu, and Yu-Hung Lin. "Effects of Dietary Fishmeal Replacement by Soybean Meal on Growth, Body Composition and Hematological Responses of Round Batfish *Platax orbicularis*." *Journal of the Fisheries Society of Taiwan* 41, no. 4 (2014): 249–255.
[74] Changchien, Tsung-Chih, Li-Chao Zhuo, Man-Ting Chiu, and Yu-Hung Lin. "Effects of Dietary Protein Levels on Growth, Body Composition and Hematological Responses of Round Batfish, *Platax orbicularis*." *Journal of the Fisheries Society of Taiwan* 40, no. 4 (2013): 267–274.

high-value model is paired with a dense network of small processing enterprises specializing in drying, marinating, smoking, and ready-to-eat formats that retain value domestically.[75]

The Philippines has built one of the world's largest low-value, high-volume aquaculture systems, with an annual production of ~$2.2 billion USD in 2023, anchored in milkfish, tilapia, shrimp, and seaweed production.[76] The Philippines expanded through low-cost and community-based methods adopted by small-scale farmers across hundreds of islands, enabling consistent domestic supply and anchoring rural employment. It was supported by government-backed hatcheries, breeding programs, small-scale feed mill initiatives, and extensive training and extension services.[77] [78]

3. Implications and policy recommendations for the aquaculture industry

The French Polynesia aquaculture industry should focus on three key initiatives:

- **Build a premium aquaculture segment for export around species with strong biological feasibility and manageable scale.** High-value, low-volume export species include giant clams, sea cucumber, sea urchins, premium algae (green caviar, spirulina), and green crab,[79] with strong prices and well-aligned with French Polynesia's ecological and economic realities.[80] Shrimp remains the backbone of the sector, but the lineage needs to be stabilized, as demonstrated by New Caledonia.[81] Platax can fit into this bucket, but only as a niche species, given its slow growth, high protein needs, and still unknown omnivorous diet.[82]
- **Develop a commodity aquaculture segment for domestic food security using robust and lower-cost species**. Low-value and high-volume species would reduce import dependence and supply affordable protein, such as milkfish, golden trevally, yellowtail, and Pacific threadfin. Despite 15,000 km² of lagoon, only a few parcels have been allocated to aquaculture in the past 35 years.[83] Unlocking this segment requires a careful site selection to build a climate-resilient aquaculture.[84] French Polynesia should mobilize its outer atolls, using semi-intensive systems that support milkfish, megafish, and fingerling capture,while leveraging atoll productivity to reduce imported feed reliance and scale production where reef fish are declining.[85]
- **Develop value-added processing hubs for food and cosmetic products with realistic, locally-financed scaling.** Processing can unlock higher margins, as shown in Formaqua,[86] but not without local ownership and strong technical training. Past foreign-funded megaprojects

[75] Taiwan Smart Agriweek. "Transforming Taiwan's Seafood Industry: Cutting-Edge Processing and Cold Chain Logistics." https://www.taiwanagriweek.com/en/media-detail/390.
[76] "Fisheries Country Profile: Philippines 2025 – SEAFDEC." Accessed April 19, 2026. https://www.seafdec.org/fisheries-country-profile-philippines/.
[77] Bureau of Fisheries and Aquatic Resources (BFAR). *Aquaculture Development and Management Plan* 2025–2030. Quezon City: Department of Agriculture–BFAR, 2025. https://fishcore.bfar.da.gov.ph/wp-content/uploads/2025/09/ADMP.pdf.
[78] Tolentino, Ariel Jerald. "Fish Hatchery Projects to Boost Aquaculture Sector - Cynthia Villar." POLITIKO - News Philippine Politics, September 12, 2024. https://politiko.com.ph/2024/09/12/fish-hatchery-projects-to-boost-aquaculture-sector-cynthia-villar/politiko-lokal/.
[79] Direction Des Ressources Marines. "Les Filières de L'aquaculture En Polynésie Française." Accessed April 19, 2026. https://www.ressources-marines.gov.pf/aquaculture/aquaculture-filieres/les-filieres-de-laquaculture-en-polynesie-francaise/#toc_La_spiruline_Arthrospira_platensis.
[80] Marine research center official, personal communication, March 10, 2026
[81] Sopac. "OUR PRAWN." August 9, 2022. https://sopac.nc/en/our-shrimp-2/.
[82] Aquaculture private company and aquaculture cooperative, personal communication, March 18, 2026.
[83] Direction Des Ressources Marines. "Les Filières de l'aquaculture En Polynésie Française." Accessed April 19, 2026. https://www.ressources-marines.gov.pf/aquaculture/aquaculture-filieres/les-filieres-de-laquaculture-en-polynesie-francaise/#toc_La_spiruline_Arthrospira_platensis.
[84] The Nature Conservancy. *Sélection des sites pour une aquaculture durable*. Arlington, VA: The Nature Conservancy, 2022. https://www.aquaculturescience.org/content/dam/tnc/nature/en/documents/aquaculture/FrenchPolynesia_translation.pdf
[85] Marine research center official, personal communication, March 10, 2026
[86] hmarquier. "Polynésie – Aquaculture : Une Filière Sous Tension Mais En Quête de Nouvelles Pistes." Produits de La Mer, March 4, 2026. https://www.pdm-seafoodmag.com/regions/outremer/polynesie-aquaculture-une-filiere-sous-tension-mais-en-quete-de-nouvelles-pistes/

that failed, such as the Hao industrial fish farm (planned 50,000 tons/year, 150 billion XPF),[87] demonstrate the risks of externally driven ventures, from lagoon-capacity concerns to years of delays despite promises of jobs. A more viable path could be to equip existing aquaculture sites with shared facilities for smoking, drying, marinating, for food, and small extraction units to scale high-margin cosmetic lines such as spirulina powders and capsules, algal gels, and marine-based soaps and serums. Existing successes like Tahiti Marine Products' sea-cucumber cream shows how niche marine ingredients can generate premium value.

The government should develop a dual-track strategy of premium and mainstream species to meet domestic food-security needs and anchor employment in outer islands:

Recommendation #1: Develop a clear dual-track aquaculture strategy for French Polynesia at the *Direction des Ressources Marines* (DRM) level:

- Publish an official species roadmap distinguishing high-value export species (e.g., sea cucumbers, urchins, giant clams) from low-value domestic supply species (e.g., milkfish, threadfin, trevally), with biological and economic justification.
- Set species-specific production protocols and stabilize seed supply by funding shared hatchery and managing lagoon carrying capacity for saturation or shortages.
- Launch a national aquaculture zoning plan for new lagoon sites in atolls and outer archipelagos (based on depth, currents, dilution capacity, and sensitive habitats).

Recommendation #2: Reduce dependence on imported feed and larval diets through local feed production and natural-productivity systems:

- Fund pilots for local feed production using tuna trimmings, fish waste, algae, and insect protein, in partnership with private operators and regional research centers.
- Support hatcheries in shifting to natural-productivity systems (sun-driven plankton production) to reduce reliance on imported microalgae, rotifers, and artemia.
- Develop regional partnerships (New Caledonia, Taiwan) to improve broodstock lines and co-develop feed formulations for Pacific blue shrimp and other priority species.

Recommendation #3: Build shared processing hubs and training pipelines:

- Encourage shared processing facilities (smoking, drying, marinating, cosmetic extraction) to help small producers access value-added markets.
- Establish accredited training programs for hatchery technicians, farm operators, and processing specialists, with scholarships for youth from outer islands.
- Support local project holders through cooperative services (bulk purchasing, cold chain, logistics) and targeted grants for small-scale, lagoon-based farms.

2.3.4 Build a Digital Enabled Nation led by Public Service

1. The current state of the digital economy in French Polynesia

French Polynesia has above-average connectivity for the Pacific region, built on two critical foundations: a growing submarine cable network, with two additional trans-Pacific Google cables, and mobile coverage reaching 98% of the population.[88] These foundations are undermined by connectivity gaps between Tahiti and its outer islands, a market dominated by the public operator

[87] Valo, Martine. "A Hao, En Polynésie Française, Un Projet Controversé de Ferme Aquacole Géante." *Le Monde*, February 6, 2022. https://www.lemonde.fr/planete/article/2022/02/06/a-hao-en-polynesie-francaise-un-projet-controverse-de-ferme-aquacole-geante_6112517_3244.html.

[88] Barde, Stephane Remy Antoine. *The Art of Digitalization:* A *Dive into e-Estonia*. Productivity Insights Vol. 5-1. Tokyo: Asian Productivity Organization, September 2024, 10, 12. https://www.apo-tokyo.org/wp-content/uploads/2024/09/5-1_The-Art-of-Digitalization_PUB.pdf.

for postal services and telecommunications, OPT, which controls all underlying infrastructure and the majority of retail services,[89] and an outdated regulatory framework. The more significant gaps are in Internet Exchange Points (IXPs) and data centers: the territory relies on a single IXP, and data center development only focuses on small-scale data facilities rather than commercial capacity.[90] In remote connectivity, Low Earth Orbit satellites offer a potential solution but carry real risks: Business-to-consumer providers like Starlink are legally banned to protect local operators,[91] following the Cook Islands' experience where Starlink halved local provider subscriptions. Simultaneously, OneWeb is being deployed by OPT to extend 4G to remote atolls.[92]

Beyond infrastructure, French Polynesia's digital ecosystem remains early-stage across skills, institutions, and services. The Digital Economy Directorate (DGEN), which oversees all telecom regulation, digital subsidies, and audiovisual policy, employs only eight people. Digital education is limited to a handful of programs in Papeete, including degrees at the University of French Polynesia and Kanea's creative technology courses, while a persistent brain drain creates a situation where students who train abroad rarely return. Cybersecurity has emerged as the most urgent services priority: since the Paris 2024 Olympics, the territory receives 200,000 cyberattacks per month, exposing a critical gap in local cyber resilience. Telehealth and e-commerce remain constrained by connectivity gaps in the outer islands, though both should accelerate as infrastructure improves.[93]

2. Insights from the Estonian digital economy

Estonia leveraged digital transformation to build one of the world's most advanced digital societies, growing from a GDP per capita of $2,800 at independence in 1991 to more than $30,000 today as a fully digitized economy.[94] Today, 99% of government services are online, 98% of medical prescriptions are issued digitally, and 99% of the population holds a digital ID.[95] This represents an estimated 2% of GDP and over 800 years of working time in annual savings.

Estonia achieved this by making one strategic choice. A universal digital identity system was built on X-Road, a secure data exchange layer established by Estonia in 2001, connecting ministries, banks, hospitals and businesses without centralizing data.[96] Estonia and Finland co-developed and open-sourced X-Road between 2013 and 2017, establishing the Nordic Institute for Interoperability Solutions (NIIS) to govern it as a free public good and also provide free technical assistance. Adoption now spans over 20 countries.[97] [98]

Skills were treated as public infrastructure from the outset. The government-backed Tiger Leap Foundation connected all schools to the internet and introduced programming from age seven, with

[89] Autorité Polynésienne de la Concurrence. *Opinion on Competitive Functioning of the Mobile Telecommunications Sector in French Polynesia*, no. 2018-PAC-01, 2018. https://autorite-concurrence.pf/wp-content/uploads/2024/08/2018-PAC-01-EN.pdf.
[90] Digital economy directorate official, personal communication, March 17, 2026
[91] Teariki, Hina. "Starlink en Polynésie : La révolution internet qui fait débat dans nos îles." *Tahiti Presse*, February 2025. https://www.tahitipresse.pf/2025/02/starlink-en-polynesie-la-revolution-internet-qui-fait-debat-dans-nos-iles/.
[92] OneWeb : Onati espère proposer des offres dans le courant du premier trimestre 2025." *TNTV News — Tahiti Nui Télévision*, 2024. https://www.tntvnews.pf/polynesie/societe/oneweb-onati-espere-proposer-des-offres-dans-le-courant-du-premier-trimestre-2025/.
[93] Digital economy directorate official, personal communication, March 17, 2026
[94] European Union. "Estonia – EU Country." Accessed May 4, 2026. https://european-union.europa.eu/principles-countries-history/eu-countries/estonia_en#:~:text=Trade%20and%20economy,figures%20for%20exports%20and%20imports).
[95] Silaškova, Jana, and Masao Takahashi. "How Estonia's Digital Society Became a Lifeline During COVID-19." *World Economic Forum*, July 1, 2020. https://www.weforum.org/stories/2020/07/estonia-advanced-digital-society-here-s-how-that-helped-it-during-covid-19/.
[96] Barde, Stephane Remy Antoine. *The Art of Digitalization:* A *Dive into e-Estonia.* Productivity Insights Vol. 5-1. Tokyo: Asian Productivity Organization, September 2024. https://www.apo-tokyo.org/wp-content/uploads/2024/09/5-1_The-Art-of-Digitalization_PUB.pdf.
[97] Nordic Institute for Interoperability Solutions. "History." NIIS. Accessed April 22, 2026. https://www.niis.org/history.
[98] "Estonia's X-Road: Data Exchange in the World's Most Digital Society." *GovInsider*, March 21, 2024. https://govinsider.asia/intl-en/article/estonias-x-road-data-exchange-in-the-worlds-most-digital-society.

the first three-year phase budget poorly documented but estimated at around €30 million.[99] The Look@World public-private partnership, backed by telecom and banking companies,[100]provided free computer training to over 100,000 adults, equivalent to 10% of the adult population.[101] No Pacific territory has yet adopted X-Road, representing a concrete opportunity for French Polynesia to become the region's first, with direct access to Estonian and NIIS technical expertise.

3. Implications and policy recommendations for the digital economy

The French Polynesia digital economy should focus on three key initiatives:

- **Build connectivity as a platform for decentralization and public service delivery, not as an end in itself.** The government should use the upcoming infrastructure to build an interoperable platform bringing telehealth, digital administration, and education to outer island citizens without requiring physical presence in Papeete. If outer islanders can access quality public services and work remotely from their home archipelago, the economic pull that drives internal migration toward Tahiti weakens. Connectivity is not just a digital economy instrument; it is the most powerful tool for rebalancing population and economic activity across the territory.
- **Define precisely which digital sectors French Polynesia will prioritize before deploying further policy instruments.** The 25% GDP ambition sets a clear direction, but translating it into action requires identifying clear priority sectors, so that private actors can invest and educators can design curricula. Three candidates stand out: cybersecurity services, given the post-Olympic attack surge; animation and creative industries, given Kanēa's early traction and the follow-the-sun production model opportunity; and digital public services, given French Polynesia's emerging position as the Pacific region's connectivity hub.[102]
- **Treat digital skills as public infrastructure, investing directly rather than waiting for private training markets to supply them.** French Polynesia's current ecosystem, with Kanēa, the CCISM École du Numérique, and Pacific Genius, is a promising start but remains small, concentrated in Papeete, and fragile. The government should invest in digital literacy across all islands as a public service, and create explicit retention incentives such as scholarships, return bonuses, and remote work infrastructure for Polynesian graduates who train abroad, reversing the brain drain before the ecosystem that would employ them is built.

The government should accelerate French Polynesia's digital transition by legislating clear sector priorities, building a decentralized public services platform on open-source technology, investing directly in civil servant upskilling, and creating a domestic talent pipeline for young people to stay:

Recommendation #1: Legislate digital economy sector priorities:

- Designate two or three priority digital sectors and design a ranked regulatory agenda with milestones to create clear market signals for private investment.
- Define explicitly what the state will build and fund directly, and what it expects the market to deliver once conditions are in-place.

Recommendation #2: Leverage Estonia's open-source technology to develop a Digital Public Services Platform for outer island delivery:

[99] Tambur, Silver. "Estonia's Tiger Leap: The Schools Project That Wired a Nation for the Digital Age." Estonian World, February 21, 2026. https://estonianworld.com/technology/estonias-tiger-leap-the-schools-project-that-wired-a-nation-for-the-digital-age/.
[100] European Commission/EACEA/Eurydice. "Fostering the Creative Use of New Technologies." *Youth Wiki: Estonia*, Section 8.7. Accessed April 21, 2026. https://national-policies.eacea.ec.europa.eu/youthwiki/chapters/estonia/87-fostering-the-creative-use-of-new-technologies.
[101] "Global Lessons from Estonia's Tech-Savvy Government." The UNESCO Courier. Accessed April 21, 2026. https://courier.unesco.org/en/articles/global-lessons-estonias-tech-savvy-government.
[102] Digital economy directorate official, personal communication, March 17, 2026

- Commission a scoping study with the NIIS to map institutional, infrastructural, and legal prerequisites for adoption across French Polynesia's dispersed archipelago.
- Enact a data sovereignty legal framework, designating a central authority to govern the platform and defining institutional data ownership and sharing conditions.
- Redirect public investment toward delivering telehealth, digital administration, and education to outer island citizens without requiring physical presence in Papeete.
- Use platform development as a catalyst for direct employment of locally-trained engineers, turning infrastructure projects into a domestic talent demand signal.

Recommendation #3: Upskill the existing public sector workforce through structured partnerships with CCISM and private sector trainers:

- Train civil servants rather than outsourcing digitalization to foreign consultants, turning the public sector into a talent base rather than reliant on external expertise.
- Commission the CCISM École du Numérique to deliver a structured digital upskilling program for public sector employees, funded through the Fonds Paritaire, and prioritizing the DGEN, the health ministry, and outer island administration.

Recommendation #4: Build a sustainable domestic talent pipeline by embedding digital literacy in schools and creating guaranteed employment pathways for graduates:

- Make programming and data literacy mandatory from secondary school-level across all islands, through a formal partnership between the DGEN and the Vice-Rectorat.
- Commit to hiring a defined number of digital graduates annually into public roles such as platform development, cybersecurity, and telehealth systems.

2.3.5 Position SWAC and OTEC as Global Leaders in Ocean Energy

1. The current state of the SWAC and OTEC industries in French Polynesia

SWAC and OTEC have both become strategic ocean-energy options for French Polynesia: SWAC is already proven in operation, while OTEC remains promising. SWAC delivers clean cooling by pumping 5 °C water from ~900 m depth through a freshwater heat-exchange loop, with three systems operating at The Brando, the Intercontinental Bora Bora, and the *Centre Hospitalier de Polynésie Française* (CHPF). French Polynesia's geography, with deep ocean drop-offs close to shore, makes it one of the most naturally suited regions in the world for this technology.[103] OTEC builds on the same natural advantage, using the strong and stable thermal gradient between warm surface waters (27–28 °C) and deep cold waters (4–5 °C at ~1,000 m).[104] OTEC can provide continuous baseload power, a critical advantage for archipelagos dependent on imported fossil fuels.

SWAC is a significant contributor to French Polynesia's energy transition, while OTEC is entering a new phase of development. SWAC already delivers major economic and environmental gains, cutting cooling electricity use by nearly 90% at CHPF and saving ~$3 million USD and 5,000 tons of CO_2 annually,[105] with a $30 million USD investment and a 10-year payback.[106] Its performance shows how deep-seawater cooling can reliably displace fossil-fuel-based air-conditioning in an energy

[103] Service Des Énergies. "Le SWAC Du CHPF, Une Réalisation de La Polynésie Française, Portée Par Le Service Des Énergies." July 28, 2022. https://www.service-public.pf/sde/2022/07/27/swac/.
[104] EBSCO. "Ocean Thermal Energy Conversion." Accessed April 19, 2026. https://www.ebsco.com/research-starters/power-and-energy/ocean-thermal-energy-conversion.
[105] ADEME Infos. "À Tahiti, L'eau de Mer Rafraîchit L'hôpital." January 31, 2023. https://infos.ademe.fr/magazine-fevrier-2023/terrain/a-tahiti-leau-de-mer-rafraichit-lhopital/.
[106] ESMAP. *Sea Water Air Conditioning for Tahiti Hospital: A Success Story*. October 17, 2024. https://www.esmap.org/sites/default/files/2022/Presentations/SWAC-FOR-TAHITI-HOSPITAL.pdf.

system where 65% of electricity is still generated from thermal power plants.[107] OTEC is now advancing through a concrete pilot in Bora Bora, where the municipality and Akuo aim to install the first unit on Motu Mute by 2030 to help reach 100% clean energy without expanding solar farms.[108]

For both SWAC and OTEC, scaling will require overcoming economic, financial, and environmental uncertainties. SWAC is already delivering strong results in French Polynesia, but limited demand for cooling constrains expansion. Future growth will depend on promising opportunities such as data centers and deep-sea desalination, and on exporting Polynesian expertise to other islands and tropical regions, with French Polynesian companies such as Airaro leading the international scene.[109] OTEC remains at an earlier stage, and still faces hurdles related to infrastructure costs, deep-water engineering, and long-term performance proof.

2. Insights from Hawaii and Japan

SWAC succeeds when sized to real demand and anchored to diversified uses, while oversized projects tend to fail. Honolulu's SWAC project was ultimately abandoned after 16 years because it was over-scaled for actual cooling demand, faced soaring construction costs (from $275 to $400 million USD), and became financially unviable despite permits and committed customers, highlighting the risks of pursuing large, centralized systems without a clear anchor client.[110] French Polynesia remains the only place to have built fully operational commercial SWAC systems, with projects rigorously right-sized to high-load, 24/7 clients such as hospitals or resorts.[111]

OTEC only succeeds when grounded in research & development (R&D) and gradual scaling, but large commercial plays have repeatedly failed. Japan remains the global reference point, with the 100 kW Kumejima plant (the only continuously operating OTEC unit)[112] [113] and the 30 kW Okinawa Deep Seawater Lab, providing decades of data on turbines, working fluids, and heat exchangers.[114] Meanwhile, major projects in Hawaii (Lockheed Martin–Makai 10 MW), and Martinique (DCNS/Naval Group 10 MW) collapsed due to engineering complexity, cost, and political barriers.[115]

3. Implications and policy recommendations for the SWAC and OTEC industries

The French Polynesia SWAC and OTEC industries should focus on three initiatives:

- **Prioritize right-sizing, anchor clients, and diversified uses to avoid the Hawaiian trap.** SWAC applications should focus on right-sized systems for hospitals, airports, universities, and data centers, clients with 24/7 loads and predictable consumption. French Polynesia can strengthen project viability by integrating co-uses such as aquaculture, cosmetics, or deep-water desalination where spatially feasible.

