

INDEFINITE MORATORIA ON DEEP-SEA MINING: CLIMATE NECESSITY OR COMPENSABLE REGULATORY TAKING?

Ogonna Beauty Ogbologu¹

ABSTRACT

Deep-sea mining has increased because critical minerals are essential to the blue economy. However, a mining entity can only proceed if sponsored by a state party to UNCLOS and approved by the ISA, which has a dual mandate to facilitate resource development and ensure environmental protection. States remain cautious because the extent of ecological harm has not been scientifically ascertained. This places the ISA in a legal dilemma: balancing its dual mandate with the 1994 Agreement's two-year rule, which requires resolving political and scientific deadlock. This article asks: when does a precautionary moratorium cease to be a legitimate regulation and become compensable indirect expropriation? It argues that open-ended moratoria neutralise the economic value of ISA-approved exploration investments, triggering claims based on legitimate expectations, regulatory takings and FET. Extractive-sector case law shows ISA-approved contracts are conditionally protected investments, giving investors legitimate expectations of procedural progression. Consequently, open-ended, scientifically unanchored moratoria without review mechanisms breach FET and expose sponsoring states to indirect expropriation claims. Police powers and climate necessity defenses cannot shield states where economic effects are severe. This article concludes by proposing that the ISA Council adopt a binding Moratorium Governance Protocol as a procedural instrument, requiring moratoria to identify specific ecological risks, undergo mandatory independent review at defined intervals, expire automatically without affirmative renewal, and trigger compensation assessments where suspension remains unresolved beyond two consecutive review cycles.

KEYWORDS: Deep-Sea Mining, International Seabed Authority, Indirect Expropriation, International Investment Law, Blue Economy Governance.

INTRODUCTION

The first known investor-state case involving seabed mining was *Odyssey Marine Exploration, Inc. v. United Mexican States*. In 2024, an investor-state tribunal awarded US\$37.1 million to Odyssey Marine Exploration Inc. against Mexico for arbitrarily denying a seabed mining permit. The tribunal held that Mexico's rejection was driven by a senior official's personal agenda rather than scientific or legal grounds, crossing the line from legitimate regulatory discretion into an abuse of power (*Odyssey Marine Exploration, Inc. v. United Mexican States*, ICSID Case No. UNCT/20/1, Award, 2024). This case highlights the tension between environmental protection and investment protection. For investors who have committed hundreds of millions of dollars to ISA-approved exploration

¹ Research Fellow, International Law and Organisations (Trade and Investment), Nigerian Institute of International Affairs (NIIA). He can be reached at: obogbologu@gmail.com.

contracts, the risk of indefinite suspension is a concrete exposure. This is the legal landscape in which precautionary moratoria on deep-sea mining must be assessed.

This situation serves not only as a warning but also as a preview of the legal deadlock now unfolding within the International Seabed Authority (ISA). The ISA has a dual mandate under the United Nations Convention on the Law of the Sea (UNCLOS): to facilitate the orderly development of seabed mineral resources and to ensure the effective protection of the marine environment (United Nations Convention on the Law of the Sea, 1982, Articles 145, 151). Reconciling these obligations has proven challenging. The competition for critical minerals essential to the energy transition has made deep-sea mining a matter of strategic autonomy and supply-chain security (IEA, 2023).

However, the scientific uncertainty about potential irreversible ecological damage has led several states to advocate for precautionary moratoria (UNESCO-IOC, 2022). In international investment law, prolonged regulatory uncertainty can diminish the economic value of capital-intensive projects as effectively as a formal prohibition (Dolzer & Schreuer, 2012; *Metalclad Corp. v. Mexico*, 2000). For investors who have committed irreversible capital under ISA-approved exploration contracts, time carries significant legal implications. The core legal question this article examines is: under what conditions do precautionary moratoria on deep-sea mining cross from legitimate environmental regulation into indirect expropriation, attracting compensation under international investment law? The objective is to establish that ISA-approved exploration contracts constitute conditionally protected investments and the threshold at which precautionary moratoria become compensable indirect expropriation. Scholars have addressed deep-sea mining governance (Jaeckel, 2017; Lodge, 2014) and indirect expropriation in extractive industries (Dolzer & Schreuer, 2012; Newcombe & Paradell, 2009) as largely separate fields. However, no study has systematically applied the indirect expropriation doctrine and the FET standard to ISA-approved seabed exploration contracts in the specific context of climate-driven moratoria. This article bridges that gap.

This article contends that although good-faith and temporary regulatory moratoria are acceptable in law, when prolonged and indeterminate, they substantially deprive the investment of its economic utility, the threshold at which investment law obliges compensation. Though the climate change emergency is a compelling argument, it does not provide a robust legal defence for states against compensation arising from regulatory action with devastating economic effects (Brauch, 2022). The article adopts a doctrinal methodology, analysing the applicable rules of international investment law through close reading of arbitral awards, treaty texts, and scholarly commentary to determine how they apply to the ISA's regulatory framework. The article proceeds as follows. 2.0 traces the legal foundations of deep-sea mining from the Common Heritage principle to fragile investment entitlements. 3.0 examines when environmental pauses become regulatory takings. 4.0 evaluates why regulatory defence fails under conditions of prolonged paralysis. The conclusion proposes a Moratorium Governance Protocol to reconcile environmental precaution with investment protection.