[107] Direction de l'Énergie de la Polynésie française. *Colloque EnR : La transition énergétique en Polynésie française – Où en sommes-nous ?* Presentation, 2 December 2025. https://www.service-public.pf/sde/wp-content/uploads/sites/15/2025/12/Presentation_colloque-EnR_021225_OPE-1.pdf.
[108] Agrisolaire, ETM, Bateaux à Hydrogène… Bora Bora Accélère Sur Le Développement Durable - Radio1 Tahiti." Radio1 Tahiti - La Première FM de Tahiti - Radio1.Pf l'info Web à Tahiti, March 26, 2025. https://www.radio1.pf/agrisolaire-etm-bateaux-a-hydrogene-bora-bora-accelere-sur-le-developpement-durable/.
[109] SWAC developer officials, personal communications, March 4 and March 19, 2026.
[110] The Associated Press. "Hawaii Seawater Air Conditioning Plans Shut Down Over Costs." *Hawai'i Public Radio*, December 29, 2020. https://www.hawaiipublicradio.org/local-news/2020-12-29/hawaii-seawater-air-conditioning-plans-shut-down-over-costs.
[111] SWAC developer officials, personal communications, March 4 and March 19, 2026; SWAC engineering firm official, personal communication, March 4, 2026; Energy department official, personal communication, March 19, 2026.
[112] Betancourt, Mark. "The Century-Old Renewable You've Never Heard Of." *Eos*, January 24, 2022. https://eos.org/features/the-century-old-renewable-youve-never-heard-of.
[113] Yokogawa Electric Corporation. *Okinawa OTEC: Success Story* ISD-SP-R202. Tokyo: Yokogawa Electric Corporation, 2022. Accessed April 20, 2026. https://web-material3.yokogawa.com/1/5033/files/202_SS%20Okinawa%20OTEC%20Final%20April%2015.pdf.
[114] "IOES Facilities | About IOES | INSTITUTE OF OCEAN ENERGY SAGA UNIVERSITY JAPAN." Accessed April 20, 2026. https://www.ioes.saga-u.ac.jp/en/facilities/ioes_facilities.
[115] SWAC developer official, personal communications, March 4, 2026

- **Build an export-oriented industrial ecosystem while structuring domestic governance and financing**. French Polynesia is the only country with fully operational commercial SWAC systems, but its domestic market is too small to sustain a full industrial chain. Its strategic path is therefore to develop a structured export industry, with growing demand in Mauritius, the Caribbean, and other island regions. To capture this opportunity, French Polynesia needs a coherent industrial strategy and strong governance, providing early technical integration to avoid delays seen at CHPF, standardized engineering packages, and a clear financing pathway combining public and private investors. This unique expertise allows a clear competitive edge in delivering an end-to-end, de-risked SWAC offering.[116]
- **Develop OTEC through a staged, land-based pathway informed by Japan's incremental model**. OTEC only succeeds when developed gradually, with strong R&D support and realistic engineering choices. Japan's Kumejima plant demonstrates the value of small, continuous pilots, while large "first-of-a-kind" projects in Hawaii and Martinique failed due to over-ambition and unproven offshore designs. Possible paths include pursuing a land-based Organic Rankine Cycle (ORC) pathway already mastered locally, rather than deep offshore concepts requiring massive pipes.[117]

We recommend the government to develop an ambitious SWAC and OTEC strategy, both domestically and as a leading export industry:

Recommendation #1: Establish an integrated SWAC project-development framework combining early technical scoping and structured financing:

- Create a Technical Integration Cell to bring all relevant stakeholders together early on (e.g., Airaro, Geocean, *Direction Polynésienne de l'Energie*) and validate bathymetry, pipe routing, chilled-water networks, and environmental constraints before feasibility studies begin, preventing the delays and redesigns seen at CHPF.
- Launch a SWAC–OTEC Financing Window combining SOFIDEP guarantees, ADEME grants, and AFD/BEI concessional loans, with a clear "who-funds-what" map for developers to address the financing fragmentation.
- Pre-fund feasibility studies (€1-2 million) for priority anchor clients (e.g., airport, university, data center) to ensure projects start with realistic engineering and bankable cost envelopes.

Recommendation #2: Build a coherent SWAC industry strategy focused on anchor clients, export markets, and hybrid deep-water uses:

- Publish a territorial SWAC siting plan, identifying viable anchor loads (airport, hospitals, data center), feasible intake zones, and parcels suitable for pipe staging.
- Support French Polynesian firms in export markets by co-funding feasibility studies in Mauritius, La Réunion, the Caribbean, coordinating SOFIDEP export guarantees, and promoting its unique operational track record in international tenders.
- Develop hybrid SWAC applications where spatially feasible, such as deep-water desalination (leveraging international partnership) and aquaculture, and create a digital-infrastructure strategy to attract a SWAC-cooled data center industry.

Recommendation #3: Launch a staged, land-based OTEC development program aligned with Japan's incremental model:

- Fund the heat-exchanger test (18 months) required to validate OTEC performance and avoid the engineering failures seen in Martinique and Hawaii.

[116] SWAC developer officials, personal communications, March 4 and March 19, 2026; SWAC engineering firm official, personal communication, March 4, 2026; Energy department official, personal communication, March 19, 2026.
[117] SWAC developer official, personal communications, March 19, 2026

- Instrument existing SWAC systems with UPF and CNRS to generate operational data on flow rates, pump regulation, and thermal performance for OTEC design.
- Require private-sector leadership for the first commercial OTEC unit, with public support only after performance is proven, and publish a 5-year OTEC R&D roadmap to structure partnerships and de-risk scale-up.

2.4 Levers the Government Can Employ to Achieve Sustainable Prosperity

The government's ultimate goal is to achieve economic autonomy, driven by (i) greater self-sufficiency in critical sectors like food and energy; (ii) stronger private-sector investment and innovation; and (iii) a rebalancing of activity and employment across outer islands beyond Tahiti. The government's role is not to build sectors like a company would, but to create the conditions under which private actors, communities, and local industries can grow.

In practice, the government has six (6) main levers in its toolbox to shape economic outcomes: they can be used to lower the cost of doing business, reduce risk for investors, expand essential services, strengthen local capabilities, and ensure that opportunities reach outer islands beyond Tahiti.

Figure 3: French Polynesia's Government Has Six (6) Levers in Its Toolbox, with Uneven Room for Action Under its Autonomous Status

	Levers	Policy Instruments	Degree of Autonomy
1	Policy & Regulatory	Local economic regulations (energy, food, maritime, environment), local permitting,licensing, land use and zoning, environmental and resource-management (lagoons, coastal), trade and import rules	**Limited:** excl. regalian powers, international trade, customs policy, maritime sovereignty
2	Fiscal & Financial	Local taxes, tax reduction, fiscal incentives, subsidies and grants, public financing (loans, guarantees, blended finance) and spending, PPP structures, investment promotion and de-risking tools	**Limited:** excl. monetary policy, sovereign borrowing, EU-fiscality
3	Infrastructure & Public Services	Transport infrastructure (maritime, air, road), digital and communications networks, energy and water systems, health services, food systems infrastructure	**High:** excl. major national infra, specialized medical, telecom laws
4	Human Capital & Workforce	Education and vocational training, workforce programs, entrepreneurship and SME capability building, technical assistance	**Near-full:** excl. university-level sovereignty, national certifications, immigration
5	Institutional & Operational	Local administration and decentralized administration, internal processes and relays, data systems, monitoring and evaluation, investor one-stop shops, inter-island coordination mechanisms,	**Near-full:** excl. foreign representation (except with France's agreement)
6	External Engagement & Soft Power	Partnerships with private sector, academica, NGOs, regional cooperation, international funding, technology transfer and innovation partnerships, cultural influence, recognition and branding	**Limited:** excl. diplomacy, sovereign agreements (France's approval), EU representation

Together, these six levers form the foundation for action. The initiatives that follow are directly informed by conversations with a wide range of stakeholders across French Polynesia, including private-sector entrepreneurs, ministers, NGOs, researchers, and community actors, who highlighted the practical solutions needed to unlock sustainable growth across all economic sectors:

1. **Policy and regulatory initiatives**:
    - Modernize land, lagoon, and maritime-domain regulation to unlock investment (including lagoon use and protection).
    - Update and simplify key laws (VAT tiers, recycling, sector standards) to reduce uncertainty and encourage priority initiatives.

- Ensure competitive procurement and reduce monopolistic capture, allowing Polynesian small and mid-size companies to compete and lower project costs.

2. **Fiscal and financial**:
   - Clarify and streamline access to public finance (ADEME, AFD, BEI, France 2030, EU programs) and simplify requirements (e.g., no SIREN number).
   - Expand fiscal incentives beyond tourism, extending tax exemption and grants to productive sectors that generate employment and outer-island activity.
   - Map and simplify all subsidy and financing windows into a single, accessible guide for small and medium enterprises (SMEs) and developers.
3. **Infrastructure and public services**:
   - Expand essential services and capabilities beyond Tahiti, including reliable health, education, digital connectivity, transport, administrative services.
   - Work with local governments to fix wastewater, sedimentation, and waste-management systems as prerequisites for the blue-economy strategy.
   - Invest in shared, cross-sector infrastructure (labs, logistics hubs, testing facilities) to reduce costs and accelerate innovation.
4. **Human capital and workforce**:
   - Align training with real labor-market needs (energy and IT technicians, aquaculture operators, marine engineering, pearl grafters, etc.).
   - Strengthen vocational pathways and apprenticeships, removing administrative barriers and improving qualification pipelines to address brain drain.
   - Address workforce fragility (youth unemployment, addiction, health issues) to restore labor-force participation.
5. **Institutional and operational**:
   - Strengthen institutional capacity for primary-sector governance (pearl farming, fishing, aquaculture) to improve coverage and initiatives.
   - Break ministerial silos and coordinate DRM, environment, economy, innovation, and lagoon authorities.
   - Create local support units to help SMEs navigate regulation, funding, R&D partnerships, and administrative processes.
6. **External engagement and soft power**:
   - Strengthen regional diplomacy on fish aggregating devices (FADs), tuna quotas, deep-sea mining, and climate to position French Polynesia as a Blue Pacific leader.
   - Support private-sector visibility abroad, helping access international markets for French Polynesian SMEs, leveraging consulates and global networks.
   - Promote a unified *Made in Fenua* Tahiti premium brand/label to support export-oriented products (pearl, rum, monoi, cosmetics, fisheries, etc.).

External engagement and soft power are often overlooked in economic strategy, yet their impact on investment, market access, and national visibility is immense. To illustrate this leverage in practice, the next section deep-dives into how the government could operationalize a unified *Made in Fenua* Tahiti premium brand as a concrete example of soft-power-driven economic transformation.

2.5 Policy Blueprint: How the Government Should Promote a Made in Fenua Tahiti Brand

French Polynesia benefits from strong local industries and recognized expertise in pearls, aquaculture, surfing, premium tourism, and ocean energy, which are solid foundations of a modern ocean economy. However, a unifying strategy is missing, which would make these strengths visible, investable, and globally differentiated. Across all sectors analyzed in this report, one theme consistently emerges: French Polynesia's competitive advantage grows when it turns natural assets and cultural identity into a recognizable, trusted brand.

Branding is an underused but powerful economic tool. While governments typically rely on regulation, taxes, and subsidies, they also hold global visibility, diplomatic reach, and the ability to set national narratives. Countries that have successfully branded themselves, such as Estonia with digitalization,[118] New Zealand with sustainable agriculture,[119] and Iceland with geothermal energy,[120] show how national branding can unlock investment, talent, and export opportunities far beyond what their size would predict. Success creates multipliers, with new industries emerging simply because the country became known for excellence.

French Polynesia can build this momentum by developing a Tahiti or *Made in Fenua* brand as a cross-sector platform that elevates its premium, sustainable, and ocean-based economy. This brand would unify the country's strongest sectors under a single identity: authentic, sustainable, high-value, culturally rooted, and ocean-positive. The four areas of focus are:

- **Tahiti as the global standard for sustainable pearls**: position Tahitian pearls as the ethical luxury benchmark; the equivalent of "conflict-free diamonds," but rooted in sustainability, lagoon stewardship, and cultural craftsmanship.
- **Tahiti as the world capital of surfing and ocean sports**: leverage Teahupo'o's global prestige to build a homegrown surf brand rooted in mana, culture, and world-class performance.
- **Tahiti as a premium aquaculture, agriculture, and wild fisheries hub:** brand premium export, such as gourmet aquaculture products, cosmetics, nutraceuticals, premium tuna and flagship agriculture goods like vanilla, monoï, and noni.
- **Tahiti as a global reference for ocean energy innovation**: capitalize on French Polynesia's unique commercial SWAC systems and a credible pathway for land-based OTEC.

Relevant international benchmarks include Swiss watch certification and Japan's Wagyu grading for premium quality standards; Chamonix and Bali for world-leading mountain and surf tourism; South Korea's Jeju cosmetics cluster and Norway's salmon certification for high-value bio-based products; and Iceland's geothermal and Denmark's wind-energy identity for clean-energy innovation.

A practical roadmap for the government includes:

1. Create a Tahiti or *Made in Fenua* brand authority to coordinate certification, marketing, and licensing.
2. Develop overarching strategy, priority sectors, sector-specific label requirements (pearls, surfing, aquaculture, ocean energy) and unified visual identity across labels.

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[118] Papp-Váry, Árpád Ferenc. "A Successful Example of Complex Country Branding: The E-Estonia Positioning Concept and Its Relation to the Presidency of the Council of the EU." *Acta Universitatis Sapientiae, European and Regional Studies* 14, no. 1 (2018). https://doi.org/10.2478/AUSEUR-2018-0013.

[119] Admin. "Sustainable Agriculture: Key to NZ's Zero Carbon Goals." Zero Carbon Act, January 23, 2025. https://zerocarbonact.nz/sustainable-agriculture-key-to-nzs-zero-carbon-goals/.

[120] Geothermal. "Geothermal." Accessed April 24, 2026. https://www.government.is/topics/business-and-industry/energy/geothermal/.

3. Identify relevant pipelines of existing and potential local products to be branded and coordinate certification campaigns with relevant stakeholders (public and private).
4. Launch a global promotion campaign through embassies, trade missions, international fairs, and tourism channels.
5. Support local firms through branding toolkits, export readiness programs, co-financing and technical assistance for business creation.
6. Integrate branding into education and training to build long-term local expertise.

French Polynesia's digital economy can further accelerate this initiative, with digital channels amplifying Brand Tahiti's reach into a global online presence, supporting e-commerce, creative industries, and the wider digital ecosystem that connects local producers to international markets.

3 Understanding Critical Minerals and the Debate over Deep-Sea Mining

Across the Pacific, several island nations are exploring deep-sea mining as a potential economic opportunity, promising new activity and jobs. Yet the case is far more complex, with deep uncertainties around profitability, revenue-sharing, environmental harm, and human rights. This section examines global demand for critical minerals, where deep-sea mining fits into that debate, and which alternative solutions to mineral supply are actually feasible.

3.1 Why Critical Minerals Matter and Where Deep-Sea Mining Fits Into the Picture

Rapid growth in demand for critical minerals and persistent supply bottlenecks have fueled interests in deep-sea mining. The U.S.' recent acceleration of permit approvals has further reshaped the governance landscape, disrupting a system that previously centered on the ISA. However, deep-sea mining cannot resolve supply constraints and faces uncertain demand as recycling and new technologies provide credible alternatives.

3.1.1 The What, Where, and Why of Deep-Sea Mining

Deep-sea mining is the extraction of seabed critical minerals that are contained within polymetallic nodules, polymetallic sulphides, or cobalt-rich crusts. Unlike land-based mining, deep-sea mining happens thousands of meters below the ocean surface. Critical minerals that can be mined include copper, cobalt, nickel, manganese, and rare earth elements, among others, which are essential to energy and military technologies.[121] While technology varies across companies, seabed nodules will likely be collected by robotic vehicles that move along the ocean floor. After the nodules are moved up to the surface, dry nodules will be collected on a vessel while water containing sediments are discharged into the water mid-depth. Through this process, the ocean floor and water ecosystems are heavily disturbed.[122]

[121] Oliver Ashford et al., "What We Know About Deep-Sea Mining — and What We Don't," World Resources Institute, accessed March 6, 2026, https://www.wri.org/insights/deep-sea-mining-explained.
[122] *Deep sea mining: How deep sea mining works*. (n.d.). Deep Sea Mining. Retrieved April 12, 2026, from https://deepseamining.ac/how_it_works#gsc.tab=0

Most assessments of deep-sea mineral composition have been concentrated in the Clarion-Clipperton Zone (CCZ), as the CCZ contains the largest known concentration of polymetallic nodules.[124] Another area of international focus is the Prime Crust Zone (PCZ), where cobalt-rich crusts contain manganese, iron, and rare earth elements.[125] [126]

While there have been some studies outside of the CCZ and PCZ, large swaths of the ocean floor remain unstudied, as shown in Figure 5. This means that there is not a complete assessment of the deep-sea critical mineral distribution. Additionally, mineral content within each nodule varies: while each nodule costs roughly the same to collect and lift from the seafloor, the wide variation in mineral content makes the revenue per nodule highly uneven.[127]

Figure 4: CCZ Nodule Composition[123]

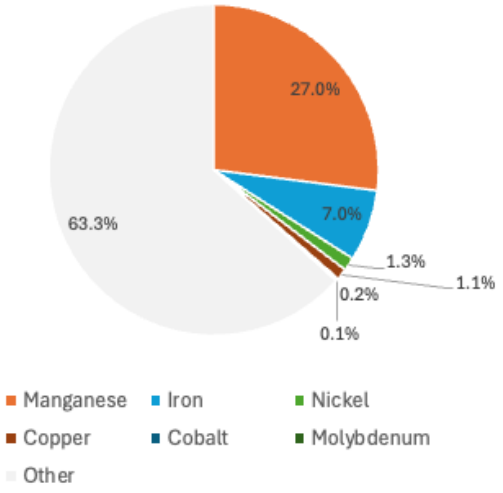
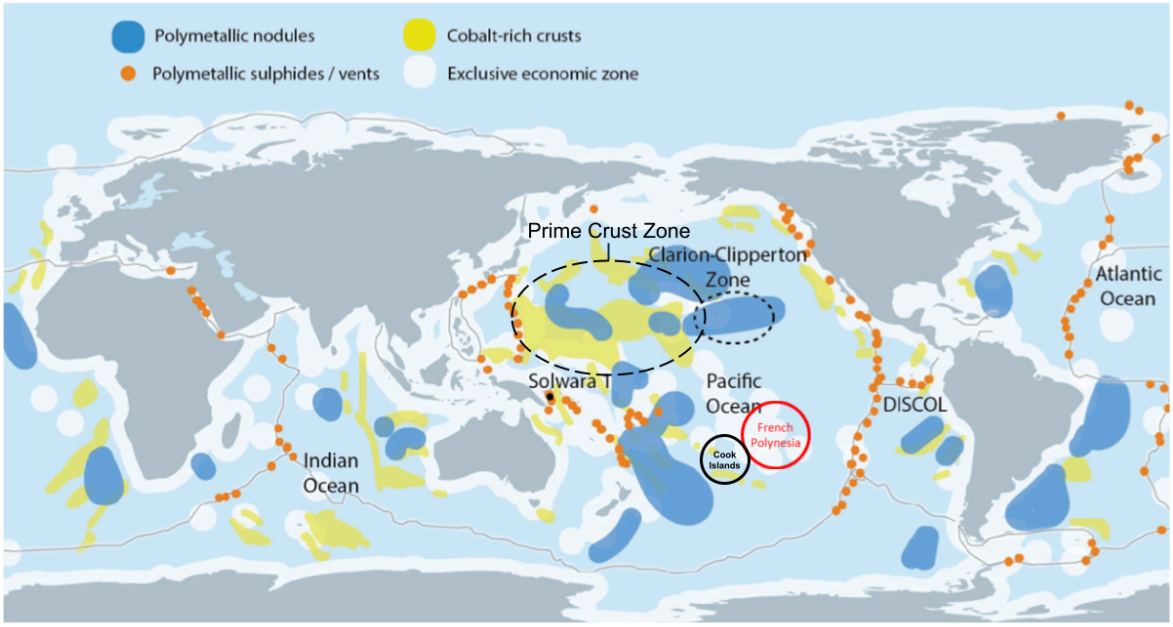


Figure 5: Distribution of Critical Minerals Resources in the Deep Sea[128]



Note: The white area around Antarctica is not an exclusive economic zone but rather governed by an international institution

Interest in deep-sea mining extends beyond the CCZ and PCZ, with some countries exploring it in their own EEZs, such as the Cook Islands, adjacent to French Polynesia.[129] With marine ecosystems crossing borders, deep-sea mining in the Cook Islands' EEZ could directly affect French Polynesian

[123] *Ibid.*
[124] Vivoda, V. (2024). Uncharted depths: Navigating the energy security potential of deep-sea mining. *Journal of Environmental Management*, 369, 122343. https://doi.org/10.1016/j.jenvman.2024.122343
[125] World Ocean Review. "Cobalt Crusts." May 9, 2014. https://worldoceanreview.com/en/wor-3/mineral-resources/cobalt-crusts/.
[126] Hein, James R., et al. "Deep-ocean mineral deposits as a source of critical metals for high- and green-technology applications: Comparison with land-based resources." *Ore Geology Reviews*, vol. 51, no. N/A, 2013, pp. 1-14, https://www.sciencedirect.com/science/article/abs/pii/S016913681200234X.
[127] Barnard, M., & Trytten, L. (2025). A Techno-Economic Assessment of Seabed Mining: American Samoa and Global Implications. *National Ocean Protection Coalition*, N/A(N/A), 1–81. CleanTechnica.
[128] Ashford, O., Baines, J., Barbanell, M., & Wang, K. (n.d.). *What we know about deep-sea mining — and what we don't*. World Resources Institute. Retrieved April 8, 2026, from https://www.wri.org/insights/deep-sea-mining-explained
[129] Herman, A. (n.d.). *Proposed amendments to the seabed minerals act* 2019.

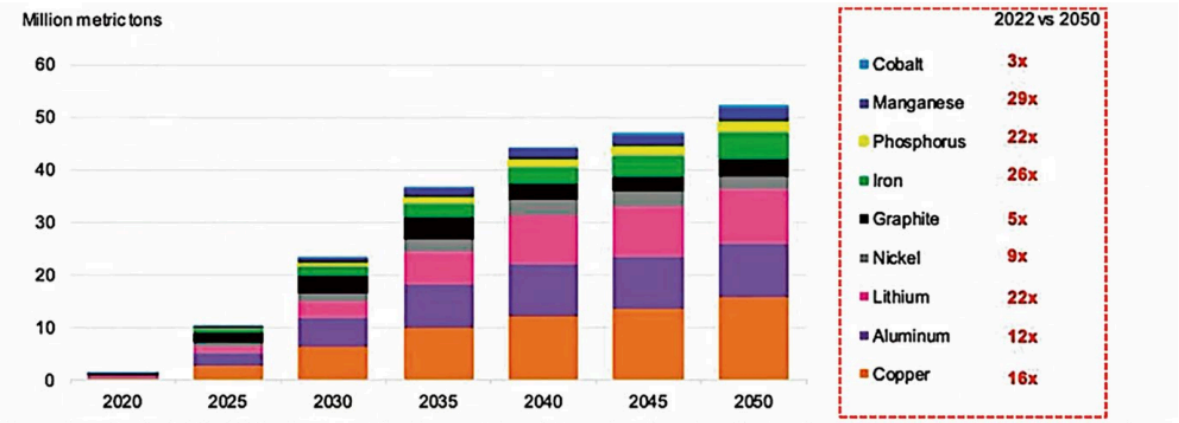
waters.[130] Outside of EEZs, the ISA is the designated authority for deep-sea mining in international waters, ensuring environmental protection and benefit-sharing across member states.[131]

Countries hold divergent positions on deep-sea mining. As of July 2025, 37 countries supported a precautionary pause or moratorium.[132] The U.S., which is not a member of the ISA, has unilaterally taken an opposite course: in April 2025, it issued an Executive Order allowing deep-sea mining permits for U.S. companies and the U.S. subsidiaries of foreign companies on the grounds of mineral supply security concerns, and further accelerated the approval process in January 2026.[133]

3.1.2 The Rising Importance of Critical Minerals in Energy and Defense

Critical minerals are essential for the energy transition and military applications, making them especially valuable geopolitically. Regarding the energy transition: lithium, cobalt, nickel, and copper, are needed for specific components in electric vehicles (EVs); copper, silicon, silver, and zinc, are used in the manufacture of solar panels, and nickel and rare earth elements are needed for wind turbines; lithium, cobalt, manganese, and graphite, and nickel, are used in battery energy storage systems.[134] Due to the rapid deployment of energy technologies, the demand for critical minerals has been growing more than fivefold for the past five years.[135] Such growth is expected to continue for decades, as shown in Figure 6.

***Figure 6:** Annual Metals Demand for Net-Zero Scenario by 2050*[136]



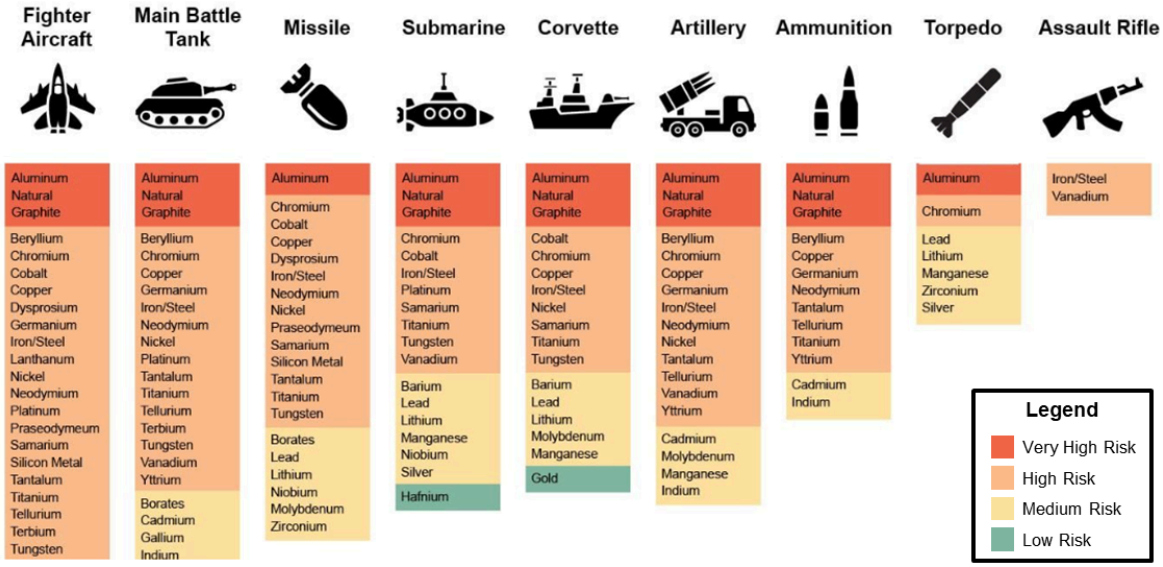
Source: BloombergNEF. Note: Lithium is expressed in million metric tons lithium carbonate equivalent (LCE). Demand occurs at the mine mouth, one year before battery demand. Multiples between 2022 and 2050 are based on annual demand in the given year.

Critical minerals are also essential for military technologies. In 2024, the North Atlantic Treaty Organization (NATO) highlighted 12 critical raw materials applied in military usage and highlighted

[130] Gales, P. (2024, May 27). Subsea minerals in Pacific island EEZs. *Deep Sea Mining*. https://deepseamining.ac/article/48#gsc.tab=0
[131] IISD Earth Negotiations Bulletin. "International Seabed Authority." Accessed April 24, 2026. https://enb.iisd.org/negotiations/international-seabed-authority.
[132] ISA. "Frequently Asked Questions about the International Seabed Authority and Deep-Sea Mining." July 2025. https://isa.org.jm/wp-content/uploads/2025/07/ISA_FAQS_JULY-2025.pdf.
[133] Mitchell, S. (2026, February 25). *US moves to reduce deep-sea mining permit times under new NOAA rule*. Gibson Dunn. https://www.gibsondunn.com/us-moves-to-reduce-deep-sea-mining-permit-times-under-new-noaa-rule/
[134] Columbia University. "Sirens in the Deep:A Criticaljuncture Forseabed Mining." Net.Pf, May 2025. https://www.service-public.pf/daie/wp-content/uploads/sites/14/2025/09/2025-French-Polynesia-Capstone-Final-Report-Columbia-University.pdf.
[135] Sharma, R. (2025). *Deep-sea mining management, policy and regulation: Data management, environmental monitoring, techno-economic assessment, law of the sea and regulatory regimes*. Springer Nature.
[136] *Ibid.*

their supply chain risks, as shown in Figure 7.[137] With the growing number of regional conflicts in recent years, the urgency of securing critical minerals has also heightened.

***Figure 7:** Critical Minerals and Rare Earth Used in Military Applications*[138]



3.2 The Geopolitical Context of Critical Minerals

As global demand for critical minerals surges, countries are creating strategies to secure critical minerals supply. China created its National Plan for Mineral Resources (2016–2020),[139] the EU passed the Critical Raw Materials Act in 2023,[140] and the U.S. administration recently signed the "Order of Adjusting Imports and Processed Critical Minerals and Their Derivative Products into the U.S.' Executive Order in January 2026.[141] Additionally, as China continues to be the dominant player in the critical minerals supply chain, other countries are looking for new ways to gain market leverage. To do so, countries are utilizing strategic cooperation among states and private entities, and are funding new innovations within the supply chain, such as mineral recycling.

3.2.1 Concentration of Production, Reserves, and Enrichment Capacity

Like other natural resources, critical minerals are unevenly distributed across the globe. Mineral "reserves" are the portion that can be economically and technically extracted.[142] Currently, most critical mineral reserves are concentrated in 15 countries, as shown in Figure 8.

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[137] North Atlantic Treaty Organization. "NATO Releases List of 12 Defence-Critical Raw Materials." North Atlantic Treaty Organization (NATO), December 11, 2024. https://www.nato.int/en/news-and-events/articles/news/2024/12/11/nato-releases-list-of-12-defence-critical-raw-materials.

[138] Saenz de Tejada, M. (2025, June 27). How rare earths could make or break the EU's defence ambitions. Euractiv. https://www.euractiv.com/news/how-rare-earths-could-make-or-break-the-eus-defence-ambitions/

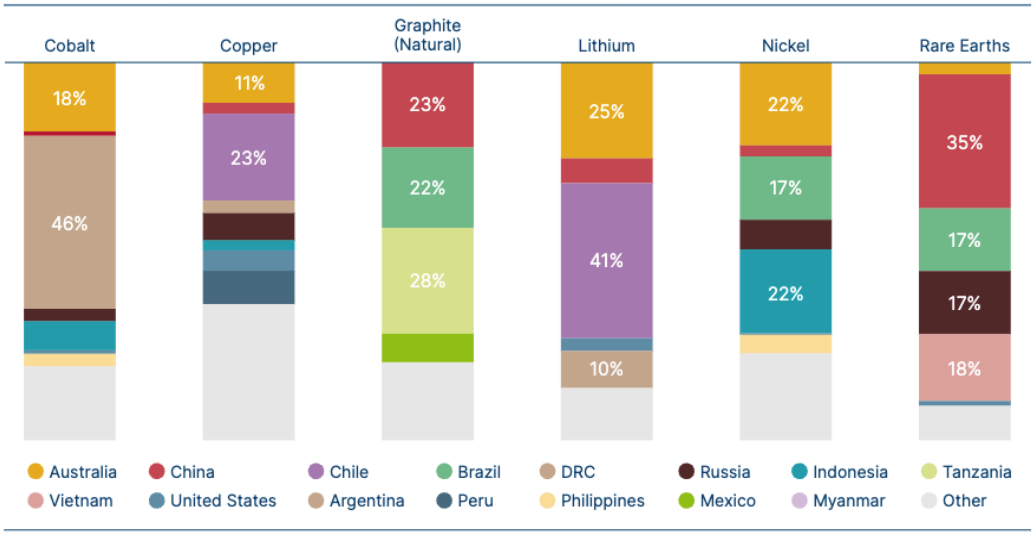
[139] 【全国矿产资源规划】-国家发展和改革委员会. (n.d.). Retrieved April 13, 2026, from https://www.ndrc.gov.cn/fggz/fzzlgh/gjjzxgh/201705/t20170511_1196755.html

[140] *European critical raw materials act*. (n.d.). European Commission. Retrieved April 13, 2026, from https://commission.europa.eu/topics/competitiveness/green-deal-industrial-plan/european-critical-raw-materials-act_en

[141] Wales, M. (2026, January 14). Adjusting imports of processed critical minerals and their derivative products into the United States. *The White House*. https://www.whitehouse.gov/presidential-actions/2026/01/adjusting-imports-of-processed-critical-minerals-and-their-derivative-products-into-the-united-states/

[142] Murray, Jacqueline. "Mineral Resources vs. Mineral Reserves." Resource Capital Funds |, July 9, 2024. https://resourcecapitalfunds.com/insights/rcf-partners-blog/mineral-resources-reserves/.

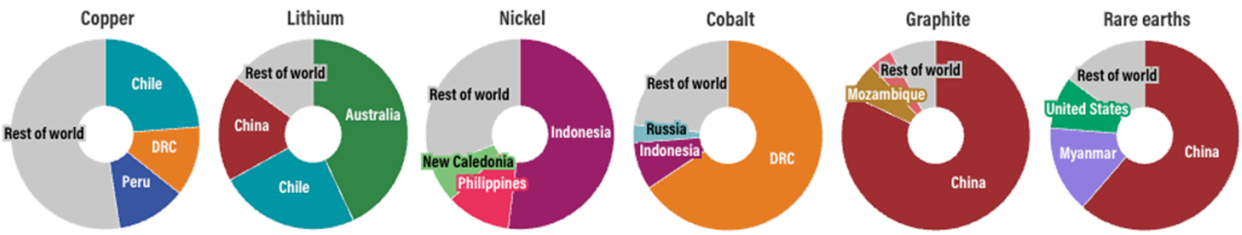
***Figure 8**: Global Distribution of Mineral Reserves (%)*[143]



SOURCE: US Geological Survey (2023), *Mineral Commodity Summaries.*

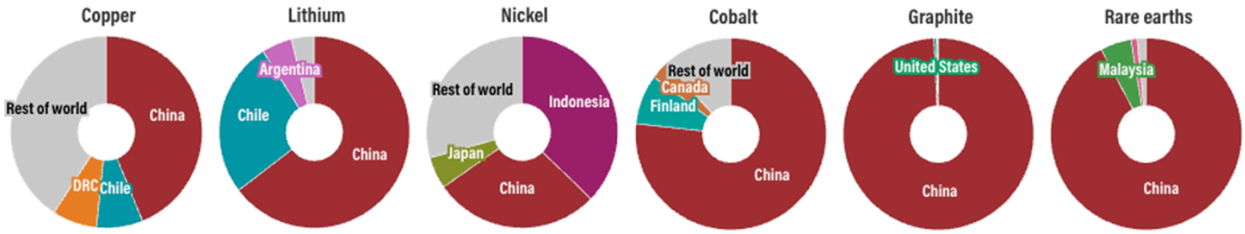
Mining capacity is also heavily concentrated, with a clear gap between where critical mineral reserves are located and where mining actually occurs; as of 2023, China, the Democratic Republic of Congo, Indonesia, and Australia capture the vast majority of global capacity, as shown in Figure 9.

***Figure 9**: Share of Mined Minerals in 2023*[144]



Once minerals are mined, they must be processed. China has a near-monopoly over processing, as shown in Figure 10. Although Indonesia appears to rival China for nickel processing, roughly 75% of Indonesia's processing facilities are controlled by Chinese companies or shareholders.[145]

***Figure 10**: Share of Processed Minerals in 2023*[146]



[143] "Material and Resource Requirements for the Energy Transition." Energy Transitions Commission. https://www.energy-transitions.org/wp-content/uploads/2023/07/ETC-Material-and-Resource-Requirements_vF.pdf.
[144] Li, S., & Wang, K. (n.d.). The critical minerals conundrum: what you should know. World Resources Institute. Retrieved April 13, 2026, from https://www.wri.org/insights/critical-minerals-explained
[145] Miller, E. (2025, February 4). Refining power. C4ADS. https://c4ads.org/commentary/refining-power/
[146] Id. 143.

From reserves to mining to processing, limited capital, technology, and industrial capacity constrain supply diversity at every stage. Even if deep-sea mining were to diversify the sources of mined minerals, the downstream processing bottleneck would remain unchanged.

3.2.2 Export Controls and Trade Wars

Critical minerals have become a central piece of economic statecraft, with restrictions on industrial raw material export have grown five times from 2009.[147] Among all countries using export control, China has leveraged its dominance in processing capabilities as a tool in economic, security and sovereignty disputes, starting with Japan[148] and more recently globally, with a focus on the U.S., after it tightened semiconductor restrictions,[149] and imposed new tariffs on Chinese goods.[150] Although the U.S. secured temporary pauses to China's export bans, this episode exposed its vulnerability in critical mineral supply chains, prompting cooperation with allies and recycling efforts.[151] However, such a sense of urgency also fuels interest in deep-sea mining, which cannot meet near-term needs and moreover cannot solve the processing bottleneck.

3.3 Current and Potential Solutions to Critical Mineral Needs

As critical minerals become both geopolitically weaponized and increasingly essential for energy and security, countries are accelerating efforts to reduce critical minerals demand and expand supply. Japan was one of the first countries forced to develop solutions to critical mineral dependence, after China's 2010 suspension of rare earth exports. In response, Japan launched a $1.2 billion policy package built around five pillars: invest in mines in other countries, promote mineral recycling, enhance usage efficiency, develop alternative materials, and stockpile rare earth elements.[152] These measures helped the country reduce its dependence on Chinese rare earths from 90% to roughly 60%, offering valuable lessons for other countries facing similar vulnerabilities.

3.3.1 Investment Agreements and Alliances

Countries are investing in the supply chains, forming alliances and using various tools to ensure supply. For example, Japanese companies gradually establish deeper ties with the mining companies to integrate themselves into the supply chain, from buying production, investment in new mines, to building processing facilities.[153] [154] On the cross-country partnerships, in October 2025, the U.S. signed with Japan the Framework For Securing the Supply of Critical Minerals and Rare Earths

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[147] Export restrictions on critical raw materials rise sharply amid growing demand. (2025, May 12). https://www.oecd.org/en/about/news/press-releases/2025/05/export-restrictions-on-critical-raw-materials-rise-sharply-amid-growing-demand.html

[148] Baskaran, Gracelin, and Meredith Schwartz. "China's Rare Earth Campaign Against Japan." January 13, 2026. https://www.csis.org/analysis/chinas-rare-earth-campaign-against-japan.

[149] Pierson, David, Keith Bradsher, and Ana Swanson. "China Announces a Ban on Rare Minerals to the U.S." *The New York Times*, December 3, 2024. https://www.nytimes.com/2024/12/03/world/asia/china-minerals-semiconductors.html.

[150] Shivaprasad, Ashitha, Amy Lv, and Alessandro Parodi. "What Critical Minerals Are on China's Export Control List Now?" *Reuters*, April 4, 2025. https://www.reuters.com/world/china/chinas-curbs-exports-strategic-minerals-2025-10-09/.

[151] Jackson, L. (2025, October 30). US gets rare earth reprieve from China, but not rollback. *Reuters*. https://www.reuters.com/sustainability/climate-energy/china-agrees-one-year-rare-earth-export-deal-issue-settled-says-trump-2025-10-30/

[152] Terazawa, T. (2023, October 13). How Japan solved its rare earth minerals dependency issue. *World Economic Forum*. https://www.weforum.org/stories/2023/10/japan-rare-earth-minerals/

[153] Tabuchi, H. (2010, November 24). *Japanese Firm in Rare Earths Deal With Australian Miner*. The New York Times. https://www.nytimes.com/2010/11/25/business/global/25rare.html.

[154] Shin-Etsu. "Shin-Etsu Chemical to Construct a Rare Earth Magnet Manufacturing Plant in Hai Phong Province in Vietnam." Shin-Etsu Chemical Co., Ltd., April 21, 2014. https://www.shinetsu.co.jp/en/news/news-release/shin-etsu-chemical-to-construct-a-rare-earth-magnet-manufacturing-plant-in-hai-phong-province-in-vietnam/.

through Mining and Processing,[155] enabling both countries, and potentially other like-minded countries to co-finance critical mineral projects.

The EU is also building its strategic alliances with the Critical Raw Materials Act. It has established strategic partnerships with 14 countries, including mineral-rich Argentina and DRC.[156] The EU's approach incorporates enhancing the partners' environmental, social and governance practices, to ensure its investment brings sustainable advancements to partnering countries while securing its security of strategic raw materials.

Apart from partnerships and alliances targeting critical minerals, broader trade agreements have also become avenues for countries to establish partnerships on critical minerals. The EU-Australia Trade Agreement, concluded in March 2026, includes clauses that reduce or eliminate tariffs on aluminium, lithium, and manganese to facilitate cooperation on critical mineral supply chain security.[157] Another example is the Reciprocal Trade Agreement between The U.S. and Taiwan, which includes a clause to "promote the recovery of critical minerals from waste streams."[158]

3.3.2 Technological Innovation to Reduce Mineral Usage

New technologies are being developed to reduce or eliminate the use of certain critical minerals like cobalt and nickel, driven by rising global demand and the long lead time for new mining projects, which often exceed 15 years.[159]

On the battery front, the Lithium Iron Phosphate (LFP) batteries, which only use lithium iron phosphate have been proved to out perform Nickel Manganese Cobalt (NMC) batteries on many aspects, including cycle life, safety, and costs.[160] The broader adoption of LFP batteries can reduce the demand for nickel, cobalt, and manganese. For other energy technologies like electric vehicles and wind turbines, the usage of copper can potentially be replaced by aluminium.[161]

3.3.3 Scaling Recycling to Expand Secondary Supply

Mineral recycling is gaining traction as a faster and still underutilized alternative to mining. While traditional battery recycling projects take 2-5 years to start operation, latest modular projects can deliver in 9-12 months.[162] With more and more waste containing critical minerals being generated, the IEA assesses that secondary supply of critical minerals will continue to grow and reach more than 20% of supply for copper, cobalt and rare earths in 2040, as shown in Figure 11.

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[155] Schuster, A. (2025, October 28). United States – Japan framework for securing the supply of critical minerals and rare earths through mining and processing. The White House. https://www.whitehouse.gov/briefings-statements/2025/10/united-states-japan-framework-for-securing-the-supply-of-critical-minerals-and-rare-earths-through-mining-and-processing/

[156] Using transparency to benefit from the EU's mineral partnerships. (2024, December 11). EITI. https://eiti.org/blog-post/using-transparency-benefit-eus-mineral-partnerships

[157] The EU-Australia trade agreement. (n.d.). European Commission. Retrieved April 13, 2026, from https://commission.europa.eu/topics/trade/eu-australia-trade-agreement_en

[158] American Institute in Taiwan and Taipei Economic and Cultural Representative Office in the United States. "Agreement between the American Institute in Taiwan and the Taipei Economic and Cultural Representative Office in the United States on Reciprocal Trade Between the United States of America and Taiwan." Executive Yuan, February 13, 2026. https://www.ey.gov.tw/File/69B61B3AB7F0D07?A=C.

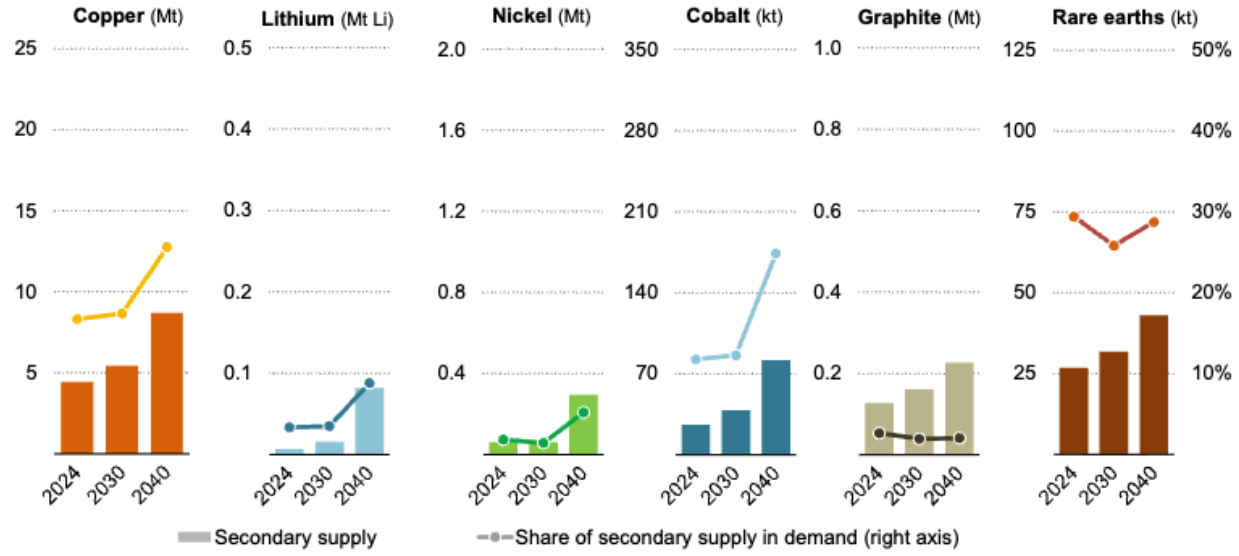
[159] Manalo, Paul. "From 6 Years to 18 Years: The Increasing Trend of Mine Lead Times." S&P Global, April 11, 2025. https://www.spglobal.com/market-intelligence/en/news-insights/research/from-6years-to-18years-the-increasing-trend-of-mine-lead-times.