FROM COMMON HERITAGE TO FRAGILE INVESTMENT IN THE DEEP SEABED REGIME

Deep-sea mining occupies a distinctive position in the global economic order because activities in the seabed and ocean floor beyond national jurisdiction, collectively called the “area,” are neither purely public nor purely private. They operate within an international legal regime that disallows private title to marine minerals while permitting private financing of capital-intensive exploration ventures. This hybrid character has generated enduring uncertainty about the rights available to investors in the deep seabed. The legal architecture governing this regime rests on two instruments. The 1982 United Nations Convention on the Law of the Sea (UNCLOS) established the Area's foundational structure and designated its mineral resources as the “Common Heritage of Mankind” (CHM). The CHM principle prohibits sovereign states from appropriating the seabed resources while requiring equitable benefit-sharing among all states (UNCLOS, 1982, Art. 136). The original Part XI regime, resisted by industrialised states as economically unworkable, produced a decade-long ratification deadlock (Oxman, 1994).

The 1994 Implementing Agreement broke this deadlock. It substantially modified Part XI, replacing mandatory technology transfer with cooperative research programmes, converting production controls into a flexible compensation scheme, and rendering the Enterprise commercially dormant pending market conditions. These market-oriented reforms restructured the ISA toward commercial viability and created a procedural expectation that the regime would progress from exploration to exploitation within a predictable timeframe. A sponsoring state is a state party to UNCLOS that vouches for a contractor's regulatory compliance and assumes legal liability for environmental harm. When Nauru triggered this provision under Section 1(15) (c) of the 1994 Agreement in June 2021, it set a July 2023 deadline that the ISA failed to meet. The Council's inability to finalise the Mining Code by that date did not invalidate the two-year rule; it exposed a level of institutional incapacity that now characterises the regime.

The CHM principle encodes a distributive bargain: orderly resource development under ISA supervision for the benefit of all mankind, with particular attention to developing states that lack deep-sea technology but stand to benefit from revenue-sharing arrangements (UNCLOS, 1982, Art. 140). This dimension carries direct relevance to moratorium analysis. Pacific island states like Nauru, Tonga, and Kiribati frequently act as sponsoring states but lack the technological and financial capacity to mine independently. They depend on private contractors, thereby exposing themselves to dual risk: environmental liability under UNCLOS and investor–state dispute settlement (ISDS) exposure if regulatory approvals are denied or indefinitely delayed. By contrast, technologically advanced states, including China through state-backed entities such as the China Ocean Mineral Resources Research and Development Association (COMRA), retain greater operational control and reduced exposure to private investor claims (International Seabed Authority, 2024). Indefinite moratoria, though framed as precautionary, may therefore entrench structural inequalities by deferring revenue flows to developing states while allowing advanced-economy actors to diversify supply through terrestrial mining or strategic reserves.

The physical character of seabed extraction amplifies these stakes. Unlike land-based mining, where capital can often be redeployed, deep-sea operations require purpose-built assets with no viable alternative use. A converted drillship fitted with a custom 4.5 km riser system designed exclusively for polymetallic nodule collection (potato-sized mineral deposits scattered across the abyssal plain) costs over \$100 million and retains value only if the project proceeds (Allseas, 2020). It is precisely this asset immobility, combined with the ISA's monopoly over any commercial pathway to the Area, that gives regulatory delays their legal consequence. They can transform a stalled project into a near-total economic loss. The distribution of exploration activities across major seabed regions reflects both geological concentration and the strategic positioning of state-sponsored and private contractors within the ISA regime (International Seabed Authority, 2024).

Table 1. Principal Deep-Sea Mining Zones, Deposit Types, and Exploration Activity

Zone/Region	Deposit Type	Key Minerals	Regulatory Status	Contracting Parties
Clarion-Clipperton Zone (CCZ) (Northeastern Pacific, ~4,000–6,000 m depth)	Polymetallic nodules	Nickel, cobalt, copper, manganese	19 exploration contracts active; exploitation regulations pending	China, United Kingdom, France, Germany, Japan, Nauru, Tonga, Kiribati, Republic of Korea, Belgium
Mid-Atlantic Ridge (Atlantic Ocean, ~1,500–4,000 m depth)	Polymetallic sulphides (mineral deposits formed by hydrothermal vents)	Copper, zinc, gold, silver	7 exploration contracts	Russia, China, Poland, France
Western Pacific Seamounts (Pacific Ocean, ~800–2,500 m depth)	Cobalt-rich ferromanganese crusts (mineral layers precipitated on submerged rock surfaces)	Cobalt, rare earth elements, platinum	4 exploration contracts	China, Japan, Russia
Indian Ocean (Central & Southwest Indian Ridge, ~4,000–6,000 m depth)	Polymetallic nodules	Nickel, cobalt, copper	2 exploration contracts	India, Germany