[160] *LFP vs NMC batteries: 2026 cost, safety & lifespan comparison*. (n.d.). Evlithium. Retrieved April 13, 2026, from https://www.evlithium.com/Blog/lfp-vs-nmc-batteries-comparison.html

[161] Hoekstra, A. (2023, July 19). *How we can substitute aluminium for copper in the green transition.* https://www.shapesbyhydro.com/en/Knowledge/how-we-can-substitute-aluminium-for-copper-in-the-green-transition/

[162] *The real roi of battery recycling: cost, throughput, and commercial value - Green Li-ion*. (n.d.). Retrieved April 13, 2026, from https://www.greenli-ion.com/post/the-real-roi-of-battery-recycling-cost-throughput-and-commercial-value

Figure 11: Secondary supply volumes and share of total demand for key energy minerals[163]



Governments around the world, including India, Japan, and Korea have come up with strategic plans for mineral recycling.[164] The U.S. Department of Energy recently announced $500 million USD to strengthen domestic critical materials processing and manufacturing, where battery recycling projects are eligible.[165] These policy signals have led to the exponential growth of the global battery recycling market, reaching 9.2% p.a. from 2025 to 2030.[166] Venture capitalists have also noticed the trend and are pouring money into recycling,[167] meaning future long-term growth of the sector.

The French Polynesian government should exercise its influence in several ways:

Recommendation #1: French Polynesia to work with the French Government for more research on material innovations. Research and development of new materials or other abundant materials that substitute for critical minerals can reduce the need for critical minerals and the dependence and insecurity associated with supply chains.

Recommendation #2: French Polynesia should work closely with the French Government on decisions related to deep-sea exploration. Under France 2030, the national plan to drive innovation and strategic industrial investment, France has identified deep-sea exploration as a scientific priority to expand knowledge of its EEZs, while noting that these areas also contain potential critical metals.[168] Therefore, it is essential that French Polynesia is fully involved in shaping any exploration plans to ensure they do not evolve into mining without its participation in the decision.

Recommendation #3: French Polynesia to advocate in the Pacific Forum for mineral recycling collaborations. These collaborations aim to build collective mineral recycling capabilities in the region, including regulations, collection mechanisms, recycling facilities, and cooperation with countries outside the region.

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[163] International Energy Agency, *Global Critical Minerals Outlook 2025*, 2025, 99.
[164] Critical minerals policy tracker – data tools. (n.d.). IEA. Retrieved April 13, 2026, from https://www.iea.org/data-and-statistics/data-tools/critical-minerals-policy-tracker
[165] *Energy department announces $500 million to strengthen domestic critical materials processing and manufacturing*. (2026, March 13). Energy.Gov. https://www.energy.gov/articles/energy-department-announces-500-million-strengthen-domestic-critical-materials-processing
[166] LLC, B. R. (2025, October 3). Battery recycling market to reach $19.8 billion globally by 2030. *Yahoo Finance*. https://finance.yahoo.com/news/battery-recycling-market-reach-19-182100548.html
[167] International Energy Agency. Global Critical Minerals Outlook 2025. 2025, 66.
[168] Info.Gouv.Fr. "France 2030." Accessed April 24, 2026. https://www.info.gouv.fr/grand-dossier/france-2030-en.

This combination of strategic demand and supply insecurity has fueled claims that deep-sea mining is "necessary" to unlock trillions in resource value and provide cleaner, safer mineral production. Yet, these pressures are neither fixed nor inevitable: new international agreements, technological innovation, and recycling can meaningfully reduce potential demand and supply gaps. Furthermore, each of the deep-sea mining's supposed benefits proves far less convincing when examined against real-world economics, technology limits, and environmental evidence.

4 Deep-Sea Mining: Claimed Benefits and the Real Costs

Deep-sea mining is claimed to have five main benefits: (1) high profitability potential; (2) royalty revenues for the sovereign state; (3) higher mineral composition of seabed nodules compared to on-land; (4) lower environmental impacts than on-land mining; and (5) reduced worker risk. Based on independent analyses and research, these claims may not be fully accurate, as shown in Figure 12). The sections below will focus on these claims to provide a more salient picture of the potential of a deep-sea mining sector, and why these five claims do not hold.

Figure 12: The Claimed Benefit and the Bottom Line of Deep-Sea Mining

Claimed Benefit	The Bottom Line
1 **The Global Deep-Sea Mining Industry with be Highly Profitable**	Cost-benefit analyses, both including and excluding externalities (i.e., external costs such as environmental damage), found profitability claims to be overly optimistic, driven by understated operational costs, and assumptions of high critical minerals prices in a volatile market where innovation and recycling are expected to lower prices in the long run.
2 **French Polynesia, Similar to Other Countries, will Receive Royalties from Deep-Sea Mining**	While there are proposals within the ISA for potential royalties from deep-sea mining, none are finalized or guaranteed. French Polynesia has no power over these royalty mechanisms, nor over whether France would transfer any revenue. Even if royalties were granted, the maximum amount is notably low, up to $1.1 million USD a year per ISA Member State, representing less than 0.02% of its GDP. Royalties also do not account for incurred costs, and could ultimately fail to cover them.
3 **Seabed Minerals Are Richer than Terrestrial Minerals**	While deep-sea deposits may contain higher overall mineral volumes than on-land deposits, their grade (purity) is lower. Additionally, most testing has focused on nodules within the CCZ – one of the areas with the highest known mineral concentration, which cannot be generalized across the global ocean. Since French Polynesia lies far from the CCZ, its mineral composition is likely to be lower.
4 **Deep-Sea Mining Has Less Environmental Impact Than Terrestrial Mining**	Deep-sea mining does not replicate the same environmental impacts as terrestrial mining, but that does not mean it is less harmful. Instead of replacing on-land impacts, it adds new, irreversible and hidden impacts in the ocean and ocean floor, while still requiring coastal infrastructure that creates additional pressures on-land.
5 **Deep-Sea Mining is Less Dangerous than Terrestrial Mining**	Although robotics will perform part of the extraction, deep-sea mining exposes personnel to risks comparable to offshore oil and gas drilling, and in some respects higher, because operations occur in remote areas with limited emergency access and under a fragmented labor-rights regime in international waters.

4.1 Claimed Benefit 1: The Global Deep-Sea Mining Industry will be Highly Profitable?

Deep-sea mining has a highly uncertain profitability potential: some estimate that the sector can create $20 trillion USD in revenue over its lifetime,[169] and others project the industry potential to be at $65 billion USD by 2034.[170] While these projections sound promising, economic analyses offer a much bleaker picture. Both studies that include and exclude negative externalities, such as environmental damage, find that profitability claims are dubious. While high revenues are projected by some, the sector is more likely to be unprofitable rather than profitable.

A 2025 study evaluated the feasibility of deep sea mining in the American Samoa region and found substantial economic and technological uncertainties for the industry, determining that commercial viability within the next 15 years is highly unlikely for 3 main reasons:

1. **Operational challenges:** In both scenarios, one utilizing Impossible Metal's untethered robotic fleet and one utilizing The Metals Company's tethered crawler system, there are issues of reliability and higher-than-projected maintenance and operational costs.[171]
2. **Unfavorable critical mineral market conditions:** Critical minerals face high price volatility.[172] This price volatility will continue through at least 2030, and will affect revenue generation for the deep-sea mining industry. Additionally, the projected rising demand for critical minerals like nickel, cobalt, and manganese can already be met by existing land-based production, and adding deep-sea mining to the supply mix would likely create oversupply and push market prices downward.[173]
3. **Lack of nodule processing facilities:** While seabed nodule processing can be viable, there is no such processing facility that exists today. Because a processing facility would need new technology, this increases potential costs and decreases economic viability.[174]

4.1.1 Operational Challenges

Only one of the two deep-sea mining technologies has been demonstrated at scale, but it has high capital costs and carries major environmental side-effects. There are two main technological proposals for how to mine in the deep-sea: Impossible Metals' (IM) autonomous underwater vehicles (AUVs) and The Metals Company's (TMC) tethered, crawler-based vertical rise system. IM's AUVs rely on inertial navigation and ultra short baseline acoustic positioning from vessels above to pinpoint location of nodules: it was demonstrated at depths of 1,600 meters, far above the 4,000-6,000 meters needed to deep-sea mine. TMC's crawler system would utilize a vehicle the size of a large bulldozer to vacuum nodules from the seabed, mixing them with seawater into a slurry, and piped into the vessel above. Unlike IM, this system has been demonstrated at scale, but it creates significant sediment disturbance, energy-intensive pump operations, and high capital costs.[175]

Both IM and TMC have overly optimistic projections for capital expenditures (CAPEX), which inflate their degree of profitability. IM estimates that each of its AUVs will cost roughly $3 million

[169] Epikhin, Ilya, Carlo Stella, Amer Hage Chahine, et al. "Seabed Mining: A $20 Trillion Opportunity." Arthur Little. Accessed April 20, 2026. https://www.adlittle.com/en/insights/viewpoints/seabed-mining-20-trillion-opportunity.
[170] Fortune Business Insights. "Marine Mining Market Size, Industry Share: Forecast, 2026-2034." March 9, 2026. https://www.fortunebusinessinsights.com/industry-reports/marine-mining-market-101570.
[171] Barnard, Michael, and Lyle Trytten. "A Techno-Economic Assessment of Seabed Mining: American Samoa and Global Implications." *National Ocean Protection Coalition* N/A, no. N/A (2025): 1 - 81. CleanTechnica.
[172] Understanding the future of critical raw materials for the energy transition. (n.d.). MIT Climate Portal. Retrieved April 13, 2026, from https://climate.mit.edu/posts/understanding-future-critical-raw-materials-energy-transition
[173] *Ibid.*
[174] *Ibid.*
[175] *Ibid.*

USD, but bottom-up estimates on current subsea robotics estimate that $10-14 million USD per AUV is more realistic.[176] Additionally, IM estimates vessel costs at $40 million USD. Based on a reference-class forecasting and sensitivity analysis, a vessel able to carry 90 AUVs would likely cost $80 million USD to $120 million USD if built in Asia or Europe, with higher costs if built in the U.S. Using these updated estimates, a full fleet could cost several billion dollars, before operations even begin.[177] TMC also relies on historical facility cost estimates for its CAPEX assessment, an unreliable approach that does not reflect current technical requirements, inflation, or commercial-scale.[178]

Similarly, both IM and TMC have overly optimistic projections for operating expenditures (OPEX), expounding on the inflated profitability claims. IM relies heavily on assumed automation and high-availability of their AUVs, which is technically unfeasible given their current proven technology. For example, IM estimates a 4-hour per dive turnaround for each AUV; even at the most nodule-rich CCZ seabed, an AUV would actually need 6-7 hours per dive, and up to 12 hours in less-dense seabeds. Additionally, maintenance like battery cycling and thruster wear, alongside crewed operations on a large vessel drive ongoing expenses well above the company's public projections. Because of this, OPEX would likely be much higher than IM is estimating.[179]

Neither company is close to having the technology ready for real-world deep-sea mining operations. The mentioned study utilizes a technical readiness level (TRL) to determine overall technology readiness for a company's technology to be ready for commercial operation. Developed by NASA, it is a standardized way to evaluate technology maturity–moving from basic research (TRL of 1) to fully-proven technology in operational state (TRL of 9). The study determines IM's AUVs at a TRL of 3-4 overall and TMC's crawler system at a TRL of 6 overall, meaning that neither company has proven a TRL ready for operation. As an example, IM expects the AUVs to operate with 18 robotic arms, but has only demonstrated use up to 3 robotic arms.[180]

***Figure 13**: Technical Readiness Level (TRL) of Impossible Metals and The Metals Company*[181]

Criterion	Impossible Metals	The Metals Company
Overall TRL	**Overall TRL ~3-4**	**Overall TRL ~6**
CAPEX	High uncertainty *(novel systems)*	High *(but benchmarks exist)*
OPEX	Potentially lower *(theoretical)*	Moderate-high *(likely higher than stated)*
Environmental Impact	Potentially low *(selective harvesting)*	High *(significant seabed disturbance)*
Operational Complexity	Extremely high *(fleet-scale robotics)*	Moderate *(single large system)*
Scalability & Capacity	Highly modular, theoretically scalable	Proven large-scale approach
Regulatory & Geopolitical Risks	Moderate *(fewer environmental hurdles, high technological uncertainty)*	Moderate-high *environmental hurdles, but more proven technology)*
Overall Economic Viability	Highly speculative	More realistic but still uncertain

[176] *Ibid.*
[177] Barnard, Michael, and Lyle Trytten. "A Techno-Economic Assessment of Seabed Mining: American Samoa and Global Implications." *National Ocean Protection Coalition* N/A, no. N/A (2025): 1 - 81. CleanTechnica.
[178] Implications of The Metals Company Pre-Feasibility Study for Next Steps by the Company. (2026, February 25). https://dsm-campaign.org/wp-content/uploads/2026/03/Implications-of-The-Metals-Company-Pre-Feasibility-Study-for-Next-Steps-by-the-Company.pdf
[179] Barnard, Michael, and Lyle Trytten. "A Techno-Economic Assessment of Seabed Mining: American Samoa and Global Implications." *National Ocean Protection Coalition* N/A, no. N/A (2025): 1 - 81. CleanTechnica.
[180] *Ibid.*
[181] *Ibid.*

4.1.2 Unfavorable Critical Mineral Market Conditions

Forecasting future critical minerals demand is uncertain, and this uncertainty affects deep-sea mining profitability. Given current data, four key minerals that would be mined in the deep-sea—nickel, manganese, cobalt, and copper—largely have enough terrestrial supply to meet demand or do not create an economically viable option for deep-sea mining. This is a critical point, as any increased supply would decrease the market price for the mineral.[182]

Nickel demand is expected to increase over the next 15 years, but terrestrial nickel supply has the capability to meet the demand increase. Cobalt demand is expected to increase in the short-term, but then fall by 2040; once again, terrestrial cobalt supply is expected to meet projected demand. Manganese is a large market, but prices could be driven down by significant nodule production. A single nodule project could boost supply by over 10%, which creates downside risk, as that large of a supply increase would decrease the market price.[183]

Copper demand is expected to flatten after 2030, but there is an expected supply gap of 50% compared to demand. However, seabed modules for copper have shown varying grades of copper composites, so there is unproven supply in the seabed. Additionally, even if seabed nodules could be mined to meet this gap, the nodules would also create increased supply for manganese, nickel, and cobalt, undercutting the prices in these markets.[184]

As discussed in Section 3.3.3, a key supply shock is critical mineral recycling. Nickel, copper, and cobalt, are highly recyclable materials, and the recycling market is set to increase, which would increase the supply of these minerals.[185]

4.1.3 Lack of Nodule Processing Facilities

There is no facility today that can process seabed nodules from raw form to finished product, and creating such a facility would require an industry reorganization in order for deep-sea mining companies to ensure profitability. The market structure for current mineral refining facilities is that the processor purchases the raw mineral and owns the finished product. In an attempt to change the market structure for seabed nodule processing, both IM and TMC maintain that they will own the finished product, and the processing facility will work on a cost-of-service plus profit basis; so for each nodule processed, the processing facility will receive a fixed amount, and will not own the finished product. This would help IM and TMC retain a higher portion of profits, but would require an industry market reorganization.[186]

Because of this market reorganization, the financial incentives would be low for a processing facility to be built and managed. Additionally, the processing company would likely face large capital costs and be highly risky, as seabed nodule processing is an entirely new process. Based on initial estimates, the facility would likely not reach full capacity within 10 years. First, the company would need to determine an economically viable practice for nodule processing. While there are two possible options–smelting the nodules or direct pressure leaching–have not proved commercially viable. This will lead to a longer ramp-up period for process design and testing, followed by trade-off studies between two process routes, as is common in the mineral processing industry. There is no quick commercial route to creating a processing facility at commercial capacity, as shown through

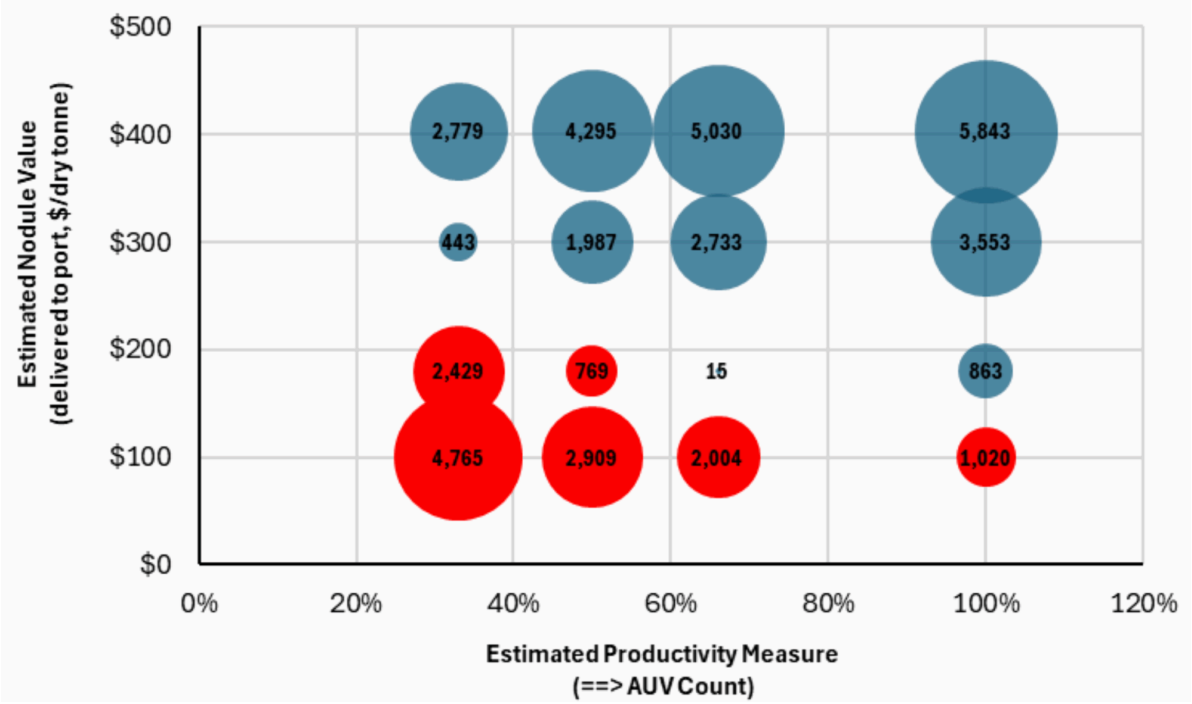
[182] Barnard, Michael, and Lyle Trytten. "A Techno-Economic Assessment of Seabed Mining: American Samoa and Global Implications." *National Ocean Protection Coalition* N/A, no. N/A (2025): 1 - 81. CleanTechnica.
[183] *Ibid.*
[184] *Ibid.*
[185] *Ibid.*
[186] *Ibid.*

examples of high-pressure acid leaching (HPAL) facilities in Australia, Madagascar, and New Caledonia, even when well-funded.[187] China's projects in Indonesia only succeeded by building the same plant designs repeatedly with a large, specialized, labor force, and government backing.

4.1.4 The Bottom Line: Negative Value is Not an Edge Case

Given the combination of uncertain revenues, elevated operating costs, and capital-intensive infrastructure, deep-sea mining is a high-risk investment in which profitability is far from assured. A fiscal sensitivity analysis of IM's commercial viability highlights how the above-noted factors interact, using realistic productivity assumptions for the AUV fleet. When the nodule valuations range from $100 to $250 per ton, internal rates of return range from below 0% to 36%. In total, net present values range from negative $4.8 billion USD to positive $5.8 billion USD at a 10% discount rate. The negative scenarios are well within the range expected when low TRL systems, uncertain processing, and volatile minerals markets intersect. The figure below shows the combinations of nodule value and productivity that sit firmly in the negative region (in red). The profitable cases sit at the top of the distribution, not the middle.

***Figure 14**: Fiscal Sensitivity Analysis of Impossible Metals' Commercial Viability*[188]



A separate study found that deep-sea mining would generate more losses than gains, when including non-financial costs, such as environmental damage and biodiversity loss. Using a net present value of extracting 3 million tons of polymetallic nodules annually over 50 years, deep-sea mining would generate financial gains of $12 billion USD over 50 years (i.e., $240 million USD a year), but would also generate $68 billion USD (i.e., $1.36 billion USD a year) in non-financial costs when using conventional discounting (i.e., future impacts matter less) and $105 billion USD ($2.1 billion USD a year) in non-financial costs when using intergenerational discounting (i.e., future impacts matter more). Additionally, the same study concluded that a 42% fall in mineral prices or an 85%

[187] Barnard, Michael, and Lyle Trytten. "A Techno-Economic Assessment of Seabed Mining: American Samoa and Global Implications." *National Ocean Protection Coalition* N/A, no. N/A (2025): 1 - 81. CleanTechnica.
[188] *Ibid.*

internal costs overrun, both of which are plausible scenarios, would push any projected financial gains to zero, without including externalities.[189]

These assessments are important as deepwater projects seem to follow predictable patterns as risky investments. A study covering 16,000 global projects found that first-of-its-kind systems tend to suffer delays, cost overruns, and optimistic early forecasts. Offshore and below-surface systems are particularly vulnerable, as they combine complex logistics, complicated environments, and intricate mechanisms.[190] This is exemplified by the deep sea mining company, Nautilus Minerals, which collapsed in 2019, leaving the sponsoring state, Papua New Guinea, with a $175 million USD bill.[191]

4.2 Claimed Benefit 2: French Polynesia will Receive Royalties from Deep-Sea Mining?

While there are proposals within the ISA for potential royalties from deep-sea mining, none are finalized or guaranteed. Even if it were, the maximum royalty amount would be minimal and unlikely to ever reach the government of French Polynesia:

1. **While the ISA has outlined several possible royalty and payment mechanisms for deep-sea mining, none are finalized or guaranteed**, leaving the financial architecture highly uncertain. Within French Polynesia's EEZ, there is likewise no clear or operational royalty system for critical minerals, and significant ambiguity remains around how revenues would be calculated, allocated, or transferred.
2. **French Polynesia has limited power to determine royalty terms**: In both the ISA and EEZ, French Polynesia has no overarching power to determine distribution amounts. In the case of the ISA, France will be the one negotiating royalty terms with Member States.
3. **It is unclear whether French Polynesia would benefit from any royalty at all:** Even if the ISA framework was ratified, the annual amount that France would receive ranges from $42,000 to $7.3 million USD a year, composed of $1.1m in royalties and $6.25m under corporate tax. Royalties would represent less than 0.02% of French Polynesia's GDP. Not only is this amount notably small, but it is also unclear what percentage of this royalty amount that French Polynesia would receive, as royalties would be collected at the national level and not necessarily distributed downward to French Polynesia.

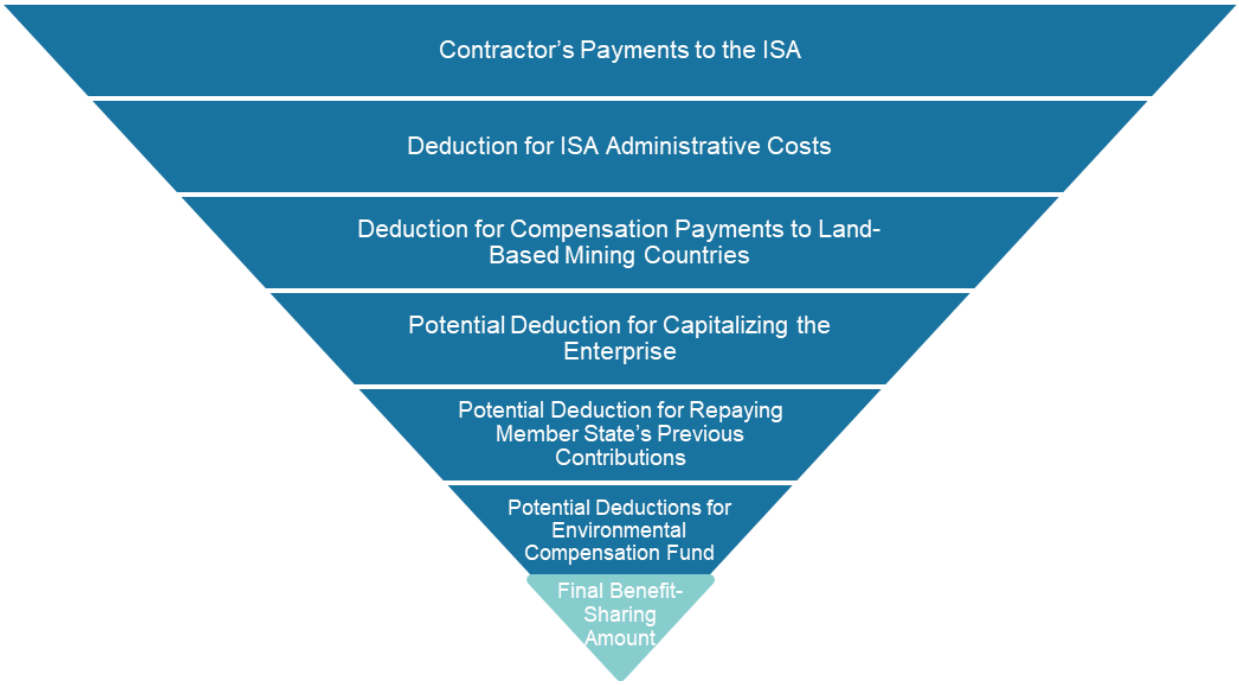
4.2.1 ISA Royalty and Tax Schemes Produce Little Value to Member Countries

While the ISA intends to introduce deep-sea mining royalties, no scheme can be confirmed until exploitation regulations are adopted and mining is authorized in the Area; even then, Member States are expected to receive only minimal revenue. Its 2024 consolidated Draft Exploitation Regulations states that any company conducting deep-sea mining in international waters would be required to make payments to the ISA under the equitable sharing of benefits scheme. These payments would be used to create a fund that will be distributed to the 169 Member States. The ISA is planning to develop rules for this funding mechanism, but there is not yet any specific mechanism proposed to calculate rates and benchmarks; however, as shown in Figure 15, there is a proposed

[189] Sumaila, U. Rashid, Lubna Alam, Kumara Pradhoshini, et al. *Deep-Sea Mining: Superficial Riches, Deep Hidden Costs*. Springer Science and Business Media LLC, 2025.
https://assets-eu.researchsquare.com/files/rs-7632394/v1/ac4ff5f9-6f0f-408c-a2b5-94842fcb7cf9.pdf?c=1758863067.
[190] Barnard, Michael, and Lyle Trytten. "A Techno-Economic Assessment of Seabed Mining: American Samoa and Global Implications." *National Ocean Protection Coalition* N/A, no. N/A (2025): 1 - 81. CleanTechnica.
[191] Amadi, Emma, and François Mosnier. "Race to the Bottom: Deep Sea Mining Provides Minimal Financial Benefits for Countries." Planet Tracker, November 2024. https://planet-tracker.org/wp-content/uploads/2024/11/Race-to-the-Bottom.pdf.

scheme for income and deductions within the ISA that would lead to the final royalty amount.[192] ISA also proposed Equalization Mechanisms with several variations of Corporate Income Tax (CIT) payment scheme by sponsor states, adapting rates typically seen in land-based mining. This ensures that all contractors will pay up to a fair level of Effective Tax Rate.[193]

***Figure 15**: ISA Income & Deductions to Calculate Distribution Amount to Member States*[194]



Analysis from Planet Tracker estimates that each ISA Member State would only receive from $42,000 to $1.1 million USD per year in royalties, as shown in Figure 16. This would be a revenue-sharing mechanism, not cost-sharing; any costs or damages that occur to the country because of deep-sea mining are not shared across member states.[195] This implies that apart from the very small amount of royalty received, there is a possibility that Pacific islands engaged in deep-sea mining would have to pay an even bigger amount to restore their environment post-mining.

***Figure 16**: The Range of Financial Benefits from Deep-Sea Mining to ISA Member States*

Direct Financial Benefits from Deep-Sea Mining for ISA Member States	**Minimum Annual Amount Per ISA Member State** (USD) (Net Present Value)	**Maximum Annual Amount Per ISA Member State** (USD) (Net present Value)
Corporate Income Tax to Sponsoring States	$0	$6,250,000
Royalties to ISA Member States (After Deductions)	$42,000	$1,100,000
Total	**$42,000**	**$7,350,000**

[192] *The mining code: Draft exploitation regulations - International Seabed Authority*. (2022, March 17). International Seabed Authority - International Seabed Authority. https://isa.org.jm/the-mining-code/draft-exploitation-regulations-2/
[193] Moore, L. (n.d.). *Analysis of additional royalty payments with reduced sponsor state CIT*.
[194] *Ibid*.
[195] Amadi, Emma, and François Mosnier. "Race to the Bottom: Deep sea mining provides minimal financial benefits for countries." Planet Tracker, vol. N/A, no. N/A, 20224, pp. 1-19, https://planet-tracker.org/wp-content/uploads/2024/11/Race-to-the-Bottom.pdf.

The number in the table indicates an extremely low figure of speculated royalty in deep-sea mining. As a comparison, $1,100,000 is equivalent to less than 0.02% of French Polynesia's GDP. Meanwhile, 80% of French Polynesia's GDP comes from ocean economic activities such as tourism, fishery, and pearl farming,[196] which will also be directly impacted by deep-sea mining. To pursue a low number of profit while damaging some of one's biggest income sources would be highly discouraged.

Furthermore, although proposals for deep-sea mining royalty regimes exist at the ISA, the extent to which the territory would effectively benefit from such revenues remains uncertain, and depends on the allocation of sovereignty and regulatory authority. In areas beyond national jurisdiction, royalties collected under the ISA framework would accrue to France as the sponsoring State, rather than directly to French Polynesia.

As of April 2026, the ISA has not finalized exploitation regulations for deep-sea mining and has not approved a single exploitation contract. Several states have nevertheless begun issuing their own licenses to authorize mining in the Area, effectively bypassing the ISA's authority. Companies such as TMC have further attempted to work through local subsidiaries in Nauru and Tonga.

Such unilateral licensing threatens the coherence of the entire regime.[197] By allowing contractors to operate outside the ISA framework, it removes any obligation to pay royalties or share benefits, putting the emerging fiscal mechanism at risk of collapsing before it is ever implemented and undermining the equitable system intended to support small island states.[198]

4.2.2 Royalties Received from the French Polynesia EEZ

Similarly, within the EEZ, revenue allocation depends on the classification of the mineral resource and the applicable legal regime, particularly where strategic minerals fall under State control. In such cases, royalties would be collected at the national level and only subsequently redistributed, if at all, through domestic fiscal mechanisms. Despite the existence of formal royalty structures, there is no guarantee that French Polynesia would receive a direct or proportionate share of the economic benefits derived from deep-sea mining activities.

France retains sovereign control over subsoil and seabed resources within French Polynesia's EEZ, and it provides concessions, which are generally long-term right-to-exploit contracts, for a defined resource area.[199] This economic activity creates royalties payments obligations according to the French General Tax Code.[200] However, there is legal uncertainty when it comes to the compensation French Polynesia would receive if they were to accept a deep-sea mining contract in its EEZ:

1. **Mineral classification determines legal jurisdiction but there is no formal definition of what is considered strategic material under French law:** depending on the classification of the resource, between"strategic material or mineral" or "other non-strategical mineral",

[196] Pete McKenzie, "Paradise Divided: French Polynesia Wrestles with Lure of Mass Cruise Tourism," *The Guardian*, December 14, 2023, https://www.theguardian.com/world/2023/dec/14/paradise-divided-french-polynesia-wrestles-with-lure-of-mass-cruise-tourism.
[197] *Seabed mining in areas beyond national jurisdiction: Issues for Congress*. (n.d.). Library of Congress. Retrieved April 18, 2026, from https://www.congress.gov/crs-product/R47324.
[198] Kessler, R. (2025, March 28). *Deep-sea miner TMC seeks U.S. approval, potentially bypassing global regulator*. Conservation News. https://news.mongabay.com/2025/03/deep-sea-miner-tmc-seeks-u-s-approval-potentially-bypassing-global-regulator/
[199] French Mining Code, L. 111-8. Article L.111-6 shall apply to searches and exploitation in the subsoil or on the surface of the land territory and of the public maritime domain, on the seabed and in the subsoil of the exclusive economic zone and the continental plate defined in Articles 11 and 14 respectively of Ordinance No 2016-1687 of 8 December 2016 on maritime zones under the sovereignty or jurisdiction of the French Republic.
[200] French General Tax Code. Article 1519. Available at: https://french-business-law.com/french-legislation-art/article-1519-of-the-french-general-tax-code/

France follows different legal rules.[201] Strategic resources, which include the seabed minerals, fall under the exclusive authority of the French State,[202] which retains exclusive competence over authorization, licensing, and the overall governance of exploration and exploitation.[203] Non-strategic mineral resources may fall within French Polynesia's autonomous competences[204] as reflected in Article 47 of the Organic Law, which cites certain earth elements as resources potentially managed at the territorial level.[205] [206] However, because French law provides no formal or definitive definition of what constitutes a strategic material, classifications can shift over time,[207] creating a persistent ambiguity in the allocation of regulatory authority over mineral resources in maritime zones. In practice, concessions, permits, and licensing may still be issued under French administrative procedures, but the precise allocation of competence between the French State and French Polynesia remains uncertain until a formal classification for critical minerals is established.

2. **Royalties from France are arbitrarily determined:** Although mining and seabed resource exploitation within France jurisdiction are generally subject to royalty regimes[208] and could be redistributed across levels of government (up to 55%),[209] these mechanisms do not apply uniformly to all overseas entities, particularly those governed under special autonomy regimes such as French Polynesia.[210] There is no fixed formula governing how revenues would be shared, and any potential royalty flows to French Polynesia are legally and politically contingent rather than guaranteed.[211] [212] [213]

The case of French Guiana provides a relevant illustration. Despite hosting the Guiana Space Centre,[214] an infrastructure of major economic and strategic importance developed throughout the 60s, the broader territorial economy has not proportionally benefited from the value generated. Despite generating 15% of French Guiana GDP,[215] a significant share of economic gains is externalized and local socio-economic challenges persist, leading to what is often described as an "enclave economy", in which high-value activities operate with

[201] Blue Ocean Law, the Pacific Network on Globalisation, and the International Justice and Human Rights Clinic at Allard Law School, University of British Columbia. Enduring Colonization. How France's Ongoing Control of French Polynesian Resources Violates the International Law of Self-Determination. Available at: https://allard.ubc.ca/sites/default/files/2020-06/enduring-colonization_en.pdf
[202] The Guardian. Playing gods with the cradle of life': French Polynesia's president issues warning over deep-sea mining. Available at: https://www.theguardian.com/world/2025/apr/01/french-polynesia-deep-sea-mining-pacific-warning-president-moetai-brotherson#:~:text=Under%20French%20Polynesia's%20statute%20of,better%20social%20and%20economic%20situation%E2%80%9D.
[203] French Mining Code, title III: Exploitation. Available at: http://rmis.jrc.ec.europa.eu/uploads/legislation/FranceConsolidatedMiningCode_English.pdf
[204] French Mining Code. Title VII. French Polynesia.
[205] Loi organique n° 2004-192 du 27 février 2004 portant statut d'autonomie de la Polynésie française. Article 47. French Polynesia regulates and exercises the rights of conservation and management, as well as the rights of exploration and exploitation of biological and non-biological natural resources, including in particular rare earth elements, (...).
[206] French Mining Code. Title VII. French Polynesia. Organic Law No. 2004-192 of 27 Feb. 2004 on the Autonomy Statute of French Polynesia (Fr.) Article 46.
[207] Le Meur, Pierre-Yves, et al., éditeurs. Les ressources minérales profondes en Polynésie française / Deep-sea mineral resources in French Polynesia. IRD Éditions, 2016, https://doi.org/10.4000/books.irdeditions.9540
[208] Kate Casellas, Jackie Leggett and Armin Fazely. Digging into mining royalties - what are they and how are they are used? Available at: https://www.lexology.com/library/detail.aspx?g=72d6f311-0a61-49f4-8d96-ab2009c37754
[209] Taşkın Deniz Yıldız. How can shares be increased for indigenous peoples in state rights paid by mining companies? An education incentive through direct contribution to the people, Resources Policy, Volume 85, Part A, 2023.
[210] Id 205.
[211] Jones Day. Deep-Sea Mining: Navigating Legal Challenges. Available at: https://www.jonesday.com/-/media/files/publications/2026/01/deepsea-mining-navigating-legal-challenges/deepsea-mining-legal-challenges.pdf?rev=8f10068b378041fbb673bcef8417e725&hash=D474550B3188E7050121810A90D8DF65
[212] Daniel Wilde, Hannah Lily, Neil Craik, Anindita Chakraborty, Equitable sharing of deep-sea mining benefits: More questions than answers, 2023, Marine Policy, https://www.sciencedirect.com/science/article/pii/S0308597X23000994#sec0015 .
[213] Taşkın Deniz Yıldız. How can shares be increased for indigenous peoples in state rights paid by mining companies? An education incentive through direct contribution to the people, Resources Policy, Volume 85, Part A, 2023.
[214] European Space Agency. CSG at 50: half a century of Europe's Spaceport. Available at: https://www.esa.int/About_Us/50_years_of_ESA/CSG_at_50_half_a_century_of_Europe_s_Spaceport
[215] CNES Mag. French Guiana: a launch base like no other. Available at: https://cnes.fr/sites/default/files/2024-08/cnesmag-78-french-guiana-en.pdf.

limited integration into the local economic structure.[216] This dynamic is directly relevant for French Polynesia, where deep-sea mining would likely be carried out by foreign operators and companies. Without strong fiscal transfer rules, local content requirements, and reinvestment policies, deep-sea mining risks repeating a familiar pattern in which extraction occurs locally but only a small share of value stays in French Polynesia, limiting its ability to translate revenues into infrastructure, jobs, capacity-building, or long-term diversification.

French Polynesia should focus on identifying where the existing framework allows flexibility and where it imposes structural constraints. Within these limits, targeted legal and institutional measures can reduce uncertainty and enhance French Polynesia's effective control over the development of its natural resources:

Recommendation #1: Negotiate expanded delegations of competence from the French State in areas directly linked to resource governance. Rather than seeking a broad and politically sensitive reallocation of sovereignty, French Polynesia could pursue incremental, sector-specific delegations, particularly in mining regulation, licensing procedures, and international commercial arrangements. This approach is politically viable and legally feasible within the existing constitutional framework.

Recommendation #2: Clarify and formalize the concept of "strategic minerals/materials." The current absence of a binding legal definition creates uncertainty and allows for discretionary intervention by the French State. French Polynesia should seek either (i) a jointly agreed legal definition embedded in legislation or regulation, or (ii) the establishment of objective criteria (e.g., based on national security, supply chain criticality, or EU classifications). Without this clarification, any expansion of local competence remains inherently unstable.

Recommendation #3: Push for a positive and explicit list of minerals within its competence, building on the precedent of rare earth elements. A codified list, regularly updated and mutually agreed, would provide legal certainty and reduce jurisdictional ambiguity. This technique is often more effective than relying on abstract categories, as it limits interpretative disputes and creates a clearer allocation of authority in practice.

4.3 Claimed Benefit 3: Seabed Minerals Are Richer than Terrestrial Minerals?

Terrestrial deposits are higher grade but lower tonnage than the nodules in the CCZ and PCZ, as shown by the two largest terrestrial mines–Bayan Obo in China and Mountain Pass in the U.S.[217] However, there are two considerations when discussing the business relevance of deep-sea mining:

1. **Uneven and unknown distribution:** While the CCZ and PCZ nodules have higher tonnage, they have lower grades than terrestrial deposits. Additionally, most mineral composition studies have been concentrated in the CCZ and PCZ, and little is known about mineral composition in other parts of the ocean, including in French Polynesia's EEZ, but it is generally understood that areas outside of the CCZ and PCZ have lower mineral tonnage.[218]
2. **Seabed nodules contain a fixed and inseparable mix of critical minerals, which creates an additional market risk compared to on-land mining:** if copper prices rise enough to make deep-sea mining profitable, the simultaneous surge of manganese, extracted unavoidably

[216] The European Space Agency. Impact of space activities in French Guiana. Available at: https://www.esa.int/About_Us/Business_with_ESA/Global_Space_Economic_Forum/Impact_of_space_activities_in_French_Guiana
[217] Hein, James R., et al. "Deep-ocean mineral deposits as a source of critical metals for high- and green-technology applications: Comparison with land-based resources." *Ore Geology Reviews*, vol. 51, no. N/A, 2013, pp. 1-14, https://www.sciencedirect.com/science/article/abs/pii/S016913681200234X.
[218] Ibid.

alongside copper, can depress manganese prices and erode overall project revenues. Unlike most on-land deposits, where operators can target specific ore bodies and avoid oversupplying low-value by-products, nodule deep-sea mining offers no such flexibility, making the self-cannibalizing price dynamic discussed in Section 3.1.3 far more acute.[219]

4.4 Claimed Benefit 4: Deep-Sea Mining Has Less Environmental Impact Than Terrestrial Mining?

Deep-sea mining is often portrayed as less environmentally damaging than terrestrial mining, but this comparison obscures the significant risks it also poses. Terrestrial mines are among the world's largest sources of industrial waste, requiring extensive land clearing, road networks, and processing infrastructure that generate polluted waterways and large volumes of toxic waste.[220] By contrast, deep-sea mining is marketed as less intrusive, with no earth to remove, no roads, seafloor ore transport systems, or buildings. It is supposed to rely on ship vessels moved to pinpoint high grade and tonnage deposits, which limits disturbance to the deep-ocean ecosystems.[221] IM claims its AUVs can gently collect nodules while minimizing sediment disruption, but as noted in Section 4.1, it has not demonstrated a commercial-scale model. TMC's system has been tested at scale, yet it produces substantial sediment plumes and seafloor disturbance.[222]

From left to right: actiniarians[223]; alcyonacean soft corals[224]; antipatharian black corals[225]; hexactinellid glass sponges[226]

Deep-sea mining introduces new and unknown environmental impacts that may equal, or even exceed, the severity of terrestrial mining. Environmental assessments should consider three effects:

1. **Mining will cause irreversible damage to the habitat:** Deep-sea mining degrades seafloor habitats that require decades, if not centuries to recover. Such impacts can disrupt marine ecosystems with long-term effects on fisheries and food systems that communities depend on. Nodules support seafloor habitats, and their removal disrupts ecosystems whose recovery is extremely slow due to nodule formation rates and slow-growing species. Long-term disturbance experiments, including the DISturbance and reCOLonization experiment (DISCOL experiment) in the Peru Basin, that has been monitored for more than

[219] Barnard, M., & Trytten, L. (2025). A Techno-Economic Assessment of Seabed Mining: American Samoa and Global Implications. *National Ocean Protection Coalition*, N/A(N/A), 1–81. CleanTechnica.
[220] Hein, James R., et al. "Deep-ocean mineral deposits as a source of critical metals for high- and green-technology applications: Comparison with land-based resources." *Ore Geology Reviews*, vol. 51, no. N/A, 2013, pp. 1-14, https://www.sciencedirect.com/science/article/abs/pii/S016913681200234X.
[221] *Ibid.*
[222] Barnard, M., & Trytten, L. (2025). A Techno-Economic Assessment of Seabed Mining: American Samoa and Global Implications. *National Ocean Protection Coalition*, N/A(N/A), 1–81. CleanTechnica.
[223] Scales, Helen. "Discovered in the Deep: The Superbuilder Sea Anemones That Make Verandas." *The Guardian*, April 28, 2023. https://www.theguardian.com/environment/2023/apr/28/discovered-in-the-deep-the-superbuilder-sea-anemones-that-make-verandahs.
[224] Alcyonacea. "Soft Corals." Accessed March 11, 2026. https://www.seawater.no/fauna/cnidaria/Alcyonacea.html.
[225] Creatures, Red Sea. "Black Coral." *Red Sea Creatures*, November 19, 2024. https://redseacreatures.com/taxon/invertebrate/stinging/black-coral.
[226] "What Is a Glass Sponge?" Accessed March 11, 2026. https://oceanservice.noaa.gov/facts/glass-sponge.html.

three decades, show that biological and ecosystem functions remain below pre-disturbance levels even after more than two decades.[227] Industrial-scale extraction would likely result in ecosystem alteration that is effectively permanent on human timescales.

Deep-sea mining generates sediment plumes from seafloor disturbance and discharging dewatered sediments into the water column. These plumes can spread widely, smothering seafloor habitats, impairing filter-feeders, and disrupting midwater ecosystems. Because dispersion models rely on limited data and lack large-scale validation, impacts on pelagic and potentially transboundary systems may be underestimated over decades of operation.[228] Beyond biodiversity loss, seabed disturbance may disrupt sedimentary carbon storage and abyssal biogeochemical processes, with potentially significant implications for long-term carbon cycling.[229] Warm mining wastewater may also kill marine life through overheating and toxicity,[230] while continuous industrial noise, light, and vibration further alter typically stable deep-sea environments.[231] Over time, multiple mining sites combined with warming, deoxygenation, and pollution may push abyssal ecosystems beyond recovery thresholds.

2. **The environmental impact of deep-sea mining is poorly known:** Persistent baseline gaps and scientific uncertainty support precautionary governance. Sixty-six percent of the entire planet is deep ocean, and data show that we have only visually observed less than 0.001%.[232] Scientific understanding of deep-sea ecosystems remains extremely limited, creating significant uncertainty in assessing the environmental impacts of deep-sea mining, even in relatively studied regions such as the CCZ. Recent discoveries, including the evidence of "dark oxygen" production associated with polymetallic nodules suggests that nodule fields may play previously unrecognized and critical biogeochemical roles, challenging assumptions that they are inert mineral substrates.[233] The recent identification of three hydrothermal vent fields along the Mid-Atlantic Ridge, hosting novel and highly specialized deep-sea communities, underscores how little is known about abyssal ecosystems and the extent of undiscovered biodiversity in areas targeted for resource exploitation.[234]

The precautionary principle plays a central role in the French legal and policy framework, particularly in relation to environmental protection. This principle, enshrined in the French Constitution through the Environmental Charter,[235] supports a cautious approach where scientific uncertainty persists, and has been a key factor underpinning France's support for restrictions, including a ban or moratorium on deep-sea mining.[236] As a result, any regulatory

[227] T. R. Vonnahme et al., "Effects of a Deep-Sea Mining Experiment on Seafloor Microbial Communities and Functions after 26 Years," *Science Advances* 6, no. 18 (2020), https://doi.org/10.1126/sciadv.aaz5922.
[228] Petrossian, G. A., & Lettieri, J. (2024). A precautionary tale: Exploring the risks of deep-sea mining. Marine Policy, 162, 106073. https://doi.org/10.1016/j.marpol.2024.106073
[229] Levin, Lisa A., Diva J. Amon, and Hannah Lily. "Challenges to the Sustainability of Deep-Seabed Mining." *Nature Sustainability* 3, no. 10 (2020): 784 - 794. https://doi.org/10.1038/s41893-020-0558-x.
[230] Leal Filho, W., Abubakar, I., Nunes, C., Platje, J., Ozuyar, P., Will, M., Nagy, G., Al-Amin, A., Hunt, J., & Li, C. (2021). Deep seabed mining: A note on some potentials and risks to the sustainable mineral extraction from the oceans. *Journal of Marine Science and Engineering*, 9(5), 521. https://doi.org/10.3390/jmse9050521
[231] Williams, R., Cox, K. D., Amon, D., Ashe, E., Chapuis, L., Erbe, C., de Vos, A., Nielsen, K. A., Collins, M. S., Smith, C., Washburn, T., Young, K. F., & Clark, C. W. (2025). Noise from deep-sea mining in the Clarion-Clipperton Zone, Pacific Ocean will impact a broad range of marine taxa. *Marine Pollution Bulletin*, 218, 118135. https://doi.org/10.1016/j.marpolbul.2025.118135
[232] Bell, Katherine L. C., Kristen N. Johannes, Brian R. C. Kennedy, and Susan E. Poulton. "How Little We've Seen: A Visual Coverage Estimate of the Deep Seafloor." *Science Advances* 11, no. 19 (2025). https://doi.org/10.1126/sciadv.adp8602.
[233] Jones, Daniel O. B., Maria Belen Arias, Loïc Van Audenhaege, et al. "Long-Term Impact and Biological Recovery in a Deep-Sea Mining Track." *Nature* 642, no. 8066 (2025): 112 - 118. https://doi.org/10.1038/s41586-025-08921-3.
[234] Mock-Bunting, L. (2023, April 20). *Scientists discover three new hydrothermal vent fields on mid-atlantic ridge.* Schmidt Ocean Institute. https://schmidtocean.org/scientists-discover-three-new-hydrothermal-vent-fields-on-mid-atlantic-ridge/
[235] French Environmental Charter in the Constitution. Article 5. Available at: https://www.constituteproject.org/constitution/France_2008
[236] Deep Sea Conservation Coalition. Deep-sea mining moratorium. Available at: https://deep-sea-conservation.org/solutions/no-deep-sea-mining/

or commercial strategy in this sector must account for a potentially prohibitive national position, even where local economic interests may differ.

3. **Deep-sea mining still needs infrastructure:** Deep-sea mining would occur offshore, but the industry would require shoreline facilities for processing and shipment of materials. Land acquisition and development are still needed, and this has historically driven habit loss and affected coastal communities that depend on marine resources.[237]

4.5 Claimed Benefit 5: Deep-Sea Mining is Less Dangerous than Terrestrial Mining?

Although deep-sea mining is often portrayed as safer because robots perform much of the extraction, the overall risk profile remains significant. According to the International Labor Organization (ILO), terrestrial mining, in most countries, is considered the most hazardous occupation when accounting for the number of people exposed to risk: it accounts for 1% of the global workforce, but is responsible for ~8% of fatal accidents at work. Mineworker injuries include disabling diseases such as pneumoconiosis, hearing loss, and negative effects from vibration.[238]

Some argue that deep-sea mining will be safer because robots, rather than workers, perform most of the extraction.[239] However, additional elements need to be considered:

1. **Heavy and complex engineering is inherently dangerous:** The risk profile of deep-sea mining is similar to offshore oil and gas drilling, where a derrick operator is ranked as the third most deadly occupation.[240] It shares similar risks of falls, heavy lifts, and equipment under pressure. Additionally, incidents can be increased due to new and unique processes, lack of experience, and location remoteness.[241]
2. **Deep-sea mining will take place in remote areas, increasing risk of emergencies:** Beyond technological dangers, workers will be far from land and rapid responses when emergencies occur, which can make deep sea mining even riskier than offshore oil and gas drilling.[242] Offshore drilling typically takes place from a few meters up to 400 kilometers offshore,[243] compared to 1,000 kilometers away for CCZ activities.[244]
3. **Protection of workers' rights is complicated in international waters:** Labor conditions are not governed by a single unified regime but instead depend on a combination of the flag State of the vessel, nationality of the workers, and applicable international conventions.[245] Enforcement of the labor regime also remains uneven, particularly where vessels are registered under so-called "flags of convenience," with weaker regulatory oversight.[246] While

[237] Ashford, O., Baines, J., Barbanell, M., & Wang, K. (n.d.). *What we know about deep-sea mining — and what we don't*. World Resources Institute. Retrieved April 8, 2026, from https://www.wri.org/insights/deep-sea-mining-explained
[238] *Mining: A hazardous work*. (2015, March 23). International Labour Organization. https://www.ilo.org/resource/mining-hazardous-work
[239] Hein, James R., et al. "Deep-ocean mineral deposits as a source of critical metals for high- and green-technology applications: Comparison with land-based resources." *Ore Geology Reviews*, vol. 51, no. N/A, 2013, pp. 1-14, https://www.sciencedirect.com/science/article/abs/pii/S016913681200234X.
[240] Mehta, Benita. "Roofers, Linemen, Oil and Gas Workers among Top 10 Most Dangerous Jobs." ISHN, November 6, 2020. https://www.ishn.com/articles/112751-roofers-linemen-oil-and-gas-workers-among-top-10-most-dangerous-jobs.
[241] Sharma, R. (2025). *Deep-sea mining management, policy and regulation: Data management, environmental monitoring, techno-economic assessment, law of the sea and regulatory regimes*. Springer Nature.
[242] *Ibid.*
[243] Havens, Jonny. "Havens & Associates, PLLC." Havens & Associates, PLLC. Accessed May 4, 2026. https://havensplc.com/faqs/how-many-oil-rigs-are-in-the-gulf-of-mexico/.
[244] AMC Consultants. *Technical Report Summary Initial Assessment of the NORI Property, Clarion-Clipperton Zone Deep Green Metals Inc.* . March 17, 2021, 1 - 347. https://doi.org/https://metals.co/wp-content/uploads/2022/03/01.05-NORI-D-Initial-Assessment-US-SK-1300-by-AMC-March-2021.pdf.
[245] United Nations Convention on the Law of the Sea art. 94, Dec. 10, 1982, 1833 U.N.T.S. 397.
[246] International Transport Workers' Federation, *Flags of Convenience Campaign*, Available at: https://www.itfseafarers.org/en/issues/flags-of-convenience

ILO established the 2007 Work in Fishing Convention (No. 188), deep-sea mining-specific labor standards are still absent.[247] It may also raise similar pervasive conflicts and potential labor crime, such as child labor cases.[248]

A further risk is the absence of a credible accountability framework capable of binding the corporate actors involved in deep-sea mining. Current draft regulations under consideration at the ISA do not reference human rights or the UN Guiding Principles on Business and Human Rights.[249] Without explicit integration of its "protect, respect, and remedy" framework, companies operating in areas beyond national jurisdiction may face no enforceable obligation to conduct human rights due diligence, disclose impacts, or provide effective remedies to affected communities.

Finally, deep-sea mining poses multidimensional risks to human rights. International law requires that all humans are guaranteed the right to life and adequate standard of living. Deep-sea mining poses a major threat to these rights, as it affects fish stocks and seafood safety, underpinning food security, and endangers the ocean's role as a critical carbon reservoir is at risk, potentially accelerating the climate emergency. The downstream consequences, including extreme weather events, altered disease distribution, and intensified sea-level rise present global risks to health and safety that compound the more localised ecological harms described above.

4.6 Case Study: How Foreign Phosphate Extraction Left Nauru Without a Future Economy

The so-called "resource curse", is the failure of natural resource-rich countries to gain the full wealth from these resources. Counterintuitively, many resource-rich countries experience lower economic stability and growth, as dependence on a single resource often fuels competition for control rather than broad-based development. In many cases, either multinational companies or powerful countries win out, leaving the host country with little benefit, and oftentimes worse-off than before the resource was capitalized.[250] Nauru provides a salient example for the future, showing why employing the precautionary principle is critical for sectors with unknown negative impacts.

Phosphate mine in Nauru

In 1901, the raised plateau of Nauru, "Topside", was home to rich vegetation and wildlife. As soon as it was discovered that 80% was rich in phosphate in 1905, the Pacific Phosphate Company made a deal with Germany to mine Nauru.[251]

Miners cleared the vegetation and topsoil, and dug the ore out of the pits of the ancient coral underneath. Four decades later, Nauru was exporting more than 800,000 metric tons of phosphate a year, all priced well below the world average to subsidize

[247] International Labour Organization, Work in Fishing Convention, 2007 (No. 188), June 14, 2007, 2937 U.N.T.S. 77.
[248] Justin Alger et al., "The False Promise of Deep-Sea Mining," *Npj Ocean Sustainability* 4, no. 1 (2025): 21-, https://doi.org/10.1038/s44183-025-00127-4.
[249] United Nations, Guiding Principles on Business and Human Rights: Implementing the United Nations "Protect, Respect and Remedy" Framework (New York and Geneva: United Nations, 2011)
[250] Dal Pra, Amelia. "The Resource Curse, Colonialism, And The Hypocrisy Of Western 'Climate Leadership.'" Georgetown Security Studies Review, April 2, 2022. https://gssr.georgetown.edu/the-forum/regions/africa/the-resource-curse-colonialism-and-the-hypocrisy-of-western-climate-leadership/.
[251] Dauvergne, Peter. "A Dark History of the World's Smallest Island Nation." The MIT Press Reader, July 22, 2019. https://thereader.mitpress.mit.edu/dark-history-nauru/.

farmers in Australia, New Zealand, and Great Britain, as mandated by the League of Nations.[252]

When Nauru finally gained independence in 1968, one-third of the island had been strip-mined. Australia, which administered Nauru before independence, had long been aware of the negative ecological impacts. However, after independence, Australia refused compensation or resettlement alternatives. In 1989, Nauru took Australia to the International Court of Justice. Australia settled, agreeing to pay A$57 million in 1994 and another A$50 million over the next 20 years.[253]

In the 1990s, Nauru attempted to diversify its economy before phosphate supplies ran out. Unfortunately, it gave up tenable agricultural land to phosphate mining, which forced the economy to import most of its food products.[254] Left with limited options, it created an offshore banking sector and started offering "economic citizenship", essentially selling Nauruan passports. These economic plays could not overcome the decline in phosphate exports. By 2004, Nauru's phosphate boom was truly over, with exports tallying just 22,000 metric tons. At this time, the Nauruan government agreed to allow Australia to step back in to manage the country's finances.[255] Today, Nauru has lost 80% of its original vegetation.[256] Nauru's economy is being propped up by Australian aid, with an 18% unemployment rate in 2019, and -1.7% GDP growth from 2019 to 2020.[257]

Nauru is now seeking a way out of its economic crisis and is turning to deep-sea mining, despite the risk of repeating the very resource-curse dynamics that undermined its economy. In 2011, it signed a contract with one of the largest deep-sea mining companies, The Metals Company, to research mineral composition on its seabed. Now, it is one of the Pacific Island countries in favor of ending the ISA moratorium and allowing deep-sea mining in international waters.[258]

5 Counter-Strategies: Market Pressure, Advocacy, and Legal Pathways

As elaborated in the previous section, deep-sea mining is a risky industry with uncertain revenue and profitability, which currently only survives through investor funding. This section outlines three counter-strategies for Pacific islands to protect themselves from deep-sea mining, anchored in pressuring markets and investors, advancing Indigenous-led advocacy, and pursuing legal pathways.

5.1 Deep-Sea Mining Is Unlikely to Survive Market Scrutiny

Market confidence and investor funding is a critical chokepoint for deep-sea mining companies:

1. **Deep-sea mining is running out of cash and rushing for permits:** Companies, such as TMC, remain in an early and capital-dependent phase where operations are sustained by investor belief, rather than a proven business model. Because their cash runway is limited, these firms

[252] *Ibid.*
[253] *Ibid.*
[254] Clifford, Martin J., Saleem H. Ali, and Kazuyo Matsubae. "Mining, Land Restoration and Sustainable Development in Isolated Islands: An Industrial Ecology Perspective on Extractive Transitions on Nauru." Ambio 48, no. 4 (2018): 397 - 408. https://doi.org/10.1007/s13280-018-1075-2.
[255] Dauvergne, Peter. "A Dark History of the World's Smallest Island Nation." The MIT Press Reader, July 22, 2019. https://thereader.mitpress.mit.edu/dark-history-nauru/.
[256] Clifford, Martin J., Saleem H. Ali, and Kazuyo Matsubae. "Mining, Land Restoration and Sustainable Development in Isolated Islands: An Industrial Ecology Perspective on Extractive Transitions on Nauru." Ambio 48, no. 4 (2018): 397 - 408. https://doi.org/10.1007/s13280-018-1075-2.
[257] The Republic of Nauru: Department of Finance. "Nauru Statistics – Department of Finance – Nauru." Accessed April 19, 2026. http://naurufinance.info/nauru-statistics/.
[258] Russell, Alexia. "Nauru's Pathway to Deep Sea Mining." *Newsroom*, July 23, 2025. https://newsroom.co.nz/2025/07/24/naurus-pathway-to-deep-sea-mining/.

are operating under intense time pressure, pushing aggressively for regulatory approvals and shortcuts before their financing collapses. This accelerates the risk that decisions will be made without scientific baselines, adequate safety measures, or legally binding protections.

2. **Biodiversity is now becoming a financial liability:** These financial pressures intersect with a rapidly evolving regulatory environment in which biodiversity loss is now treated as a financially material concern.[259] Under frameworks such as the EU's Corporate Sustainability Reporting Directive (CSRD)[260] and the International Sustainability Standards Board (ISSB),[261] companies and investors must disclose nature-related risks that could affect financial performance. Deep-sea mining triggers both financial and impact materiality due to scientific uncertainty, potential irreversible harm, and regulatory instability.
3. **Financial risks are further compounded by the possibility of stranded assets and ripple effects across entire portfolios**. Deep-sea mining projects require high upfront investment but face uncertain regulatory futures and competition from alternatives such as recycling and material substitution. This creates a credible risk that investments will not recover costs before conditions shift. The risk is also systemic for investors, as environmental damage from deep-sea mining may affect diversified portfolios beyond individual projects.
4. **Investor Pressure is closing the door to financing:** As of early 2026, 32 major financial institutions, including global banks, asset managers, and reinsurers, such as BNP Paribas, Deutsche Bank, and Lloyds, have published explicit policies excluding deep-sea mining from their financial services.[262] The Global Financial Institutions Statement to Governments on Deep Seabed Mining, signed by 37 investors representing over €3.3 trillion of combined assets, was released ahead of the annual meeting of the Seabed Authority (ISA), demonstrating that coordinated investor pressure can reach the governance level.[263] Investor advocacy is also being coordinated through civil society finance campaigns targeting capital flows into deep-sea mining: the United Nations Environment Programme Finance Initiative (UNEP FI) has concluded that the extraction of seabed deposits cannot be considered sustainable, and has urged financial institutions not to support the sector.[264]

Recommendation #1: French Polynesia should engage directly with investor advocacy to keep mobilizing investors, regulators, and Pacific coalitions. Investor-focused pressure is one of the most effective ways to constrain deep-sea mining, because it targets financial institutions whose ESG commitments conflict with the biodiversity and human rights risks the sector poses. The example of Storebrand Asset Management demonstrates how sustained advocacy can lead to divestment and broader institutional shifts:[265] [266] following growing global investor scrutiny of deep-sea mining, Storebrand co-led the Finance for Biodiversity Foundation's 37-investor statement to the ISA, backed a cross-sector moratorium supported by Volvo, BMW, and Google, divested from

[259] *Ibid.*
[260] European Parliament and Council of the European Union, Directive (EU) 2022/2464 of 14 December 2022 as Regards Corporate Sustainability Reporting, Official Journal of the European Union, 2022. See also European Commission, "Corporate Sustainability Reporting," accessed April 9, 2026, https://finance.ec.europa.eu/financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en.
[261] International Sustainability Standards Board (ISSB), IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information (London: IFRS Foundation, 2023).
[262] Deep Sea Mining Campaign, "Financial Institutions Who Have Published Policies Which Explicitly Exclude the Provision of Financial Services for Deep Sea Mining Activities," February 27, 2026, https://dsm-campaign.org/wp-content/uploads/2026/03/260227_FI-DSM-policies_table.pdf.
[263] Storebrand Asset Management, Annual Progress Report on Implementation of the Sustainable Blue Economy Finance Principles, 2023.
[264] United Nations Environment Programme Finance Initiative (UNEP FI), "Harmful Marine Extractives: Deep-Sea Mining," accessed April 9, 2026, https://www.unepfi.org/publications/harmful-marine-extractives-deep-sea-mining/.
[265] Andy Whitmore, interview with Columbia University capstone team, March 26, 2026.
[266] Storebrand Asset Management, "Annual Progress Report on Implementation of the Sustainable Blue Economy Finance Principles," 2023, accessed April 12, 2026, https://www.storebrand.no/en/asset-management/sustainable-investments/sustainable-blue-economy.

all deep-sea mining-exposed companies, and had its CEO testify before the Norwegian parliament in October 2023 against opening the Norwegian continental shelf to seabed mining.[267]

Recommendation #2: French Polynesia can leverage its EU connections to demand regulatory clarification that reinforces disclosure obligations and investor pressure. Using its EU-adjacent status, the government can encourage European supervisory authorities to clarify that investors with deep-sea mining exposure must account for those risks in their mandatory disclosures. This regulatory pressure reinforces market exclusion without requiring direct financial market participation by the government itself.

Recommendation #3: Pacific states with seats in international organizations and shared ecological and governance concerns[268] can collectively amplify pressure on investors through international forums.[269] The United Nations Guiding Principles on Business and Human Rights requires investors to conduct human rights due diligence across their portfolios.[270]

5.2 Indigenous Rights as Advocacy Levers Against Deep-Sea Mining

Indigenous rights and knowledge systems provide Pacific Island governments with strong advocacy tools, grounding political, legal, and diplomatic action in long-standing ocean governance traditions. Long before contemporary studies on ocean governance and resource management, indigenous communities have been stewards of the ocean.[271] In French Polynesia, local communities implement a *Rāhui* system, an ancestral wisdom which bans mass harvesting of resources from the ocean by establishing a temporary or permanent closure of specific areas. This method allows a recovery period for the marine ecosystems,[272] and has been applied for centuries to manage terrestrial ecosystems, preserve coral reefs and fisheries, and maintain water quality on land.[273]

Indigenous peoples have been mostly excluded from contemporary ocean governance. The making of the law of the sea did not take into account traditional practices of ocean management.[274] Current practices have displayed inequitable distribution of benefits and opportunities toward indigenous communities. One particular criticism is derived from the interpretation of the "common heritage of mankind" principle, that is often understood as benefit sharing in monetary form, instead of encouraging a sense of ownership and eventually responsibility towards the ocean.[275]

By sidelining Indigenous participation, deep-sea mining governance breaches fundamental requirements of transparency, consultation, and procedural fairness.[276] Decision-making processes have historically been dominated by states, mining companies, and technical bodies, while ocean-dependent communities, including Indigenous Peoples and Local Communities (IPLCs), have

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[267] Storebrand Asset Management, "Annual Progress Report on Implementation of the Sustainable Blue Economy Finance Principles," 2023, accessed April 12, 2026, https://www.storebrand.no/en/asset-management/sustainable-investments/sustainable-blue-economy.
[268] *Ibid.*
[269] United Nations Office of the High Commissioner for Human Rights, *Guiding Principles on Business and Human Rights: Implementing the United Nations "Protect, Respect and Remedy" Framework*, New York and Geneva: United Nations, 2011, Principles 13 and 17, https://www.ohchr.org/sites/default/files/documents/publications/guidingprinciplesbusinesshr_en.pdf.
[270] Principles for Responsible Investment, "Human Rights," accessed April 12, 2026, https://www.unpri.org/human-rights.
[271] FAO, *The State of World Fisheries and Aquaculture 2020: Sustainability in Action* (Food and Agriculture Organization of the United Nations, 2020).
[272] *Ibid.*
[273] UC Santa Barbara - Bren School of Environmental Science & Management. "What Is Rāhui? Supporting Traditional Resource Management with Contemporary Conservation in French Polynesia." Accessed March 6, 2026. https://bren.ucsb.edu/news/rahui-supporting-traditional-resource-management-contemporary-conservation-french-polynesia.
[274] NGO representative for island conservation, personal communications, March 4, 2026.
[275] NGO representative for island conservation, personal communications, March 4, 2026.
[276] Jaeckel, A., Harden-Davies, H., Amon, D.J. et al. Deep seabed mining lacks social legitimacy. Ocean Sustain 2, 1 (2023). Available at: https://www.nature.com/articles/s44183-023-00009-7

had limited direct involvement.[277] This raises concerns not only from a distributive justice perspective, but also from the standpoint of procedural fairness, as decisions affecting marine areas with cultural, ecological, and economic significance are made without systematic inclusion of those most directly affected.[278] It also directly conflicts with the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)[279] procedural requirements, whose Articles 18, 19, and 32 require participation through Indigenous representative institutions and mandate Free, Prior and Informed Consent (FPIC) for resource-extraction projects.[280] [281] Current deep-sea mining processes, dominated by sponsoring states and the ISA, have largely bypassed these obligations, replicating historical patterns of exclusion in ocean governance.

There have been several important developments in ocean management strategies that have incorporated indigenous knowledge and participation of indigenous communities. An initiative to co-produce Sustainable Ocean Plans with Indigenous and traditional-knowledge holders was launched at the Conference of the Parties to the Convention on Biological Diversity (COP16) in 2024, in hopes of promoting a resilient marine ecosystem and conserving the indigenous communities' intimate relationships with the ocean.[282] In French Polynesia, the discourse of the revival of *Rāhui* and its incorporation into modern practices is received positively. A 2019 study by the Pew Bertarelli Ocean Legacy Project found that 90% of inhabitants in French Polynesia support the creation of a *Rāhui*, higher than the support for other legal conservation methods like protected marine areas.[283]

The UNDRIP and The International Covenant on Civil and Political Rights (ICCPR)[284] together establish that Indigenous communities in French Polynesia have protected rights to maintain their spiritual, cultural, and custodial relationships with traditionally used marine spaces. Practices such as *Rāhui* are recognized expressions of Indigenous governance, and deep-sea mining threatens these rights by disrupting seabed ecosystems that sustain cultural identity, subsistence, and traditional knowledge.[285] ICCPR Article 27 reinforces this protection by affirming minorities' rights to enjoy their culture, which international bodies interpret to include longstanding relationships with land and ocean environments.[286]

5.3 Legal Pathways for Pacific Islands In the Face of Deep-Sea Mining

The U.S.' unilateral move toward deep-sea mining demands a strong legal response from the international community. In 2026, the U.S. accelerated efforts to issue an exploration license to TMC in the CCZ. As a non-party to both the United Nations Convention on the Law of the Sea (UNCLOS) and other relevant legal frameworks, the U.S. has increasingly pursued a more unilateral approach to deep-sea mining, raising broader concerns about the credibility and effectiveness of international law in governing activities in areas beyond national jurisdiction.

Against this backdrop of strained multilateralism, the entry into force of the BBNJ Agreement in January 2026 offers a renewed pathway for strengthening ocean governance. The following

[277] Jaeckel, A., Harden-Davies, H., Amon, D.J. et al. Deep seabed mining lacks social legitimacy. npj Ocean Sustain 2, 1 (2023). Available at: https://www.nature.com/articles/s44183-023-00009-7
[278] *Ibid.* 278.
[279] United Nations General Assembly. United Nations Declaration on the Rights of Indigenous Peoples. A/RES/61/295, 2007.
[280] *Ibid.*
[281] *Ibid.*
[282] "Co-Producing Sustainable Ocean Plans with Indigenous Knowledge," Ocean Panel, October 28, 2024, https://oceanpanel.org/publication/indigenous-knowledge/.
[283] Tuuhia, Tiare. "How an Ancient Practice Aids Marine Conservation." *Smithsonian Magazine*, November 10, 2023. https://www.smithsonianmag.com/science-nature/rahui-and-the-art-of-marine-conservation-180983179/.
[284] United Nations, International Covenant on Civil and Political Rights, adopted December 16, 1966, G.A. Res. 2200A (XXI), U.N. Doc. A/6316, https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-civil-and-political-rights.
[285] United Nations General Assembly. United Nations Declaration on the Rights of Indigenous Peoples. A/RES/61/295, 2007.
[286] *Ibid.*

section examines the structural limitations of the ISA regime, and explores how the BBNJ framework may help reinforce this evolving legal architecture, while enabling Pacific Island States to collectively navigate the complex challenges posed by deep-sea mining.

The seabed beyond national jurisdiction is governed by the customary international law principle of the common heritage of mankind, which prohibits any unilateral claim to mineral rights outside the ISA framework and requires that activities benefit humanity as a whole.[287] [288] UNCLOS reinforces this by barring sovereignty claims and obliging states to prevent environmental harm in both international and national waters.[289] [290] The 1994 Agreement modified Part XI to give industrialized states greater flexibility in exploration and to outline future financial terms, opening the door to deep-sea mining while departing from UNCLOS's original intent to avoid a 'race to the bottom.'[291]

5.3.1 The ISA's Authority is Challenged by Unilateral Actions Driving a Race to the Bottom

5.3.1.1 ISA's Current Situation and Downsides

The ISA, as the body responsible for regulating activities, has faced sustained criticism for limited public participation, and insufficient transparency.[292] It has encountered several challenges in being transparent about regulating seabed exploration, such as failing to disclose environmental data and contractor reports, as well as full mining contracts that have been exercised. Important procedural functions have also been convened in a confidential setting, such as Legal and Technical Commission (LTC) meetings and Finance Committee meetings. Many essential documents, including reports of contractors and state actors, are not publicly accessible. Overall, ISA only scores 44% on transparency metrics, significantly lower than regional fisheries organizations.[293]

Although the ISA has issued regulations for exploration, it has yet to adopt a regulatory regime for exploitation. Nauru's 2021 invocation of the two-year rule required the ISA to finalize these rules by July 2023, yet no framework exists. Liability remains unsolved: the ISA still "fails to fully address contractors' strict responsibility for all direct and indirect injury, damage, and legal expenses incurred by any party, including harm to sea life."[294] The currently standing exploration contracts do not make clear who will be liable for any damage, worsened by insufficient domestic laws to hold mining companies liable.[295] Given criticism of the ISA's governance of the exploration phase, there are even deeper concerns about its ability to manage an immediate shift to exploitation.

Recent unilateral actions further undermine the ISA's authority. The U.S.' decision to grant a subsidiary of TMC a license to undertake deep-sea mining outside the ISA framework challenges multilateralism and erodes trust in international legal institutions.[296]

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[287] Hannah Lily and Samantha Robb, "Two Birds, One Bill: How BBNJ National Legislation Can Tackle UNCLOS Deep Seabed Mining Gaps," EJIL:Talk! (Dec. 4, 2025)
https://www.ejiltalk.org/two-birds-one-bill-how-bbnj-national-legislation-can-tackle-unclos-deep-seabed-mining-gaps/
[288] UNCLOS, art 140.
[289] Ferid Belhaj, The United Nations Convention on the Law of the Sea at Forty: Have the Constraints on the Implementation of Part XI Finally Debunked the Myth of the Common Heritage of Mankind? Policy Center for the New South, 2024, 3.
[290] Davenport, Tara. "The Area & The 1994 Implementation Agreement." Paper presented November 17, 2017. Centre for International Law, National University of Singapore.
https://cil.nus.edu.sg/wp-content/uploads/2017/11/The-Area-and-the-1994-Implementation-Agreement-2017.pdf.
[291] Ferid Belhaj, The United Nations Convention on the Law of the Sea at Forty, 4.
[292] Elisa Morgera and Hannah Lily, "Public Participation at the International Seabed Authority: An International Human Rights Law Analysis," *Review of European, Comparative & International Environmental Law* 31, no. 3 (2022): 374–388.
[293] Columbia University. "Sirens in the Deep: A Critical juncture for Seabed Mining," 31.
[294] Jenik Radon et al., rep., Murkier Waters — The Challenge and Risks of Deep-Sea Mining "Development," 2024, 68-69.
[295] Columbia University. "Sirens in the Deep: A Critical juncture for Seabed Mining," 19.
[296] Daniel Ackerman, "This Company Wants to Be the First to Mine the Ocean Floor, with Trump's Help," NPR, June 30, 2025,
https://www.npr.org/2025/06/30/nx-s1-5450336/trump-nickel-cobalt-pacific-ocean-deep-sea-mining-environmental-concerns.

5.3.1.2 What the ISA Could Build to Credibly Regulate Deep-Sea Mining

ISA has to develop robust and enforceable regulations of exploitation to rebuild trust in multilateral governance of the ocean. ISA needs to ensure that the draft exploitation regulations will comprise clear, enforceable financial terms with precise and responsible environmental thresholds. The current provisions do not set clear standards. LTC can benefit from independent scientific panels crafting peer-reviewed baseline studies and appropriate standards.

The ISA should interpret UNCLOS and the 1994 Agreement more robustly to enable stronger enforcement, including proactive inspections of vessels and installations and strict prohibitions on any exploitation before contracts and regulations are finalized. It must also be empowered to suspend or terminate contracts and impose financial penalties for violations. A bolder approach is needed to curb arbitrary mining, holding not only sponsoring states but also contracting states accountable for activities carried out through their subsidiaries.

ISA can incentivize non-party states to comply with the law of the sea. As not all states are parties to UNCLOS, ISA can ensure universality by incentivizing compliance by providing better market access in return, and coordinating with OECD and WTO to impose strict rules on trades of non-compliant ocean minerals commodities. This would create a condition where it would be difficult and costly for states to operate outside the ISA system and regulation.

Engaging long-standing coalitions and strong states in political power to oppose deep-sea mining is the key to an eventual moratorium. Ensuring robust regulation on deep-sea mining does not mean ISA should endorse the activity, given its need to protect the ocean. ISA can serve as a strong platform for conservative coalitions to gain greater traction and support from member states, while welcoming more scientific insights to support the moratorium.

We recommend that the government leverages multilateral processes and translate normative debates into political influence:

Recommendation #1: French Polynesia to engage with France, the Pacific, and civil society in multilateral fora such as ISA to strengthen its case against deep-sea mining. French Polynesia can strategize around its limited wiggle room. French Polynesia can first engage France to strengthen its position in multilateral fora. French Polynesia, as a full member of the Pacific Islands Forum (PIF) and associations alike, can utilize its common identity and interests to consolidate with neighboring countries. Lastly, French Polynesia can utilize the strong grassroots network with relevant non-governmental organizations (NGOs) for stronger, independent positioning in international organizations, as they are able to formally intervene in dialogues and decision-making processes.

5.3.2 BBNJ as a New Conservation Regime Redefining the Future of Deep-Sea Mining

5.3.2.2 Jurisdictional Gap: Why BBNJ matters

The BBNJ Agreement, which became the third implementing agreement to UNCLOS, was adopted on 19 June 2023, and entered into force on 17 January 2026.[297] There are two main reasons why the BBNJ Agreement matters for deep-sea mining:

1. **It introduces new biodiversity governance mechanisms in Areas Beyond National Jurisdiction (ABNJ)**, in which both the high seas and the Area beneath the waterbody are

[297] Agreement on Marine Biological Diversity of Areas beyond National Jurisdiction. "BBNJ Agreement." Accessed March 5, 2026. https://www.un.org/bbnjagreement/en.

subject to. The "Area" refers to the same geographic space where deep-sea mining occurs and which has traditionally been regulated primarily by the ISA.

2. **The parallel development of the ISA regime and the BBNJ Agreement introduces a potentially complex and tension-prone governance interface for deep-sea mining activities**. While the ISA is mandated to organize and control activities in the Area for the "benefit of humankind," while ensuring effective protection of the marine environment, the BBNJ Agreement embeds a stronger ecosystem-based and precautionary approach to ocean governance. These new conservation-oriented tools and principles could potentially constrain, or in some circumstances override, decisions aimed at facilitating the exploitation of deep-sea mineral resources. As a result, the overlap between the two regimes may generate legal, institutional, and environmental tensions with the existing ISA framework.

5.3.2.2 Area-Based Management Tools: Regulation Contestation with the ISA

A key area of interaction between the BBNJ Agreement and the deep-sea mining regime arises from the establishment of area-based management tools (ABMTs), including marine protected areas (MPAs) in ABNJ.[298] Under Part III, States Parties may designate ABMTs through the Conference of the Parties (COP) to conserve and sustainably use marine biodiversity. These geographically defined management measures may regulate human activities within designated areas to achieve conservation objectives.

Because areas with higher interests of deep-sea mining are in ABNJ, particularly in regions such as the Clarion-Clipperton Zone, ABMTs adopted under the BBNJ framework may overlap with areas subject to exploration contracts or potential exploitation activities regulated by the ISA. This raises questions regarding the allocation of regulatory authority between the BBNJ COP and the ISA, which is mandated under UNCLOS to organize and control mineral-related activities in the Area.

Although the BBNJ Agreement requires respect for the competences of relevant legal instruments and bodies while promoting institutional cooperation, it does not clearly define how conflicts between conservation measures and sectoral regimes should be resolved.[299] Consequently, the designation of ABMTs that affect seabed mining activities may generate regulatory contestation between the biodiversity-focused governance framework of the BBNJ Agreement and the resource-management mandate of the ISA.

5.3.2.3 Environmental Impact Assessment: Regime Interaction Issue with the ISA

The environmental impact assessment (EIA) regime established under Part IV represents another point of interaction with the governance framework for deep-sea mining. The treaty requires States Parties to conduct EIAs for planned activities under their jurisdiction or control that may cause substantial pollution or significant adverse impacts on the marine environment in ABNJ.[300] EIA reports must assess potential and cumulative environmental impacts, baseline conditions, and mitigation measures,[301] including an initial screening process when a planned activity may have more than a minor or transitory effect on the marine environment, or where its impacts are unknown or poorly understood.[302] Deep-sea mining activities would likely trigger this screening threshold.

The BBNJ Agreement addresses this issue by recognizing environmental assessment processes conducted under other relevant legal instruments or sectoral bodies and encouraging coordination

[298] BBNJ, arts 18, 19.
[299] BBNJ, art 22.
[300] BBNJ, art 28.
[301] BBNJ, arts 27, 30, 33, 38.
[302] BBNJ, art 30.

with global, regional, and sectoral frameworks regulating activities in ABNJ. It also introduces an "equivalency" test, under which a separate BBNJ EIA may not be required if an existing assessment is considered equivalent to the one required under the BBNJ and its results are taken into account.[303]

This mechanism aims to avoid duplicative procedures while maintaining environmental safeguards. However, uncertainty remains regarding how equivalency will be determined in practice. It is unclear whether EIAs conducted under the ISA Mining Code would meet BBNJ standards for deep-sea mining, given the latter's stronger emphasis on cumulative impacts, ecosystem-based management, and transparency. The interaction between the two regimes may pose practical and institutional challenges for coordinating environmental governance of deep-sea mining in ABNJ.

5.3.2.4 Knowledge, data, and transparency

The BBNJ Agreement introduces mechanisms aimed at improving the generation, sharing, and transparency of scientific information, which may indirectly influence governance of deep-sea mining. Central to this framework is the establishment of a clearing-house mechanism (CHM), designed as an open-access platform to facilitate the dissemination of information related to marine genetic resources, ABMTs, EIAs, and other activities conducted in ABNJ.[304] The mechanism seeks to enhance transparency and international scientific cooperation by enabling broader access to environmental data and research findings relevant to marine biodiversity conservation.[305]

These provisions may intersect with information practices under the ISA regime. While contractors must collect environmental baseline and monitoring data, access to such information has often been limited, with some data remaining confidential or publicly available only in aggregated form. By contrast, the BBNJ framework promotes broader dissemination of environmental information and coordination with sectoral bodies. Its transparency and knowledge-sharing mechanisms may raise expectations for greater accessibility of environmental data related to deep-sea mining and strengthen scrutiny of environmental impacts in ABNJ.

5.3.2.5 What can BBNJ potentially bring for Deep-Sea Mining governance?

French Polynesia is pursuing an increasingly ambitious marine conservation strategy, including the establishment of three MPAs in its adjacent high seas: The newly designated UNESCO-recognized marine area announced during the United Nations Ocean Conference 2025 (UNOC3) reflects French Polynesia's position as a global leader in ocean governance and biodiversity conservation.

BBNJ PrepCom3 in the United Nations

Once implemented, the designation will safeguard approximately 220,000 square kilometers near the Society Islands and 680,000 square kilometers near the Gambier Islands. By prioritizing biodiversity,

[303] BBNJ, art 29.
[304] BBNJ, arts 12, 28, 29, 30, 31, 32, 33, 34, 36, 37.
[305] BBNJ, art 51.

traditional knowledge, and intergenerational stewardship, French Polynesia has set a new benchmark for leadership in marine conservation, demonstrating how small island territories can exert influence on global sustainability outcomes.[306] This aligns with broader efforts to strengthen protection measures across national waters and areas of ecological significance.

In addition, stakeholders highlighted one of the proposed MPAs, informally referred to as the "pocket", located in a high seas enclave between the EEZs of Kiribati and the Cook Islands. This prospective area may carry important implications for deep-sea mining governance, particularly given both neighboring states' pro-deep-sea mining positions.[307] If advanced, such an MPA could contribute to enhanced conservation outcomes in adjacent areas beyond national jurisdiction. However, its realization under the BBNJ Agreement framework is expected to be gradual. The Agreement remains in its early stages of implementation, and the scientific research, stakeholder consultations, and procedural steps required for formal designation are likely to take several years.

An important observation from the BBNJ Preparatory Commission III, held from 22 March to 2 April 2026, is the growing prominence of Indigenous Peoples and local communities (IPLCs) across negotiations, particularly in discussions on the Rules of Procedure, subsidiary bodies, and key mechanisms such as the Global Environment Facility and the Special Fund. These developments reflect a push to enhance inclusivity and integrate traditional knowledge into the framework.

This trend presents important opportunities for French Polynesia to advance its ocean governance agenda by raising awareness of conservation priorities and strengthening international cooperation. However, the extent to which these procedural gains translate into substantive influence will depend on their implementation. With the first Conference of the Parties (COP1) of the BBNJ to be convened by 17 January 2027, the evolution of these commitments remains a key area to watch.

5.3.2.5 What Pacific Islands Should Push for Under the BBNJ Agreement

Since the ISA exploitation regulations for deep-sea mining are not yet finalized, and remain highly uncertain in timing, a proactive legal strategy becomes critical. We therefore suggest:

Recommendation #1: Pacific Islands to proactively leverage existing legal frameworks, particularly the BBNJ Agreement, to safeguard ecologically significant areas in advance.

Recommendation #2: French Polynesia, in coordination with France and Pacific partners, should actively support the early identification and designation of MPAs in areas beyond national jurisdiction. By utilizing BBNJ's area-based management tools, this approach operationalizes the precautionary principle and ecosystem-based management, while embedding conservation priorities into emerging global ocean governance. Strategically, advancing MPAs under the BBNJ framework provides a legally grounded and forward-looking mechanism to restrict or preclude future deep-sea mining activities in vulnerable ecosystems, while strengthening Pacific coalitions and shaping norms at the outset of BBNJ implementation.

In this context, early action is not only defensive, but strategic: it enables Pacific actors to influence the rules of the game, restrict high-risk activities in vulnerable ecosystems, and reinforce regional cohesion in the face of regulatory uncertainty.

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[306] *Major breakthrough in marine conservation unveiled at UN Ocean Conference.* (n.d.). IUCN. Retrieved April 12, 2026, from https://iucn.org/press-release/202506/major-breakthrough-marine-conservation-unveiled-un-ocean-conference

[307] The Metals Company, The Metals Company acquires third seabed contract area to explore for polymetallic nodules (Apr. 7, 2020), https://metals.co/deepgreen-acquires-third-seabed-contract-area-to-explore-for-polymetallic-nodules/ ; United States Department of State, Joint statement on U.S.-Cook Islands cooperation on seabed mineral resources, https://www.state.gov/releases/office-of-the-spokesperson/2025/08/joint-statement-on-u-s-cook-islands-cooperation-on-seabed-mineral-resources

5.4 Strategic Responses to the U.S. Unilateral Licensing Threat

The U.S. adopts a distinct legal approach to the regulation of deep-sea mining due to its absence of ratification of the United Nations Convention on the Law of the Sea.[308] Its regulatory framework operates independently from the international seabed governance system administered by the ISA,[309] and deep-sea mining activities by U.S. entities are governed primarily by the Deep Seabed Hard Mineral Resources Act (DSHMRA).[310] This statute establishes a domestic licensing regime that authorizes U.S. organized companies to engage in exploration and potential exploitation of seabed mineral resources located in international waters. Regulatory authority is exercised by the National Oceanic and Atmospheric Administration (NOAA), which is responsible for issuing licenses and ensuring compliance with applicable legal and environmental requirements.[311]

Recent reforms have increased the flexibility and speed of the U.S. regime, including the introduction of a consolidated application process for exploration and commercial recovery.[312] This streamlined pathway contrasts with the still-evolving regulatory framework under the ISA. In practice, this path could lead to an alternative route for private actors seeking regulatory certainty, even if such certainty is confined to the domestic legal sphere and lacks international recognition.

These dynamics have become particularly visible in the Pacific region, where the interaction between national initiatives and international governance frameworks is increasingly complex. In the Cook Islands, for instance, deep-sea mining has advanced under a domestic regulatory framework that allows exploration of polymetallic nodules within its EEZ, supported by partnerships with foreign companies and growing international interest.[313] Although these activities formally fall within national jurisdiction, their development has been accompanied by political, technical, and financial engagement from external actors, including the U.S., which has expressed strategic interest in securing alternative critical mineral supply chains in the Pacific.[314] This indirect support, through diplomatic alignment, technical cooperation, and broader geopolitical signaling, has contributed to accelerating national-level initiatives that operate in opposition to ISA-led processes.

This pattern reinforces broader concerns about fragmentation in seabed governance. Even where activities are legally situated within EEZs, their connection to global supply chains, overlapping ecological systems, and shared technological infrastructures blurs the boundary between national and international domains. As a result, developments in jurisdictions such as the U.S. or the Cook Islands may have spillover effects on governance norms, particularly if they normalize decentralized or competitive regulatory approaches.

The strategy of TMC further illustrates this fragmentation. The company operates through subsidiaries sponsored by Nauru[315] and Tonga[316] in the CCZ, while simultaneously pursuing licenses through the U.S. regulatory framework. This dual-track approach enables a form of regulatory

[308] Keating-Bitonti, Caitlin. Seabed Mining in Areas Beyond National Jurisdiction: Issues for Congress. Available at: https://www.congress.gov/crs-product/R47324
[309] *Ibid.* 324.
[310] *Ibid.* 324.
[311] *Ibid.* 324.
[312] *Ibid.* 324.
[313] Alberts, Elizabeth Claire. Expedition charts Cook Islands seafloor, amid scrutiny over mining motives. Available at: https://news.mongabay.com/2025/11/expedition-charts-cook-islands-seafloor-amid-scrutiny-over-mining-motives/
[314] U.S. Department of State. Joint Statement on U.S.-Cook Islands Cooperation on Seabed Mineral Resources. Available at: https://www.state.gov/releases/office-of-the-spokesperson/2025/08/joint-statement-on-u-s-cook-islands-cooperation-on-seabed-mineral-resources
[315] The Metals Company. TMC and Nauru Announce Updated Sponsorship Agreement for Nauru Ocean Resources Inc. (NORI). Available at: https://investors.metals.co/news-releases/news-release-details/tmc-and-nauru-announce-updated-sponsorship-agreement-nauru-ocean/
[316] The Metals Company. TMC and Tonga Announce Updated Sponsorship Agreement for Tonga Offshore Mining Ltd (TOML). Available at: https://investors.metals.co/news-releases/news-release-details/tmc-and-tonga-announce-updated-sponsorship-agreement-tonga/

arbitrage, allowing the company to navigate between regimes in search of more favorable outcomes, and intensifies tensions between domestic authorization and international legitimacy.

This behavior was justified as a response to regulatory uncertainty created by the ISA's delay in adopting exploitation rules. According to both TMC and Tonga, this regulatory uncertainty impeded the ability of sponsoring States, particularly Small Island Developing States, to realize the benefits of their rights under UNCLOS. The revised sponsorship agreement between Tonga and Tonga Offshore Mining Ltd (TOML) is claimed to preserve anticipated economic returns while adapting to delays in the multilateral regime, with the U.S. system offering a more stable and enforceable regulatory pathway.[317] However, this rationale risks legitimizing recourse to unilateral alternatives in response to institutional delay, weakens ISA authority and erodes the collective governance model underpinning the seabed as the common heritage of humankind, ultimately diminishing the long-term negotiating power of the very States it seeks to benefit.

From the perspective of international law, these developments have triggered a strong institutional response. The ISA has consistently reaffirmed that it holds the exclusive legal mandate to regulate mineral-related activities in the Area, as established under UNCLOS,[318] and emphasized that all activities in the Area must be conducted under its authority and that States have a duty not to recognize or support activities undertaken outside this framework[319]. Commercial exploitation and unilateral licensing without ISA authorization may give rise to international responsibility and raise significant concerns regarding their compatibility with the international legal order.[320]

These concerns were made explicit following TMC's announcement in March 2025 that it would seek permits under U.S. law. During the 2025 session of the ISA, Secretary-General Leticia Carvalho expressed deep concern regarding this development, warning that attempts to bypass the ISA framework could violate international law and erode the principle of the seabed as the common heritage of humankind.[321] She reaffirmed the ISA's exclusive mandate and called for continued adherence to multilateral governance mechanisms.[322] This position was broadly supported by ISA Member States, including those holding exploration contracts, which reiterated their commitment to operating within the established international system and rejected unilateral approaches.[323]

For Pacific Island States, these overlapping dynamics create both legal and strategic vulnerabilities. Activities conducted using the U.S. pathway may generate environmental externalities affecting fisheries, biodiversity, and coastal livelihoods, without requiring the consent of nearby states. At the same time, the emergence of unilateral regulatory pathways may weaken the negotiating position of sponsoring states within the ISA system, especially regarding benefit-sharing, environmental safeguards, and long-term governance arrangements.

Additionally, these developments may also open space for complex, costly and potentially precedent-setting litigation. Disputes may arise not only at the international level, particularly concerning the legality of activities conducted in areas beyond national jurisdiction, but also within domestic legal systems. For Pacific jurisdictions such as French Polynesia, this creates indirect exposure to legal conflicts involving activities that may affect regional ecosystems, fisheries, or coastal communities without their formal participation or consent.

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[317] *Ibid.* 333.
[318] ISA. FAQs about the International Seabed Authority and deep-sea mining. Available at: https://isa.org.jm/faq-for-media/
[319] *Ibid.* 335.
[320] *Ibid.* 335.
[321] Keating-Bitonti, Caitlin. Seabed Mining in Areas Beyond National Jurisdiction: Issues for Congress. Available at: https://www.congress.gov/crs-product/R47324
[322] *Ibid.* 339.
[323] *Ibid.* 339.

Litigation could take multiple forms. Challenges may be brought against states that unilaterally authorize deep-sea mining activities, such as the U.S., within their own domestic courts, contesting the legality of licenses issued without adherence to international frameworks or adequate consultation with affected stakeholders. However, such actions may face structural limitations. The U.S. is generally immune from suit unless it consents, although the Administrative Procedure Act waives sovereign immunity for claims seeking non-monetary relief against federal agencies or officials acting in their official capacity, thereby narrowing the scope of potential challenges.

Alternatively, legal actions may target private operators in the jurisdictions where they are headquartered or incorporated. In the case of companies such as TMC, this could involve litigation in Canadian courts in Vancouver, focusing on environmental harm, corporate responsibility, or failure to comply with international standards. This avenue may offer a more viable pathway for accountability, especially where domestic legal systems provide for extraterritorial jurisdiction or recognize transnational environmental claims.

From a strategic perspective, French Polynesia must remain very attentive to these evolving litigation risks, particularly given its limited capacity to act independently in international legal proceedings, as discussed in Section 1.3:

Recommendation #1: **Pacific Island States should develop a coordinated regional position on deep-sea mining governance within and beyond the ISA framework.** This would help reduce fragmentation among individual licensing strategies and strengthen collective bargaining power in negotiations over environmental standards and benefit-sharing mechanisms. For French Polynesia and other Pacific jurisdictions, this evolving landscape calls for a more structured strategic response that integrates legal, diplomatic, and communicative dimensions. Strengthening regional alignment with Pacific Island States, including the Cook Islands, Tonga, Nauru, and Kiribati, is essential to avoid fragmentation and preserve collective influence in seabed governance discussions.

Recommendation #2: **French Polynesia should lead or actively participate in a regional strategic communications framework on deep-sea mining risks and governance choices.** This would ensure that domestic and regional stakeholders are informed about long-term implications, including the risk of weakened ISA-based benefit-sharing, environmental uncertainty associated with fragmented regulatory regimes, and increasing geopolitical competition in the Pacific. Such a framework would also help align scientific, legal, and policy narratives across Pacific jurisdictions.

Recommendation #3: **Pacific Island States should prioritize sustained engagement within ISA processes while resisting incentives toward fragmented or parallel licensing regimes.** Continued participation is critical to preserving institutional influence over the development of exploitation regulations and ensuring that the principle of the common heritage of humankind is not eroded through incremental reliance on unilateral alternatives.

Recommendation #4: **French Polynesia should explore, in coordination with France, mechanisms to expand its ability to engage in relevant domestic and international litigation**, particularly in cases involving environmental impacts and resource governance. The emergence of a unilateral U.S. licensing regime, alongside expanding national initiatives in the Pacific, signals a shift toward more fragmented seabed governance. Whether this produces constructive regulatory pluralism or weakens multilateral norms will depend on how effectively affected states coordinate their responses and shape public and political narratives around deep-sea mining. Strategic coordination and communication are therefore essential to preserving regulatory stability, environmental protection, and equitable benefit-sharing.

Conclusion: Pacific Islands Can Achieve a Sustainable Economy Together

French Polynesia's position offers a sustainable path for the region: build prosperity by nurturing the ocean economy and cultural ties, not by undermining them. Pacific islands need to choose a development model that creates jobs, protects sovereignty, and preserves the ecosystems their livelihoods depend on. The world must be reminded that the ocean's wealth is already alive: its fish, its plants, and the oxygen that makes life possible. French Polynesia's ambition is to show that long-term prosperity comes from investing in its real strengths that stem from its traditions, not in the risky and uncertain promises of deep-sea mining.

But this is not only a French Polynesia story. It is a story for all of the Pacific and beyond. Island economies face the same pressures: narrow economic bases, high import dependence, climate exposure, and the growing influence of external actors in ocean governance. No single island can navigate these challenges in a silo. A shared strategy is needed. This strategy must involve all countries. There is support within the ISA, including from major actors across the Indo-Pacific. With the U.S. now an outlier, it becomes even more important for the voices of French Polynesia and the wider Pacific to be heard.

A collaborative Pacific approach would focus on three priorities. First, protect the ocean's health to sustain the region's economy and the essential services it provides, including food security, oxygen production, and the foundations of life. This means coordinated positions on deep-sea mining, stronger regional science networks so local knowledge becomes global knowledge, and joint monitoring of ecological risks. Second, scale the sectors that create value at home. Islands can pool expertise on their respective strengths, and generate jobs without compromising ecosystems. Third, strengthen regional governance, supported by ISA member states. Collective action is essential to shape global rules, address legal gaps, and ensure that ocean decisions reflect Pacific priorities rather than external pressures. Incorporating the evolving U.S. position will be a shared challenge the region must navigate together.

French Polynesia's determination to move further shows what this future can look like: a development model rooted in ocean stewardship, diversified growth, and economic resilience. If Pacific islands act together, they can secure a shared prosperity that protects their people, their sovereignty, and the ocean that defines them, and, ultimately, sustains the world. As the campaign video reminds us, oceans are life.

6 Appendix

6.1 List of Interviews Conducted

For this report, we carried out 50+ interviews, including 25 during our field trip in French Polynesia, engaging stakeholders across government, the private sector, civil society, and the research community.

Sector	Type of Actor	Organization	Topic / expertise
French Polynesia Government and Public Institution			
Political	Public institution	Municipal government	Local governance
Government	Public institution	Economic development agency	Economic strategy
Government	Public institution	Digital economy directorate	Digital sector development
Government	Public institution	Office of the President	Strategic priorities
Economy	Public institution	Statistics Institute	French Polynesia Economic data
Government	Public institution	Agriculture & Marine Resources	Ocean, agriculture, food systems
Government	Public institution	Tourism board	Tourism strategy
Government	Public institution	Environmental directorate	Mining & deep-sea mining risks
Government	Public institution	Sports & Youth	Youth employment & crafts
Government	Public institution	Land & mining affairs directorate	Mining governance
Government	Public institution	Climate & sustainability office	Sustainability integration
Government	Public institution	Energy department	SWAC & energy strategy
Science, Research & Academia			
Marine science	University	International public policy school	Marine science and governance
Ocean research	Public research institute	Marine research center	Aquaculture & fisheries
Ocean research	Public research institute	Marine research center	Aquaculture & fisheries
Research	Public institution	National scientific research center	Ocean economy
Ocean research	Public research institute	Marine research center	Aquactulure
Environment	University	International public policy school	Environmental economics
Ocean & climate	University	Climate geopolitics center	Climate & security
Education	Public institution	French Polynesia University	French Polynesia Economy
Blue Economy & Blue Growth			
Blue Economy	NGO	Ocean innovation initiative	Ocean economic avenues
Blue Economy	NGO	Overseas innovation accelerator	Blue economy development
Aquaculture	NGO	Local aquaculture cooperative	Aquaculture
Aquaculture	Private company	Local aquaculture producer	Aquaculture
Aquaculture	Corporation	Marine biotech company	Sea cucumber farming
Aquaculture	Corporation	Pearl recycling start-up	Pearl waste valorization
Pearl farming	Private company	Pearl producer's association	Pearl sector
Tourism	Individual	Eco-tourism guide	Tourism & conservation
Ocean economy	Private company	Marine genomics start-up	Ocean economy & finance
Ocean Energy & Clean Infrastructure			

Ocean energy	Private company	SWAC engineering firm	SWAC development
Ocean energy	Private company	SWAC developer	SWAC deployment
Ocean energy	Public agency	National energy transition agency	SWAC feasibility
Ocean energy	Private company	SWAC developer	Pearl sector & energy
Ocean Law, Governance & Deep-Sea Mining (DSM)			
Business & HR	University	International public policy school	Human rights & DSM
Environment	NGO	Regional DSM advocacy coalition	DSM risks
Legal	Law firm	International law firm	DSM legal frameworks
Legal	Law Professor	U.S. Law School Professor	DSM legal frameworks
Individual	Individual	Pacific conservation leader	DSM & ocean protection
Ocean Law	NGO	Alliance of small island states	Ocean diplomacy
Ocean Law	University	U.S. University	Ocean law & governance
Ocean Law	Private company	Ocean policy consultancy	Ocean law & blue economy
Local Community Voices			
Local people	NGO	Local coral reef stewardship	Rahui, resource management
Local people	Individual	Traditional sailing association	Cultural perspectives
Local people	Individual	Traditional canoe restoration	Cultural heritage
Storytelling	Individual	Local photographer	Moorea culture
Culture	Individual	Local dance group	Cultural identity
Environment	NGO	Local environmental NGO	Conservation
Local people	NGO	Island conservation foundation	ISA participation for local people
Storytelling	NGO/athlete	Global environmental NGO	Ocean advocacy
Storytelling	University	International public policy school	Social impact campaign
Storytelling	Activist group	Youth ocean advocacy collective	Ocean conservation
International Partners & Comparative Insights			
Aquaculture	Public institution	Regional aquaculture council	Aquaculture and pearl systems
Ocean resource	Philanthropy	Marine conservation foundation	Ecosystem restoration

6.2 Exhaustive List of Economic Activities

Resources	Level 1	Level 2
Direct ocean	Fisheries	
Direct ocean	Wild Fisheries	Raw fishery products
Direct ocean	Wild Fisheries	Fish waste
Direct ocean	Wild Fisheries	Value-added fish processing
Direct ocean	Wild Fisheries	Fish auction
Direct ocean	Pearl & Aquaculture	
Direct ocean	Pearl & Aquaculture	Pearl farming and processing
Direct ocean	Pearl & Aquaculture	Pearl waste
Direct ocean	Pearl & Aquaculture	Raw aquaculture products
Direct ocean	Pearl & Aquaculture	Value-added aquafood & cosmetics processing
Direct ocean	Ocean Energy	

Direct ocean	Ocean Energy	Sea Water Air Conditioning Systems (SWAC)
Direct ocean	Ocean Energy	Ocean Thermal Energy Conversion (OTEC)
Direct ocean	Ocean Energy	Marine energy
Direct ocean	Ocean Energy	Offshore energy
Direct ocean	Ocean research & data	
Direct ocean	Ocean research & data	Ocean mapping & modelling
Direct ocean	Ocean research & data	Ocean research
Direct ocean	Ocean conservation finance	
Direct ocean	Ocean conservation finance	Blue carbon credits
Direct ocean	Ocean conservation finance	Ocean conservation credit (OCC)
Direct ocean	Ocean conservation finance	Debt-for-nature swap
Direct ocean	Ocean sports	
Direct ocean	Ocean sports	Surfing training & equipment
Direct ocean	Ocean sports	Sailing training & equipment
Direct ocean	Ocean sports	Triathlon/ironman
Direct ocean	Ocean sports	Wellness and coaching
Direct ocean	Ocean sports	Diving training & equipment
Direct ocean	Ocean manufacturing	
Direct ocean	Ocean manufacturing	Fishing equipments
Direct ocean	Ocean manufacturing	Fishing boats
Direct ocean	Ocean education	
Direct ocean	Ocean education	Maritime schools, Navigation & seamanship training
Direct ocean	Ocean education	Ocean science training programs
Partly ocean	Tourism & culture	
Partly ocean	Tourism & culture	Hotel & Residence
Partly ocean	Tourism & culture	Cruises
Partly ocean	Tourism & culture	Ocean-related tours & adventures
Partly ocean	Tourism & culture	Eco-tourism / slow tourism
Partly ocean	Tourism & culture	Cultural & heritage tourism
Partly ocean	Tourism & culture	Blue health & medical tourism
Partly ocean	Transport & logistics	
Partly ocean	Transport & logistics	Airport in Marquises
Partly ocean	Transport & logistics	Port activities
Partly ocean	Transport & logistics	Port modernization
Partly ocean	Transport & logistics	Intra-island transport
Partly ocean	Transport & logistics	Cold chain & export logistics
Partly ocean	Digital economy	
Partly ocean	Digital economy	Digital education
Partly ocean	Digital economy	Digital nomads
Partly ocean	Digital economy	Digital infra & telecom
Partly ocean	Digital economy	Digital tech & services

Partly ocean	Digital economy	Creative industries
Not ocean	Waste & circular economy	
Not ocean	Waste & circular economy	Waste management
Not ocean	Waste & circular economy	Recycling / Ressourcerie
Not ocean	Agriculture and forestry	
Not ocean	Agriculture and forestry	Raw agricultural products
Not ocean	Agriculture and forestry	Value-added agricultural processing
Not ocean	Construction & real estate	
Not ocean	Construction & real estate	Public infrastructure
Not ocean	Construction & real estate	Private real estate
Not ocean	Construction & real estate	Materials
Not ocean	Energy (non-marine)	
Not ocean	Energy (non-marine)	Renewables (solar, wind)
Not ocean	Energy (non-marine)	Energy storage solutions
Not ocean	Energy (non-marine)	Hydroelectric power
Not ocean	Energy (non-marine)	Geothermal
Not ocean	Industry & manufacturing	
Not ocean	Industry & manufacturing	Wood-related
Not ocean	Industry & manufacturing	Other light manufacturing
Not ocean	Industry & manufacturing	Handicrafts & artisanal products
Not ocean	Water services	
Not ocean	Water services	Water management
Not ocean	Retail & commerce	
Not ocean	Retail & commerce	Local shops, food market
Not ocean	Retail & commerce	E-commerce, Distribution networks
Not ocean	Education & research	
Not ocean	Education & research	Universities, Research institutes (non-ocean)
Not ocean	Education & research	Vocational training
Not ocean	Financial & professional services	
Not ocean	Financial & professional services	Insurance, reinsurance, fintech, microfinance, green finance
Not ocean	Financial & professional services	Consulting, architecture, engineering, legal services, accounting, marketing & creative agencies
Not ocean	Health & social services	
Not ocean	Health & social services	Hospitals, elderly care
Not ocean	Health & social services	Community health services, preventive health programs

6.3 Evaluation of Priority Economic Opportunities

Figure 17: Unlocking French Polynesia's Opportunities in Pearl, Ocean Sports, & Aquaculture

Level 1	Level 2	Priority	Current Value	Additional Potential	Feasibility	Timeline
1 Pearl	Pearl Farming & Processing	Yes	High	High	Medium	Mid-term
	Pearl Waste	Yes	Low	Medium	High	Short-term
2 Ocean Sports	Surf Training & Equipment	Yes	Low	Medium	High	Short-term
	Diving	Yes	Low	Medium	High	Short-term
	Sailing	No	Low	Medium	Medium	Short-term
	Wellness & Coaching	No	Low	Low	Medium	Short-term
3 Aquaculture	Aquaculture Raw Products	Yes	Medium	Medium	High	Short-term
	Aquaculture Processing	Yes	Low	High	Medium	Mid-term

Figure 18: Unlocking French Polynesia's Opportunities in Digital Economy & Ocean Energy

Level 1	Level 2	Priority	Current Value	Additional Potential	Feasibility	Timeline
4 Digital Economy	Digital Education	Yes	Low	Medium	Medium	Short-term
	Digital Tech & Services	Yes	Low	High	Medium	Mid-term
	Digital Infrastructure	Yes	Low	High	Medium	Mid-term
	Digital Nomads	No	Low	Medium	Low	Mid-term
5 Ocean Energy	SWAC	Yes	Medium	High	Medium	Mid-term
	OTEC	Yes	Low	High	Low	Mid-term
	Marine Energy	No	Low	Low	Low	Long-term
	Offshore Energy	No	Low	High	Low	Mid-term

6.4 About the Authors

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Jenik is Adjunct Professor at Columbia University's School of Public and International Affairs (SIPA), where he teaches sustainable natural resource development, including risk management, sovereignty, human rights, and social license. He played key roles in Nepal's constitutional peace process and in Estonia's independence struggle. He also co-authored major economic and investment laws in Estonia. He advises governments and civil society in emerging nations, including Estonia, Kosovo and Namibia, and represents countries rich in natural resources in negotiating with energy and mining companies.

Eric Chang - *Faculty Advisor*

Eric is the Founder and Principal of Chang Law, an international disputes practice specializing in commercial and investor-State arbitration across sectors such as construction, mining, energy, infrastructure, and PPPs. He is a former French Avocat à la cour at the Paris Bar, and a member of the New York and California Bars.

Anna Schneider - *Project Manager*

Anna (Columbia SIPA MPA '26) is an energy and finance professional with five years of experience in M&A, growth strategy, and clean-energy across Europe and the United States. Originally from France, she holds a Master in Management from ESSEC Business School. At SIPA, she consolidated her expertise in energy markets, regulation, and policy, serving as President of the Columbia Energy Association and collaborating with Caribbean governments, including Barbados under Prime Minister Mia Mottley, to advance energy-transition and resilience strategies. She brings strong leadership and a proven track record of execution and delivery.

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Becca (Columbia SIPA MIA '26) is a technology, finance, and sustainability professional, with experience in management consulting at Accenture and Deloitte, where she led cross-functional teams on digital transformation, financial strategy, and operational delivery for Fortune 500 clients. At SIPA, she focused on sustainability & energy and technology & AI policies, and worked with the United Nations Environment Programme (UNEP) on preparations for the 2025 UN Ocean Conference, analyzing how sovereignty, economic viability, and environmental protection shape seabed-mineral governance.

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Julia (Columbia SIPA MIA '26) is a New York City-based director and photographer working at the intersection of culture, climate, and community. Her work bridges data and storytelling across human rights, environment, and technology, with research in mis- and disinformation, climate adaptation, and international law, including at UNDP. Prior to SIPA, she built a multidisciplinary career in fashion, tech, and travel as an art director, creative producer, and editor. Having spent her life along coastlines—from Boston to Dublin, Hong Kong, and New York—she is drawn to stories that bring her closer to the sea.

Muriel Jacques - *Client Representative*

Muriel (Columbia SIPA MPA '26) is an energy, heavy industries and sustainability professional with four years of experience across Europe, Asia, the United States, and the Caribbean. Originally from Martinique, she holds dual Master's degrees in Industrial Engineering (INSA Lyon and KAIST) and Management (INSEAD). At SIPA, she focused on energy markets, geopolitical risk, and economic development, as a Fellow at the Columbia Center on Global Energy Policy (CGEP) and leading projects with Caribbean governments to advance the energy transition. She brings a nuanced understanding of challenges facing decision makers in island economies.

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Farhan (Columbia SIPA MPA '26) is an Indonesian Diplomat with 4+ years of experience in multilateral diplomacy, specializing in International Peace and Security, Human Rights & Humanitarian Affairs, and Sustainable Development. His work sits at the intersection of International Law, ESG/Corporate Sustainability, Data Analysis, and Conflict Resolution, particularly the protection of Indigenous coastal communities from the human rights impacts of deep-sea mining, with mitigation & remediation efforts grounded in the International Bill of Human Rights, and Business and Human Rights frameworks, such as UNGPs and shareholder advocacy.

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Wei-Yih (Aileen) (Columbia SIPA MPA '26) is a marine policy analyst and legal advisor. She holds an LL.M. in International Law from National Taiwan University, and served as a Legal Advisor to Taiwan's Fisheries Agency from 2021-2024, leading maritime legal research and supporting multilateral negotiations. At SIPA, she has specialized in the governance of emerging climate interventions. During her time at SIPA, she worked at the Environmental Defense Fund as a policy analyst intern on marine carbon dioxide removal, and served as a research assistant at Columbia Law School, where she focused on international legal frameworks of novel climate solutions.

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Adore (Columbia SIPA MPA-DP '26) is passionate about environmental justice and advocating for marginalized communities. She has researched environmental and health disparities linked to refineries and petrochemical facilities at the Environmental Defense Fund and examined climate-risk perceptions in coastal communities as an NCAS-M Fellow at NOAA. Her interests span circularity, human-centered design in supply chains, and the interconnected nature of systems—including art and textiles in the energy space.

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Mariana (Columbia LLM '26) is a Brazilian lawyer specializing in energy and mining law, with expertise in regulatory policy, corporate transactions, project finance, and sustainable energy initiatives. She has advised domestic and international clients on high-value investments in Brazilian mining and energy assets. She previously earned her Bachelor of Laws from the University of Brasília (UnB) and holds an MBA in Law and Regulation of Electrical Energy from the Brazilian Institute for Education, Development and Research (IDP).