**Contracting states/entities are indicative and based on publicly available ISA exploration contracts; multiple contractors may operate within each zone. Source: (ISA, 2025).*

From an investment law perspective, ISA exploration contracts constitute protected investments, not as property rights over in-situ minerals, but as a bundle of contractual rights, licences, and regulatory entitlements (Newcombe & Paradell, 2009). The *Salini v. Morocco* (2001) test, which defines an investment by its contribution of capital, duration, risk, and economic benefit to the host state, strongly supports this characterisation. The ISA's dual mandate, which is to facilitate resource development (Art. 151) and ensure effective environmental protection (Art. 145), creates a structural tension that UNCLOS does not expressly resolve. Scholarly opinion diverges on whether reconciliation is achievable. Scholars are divided on whether reconciliation is achievable. Jaeckel (2017) argues that adaptive management and procedural flexibility can harmonise both objectives. Rüpke and Markus (2025) contend that the ISA's mandate must be reframed within planetary boundaries to resolve this tension institutionally. In contrast, Pickens et al. (2024) conclude that divergent member state positions and unresolved scientific questions have produced a structural conflict between extractive and conservation objectives, a position echoed by the Deep-Sea Conservation Coalition (2021). This article adopts a qualified reconciliation position: the mandates are not inherently incompatible, but their reconciliation depends entirely on institutional design.

This institutional failure persists despite a growing body of scientific literature documenting unresolved ecological risks. Research on the Clarion-Clipperton Zone confirms measurable harm to megafaunal and microbial communities well beyond immediate extraction footprints (Levin et al., 2020). Midwater ecosystems (the water column between the surface and the seabed) face poorly quantified impacts from discharge plumes (Drazen et al., 2023), and cumulative, long-term, and transboundary ecological effects are insufficiently understood for reliable regulatory design (Amon et al., 2022). These uncertainties are reflected in the ongoing negotiations over the ISA's Draft Regulations on Exploitation of Mineral Resources in the Area, from ISBA/25/C/WP.1 (2019) through ISBA/29/C/23 (2024), where environmental threshold standards, financial payment models, and contractor liability provisions remain unresolved.

The absence of finalised exploitation regulations is not a neutral gap. UNCLOS Annex III, Article 3(4)(c) clarifies that exploration approval does not guarantee exploitation rights, but does not specify the criteria for refusal. This ambiguity invites discretionary and politically influenced decision-making, precisely the type of uncertainty that the Fair and Equitable Treatment (FET) standard is designed to prevent. FET, a cornerstone of international investment treaties, requires host states to maintain a stable, transparent, and non-arbitrary regulatory environment. A compounding dimension of this gap is the mismatch between exploration-phase environmental guidelines (ISBA/19/C/17) and the more demanding impact assessment standards anticipated for exploitation, leaving investors unable to anticipate compliance costs with any degree of certainty. The case law of extractive industries confirms that conditional rights generate legally protected expectations. Hydrocarbon participation contracts subject to regulatory preconditions were protected in *Occidental Petroleum Corporation v. Republic of Ecuador* (2012) and *Burlington Resources Inc. v. Republic of Ecuador* (2012). This principle was applied directly to seabed mining in *Odyssey Marine Exploration, Inc. v. United Mexican States* (2024), where the tribunal held that repeated denial of a seabed mining permit violated the

FET standard, drawing a clear distinction between legitimate regulatory conduct and the abuse of regulatory power (Odyssey Marine, 2024).

Scholars have framed this problem, yet none have resolved the specific intersection this article examines. International environmental lawyers have debated the precautionary principle's application to ocean governance extensively. Birnie, Boyle, and Redgwell (2009) trace its evolution across multilateral marine agreements. VanderZwaag (2002) identifies seven challenges in its application, including terminological confusion, definitional variations, and limited tribunal interpretation; and Marr (2003) argues for its progressive crystallisation from soft law into customary law in marine pollution and living resources contexts, with burden-of-proof reversal for provisional measures. Yet none of these scholars examines the legal consequences when precautionary moratoria collide with investor rights already vested under ISA-approved contracts.

Deep-sea mining governance scholars, Lodge (2014), Ardron, Ruhl, and Jones (2018), and Jaeckel (2017), have identified institutional gaps but do not analyse their investment-law implications. Investment-law scholars, such as Dolzer and Schreuer (2012), Newcombe and Paradell (2009), and Sornarajah (2017), have developed a robust doctrine on indirect expropriation and FET but have not applied it to a multilateral, non-territorial regulatory monopoly like the ISA. Emerging work on climate necessity as an investment defence (Tienhaara, 2018; Brauch, 2022) has not yet been applied to the ISA context. It is this baseline of conditionally protected investment rights, unresolved by existing scholarship, that 3.0 tests against the law governing environmental moratoria.

WHEN ENVIRONMENTAL PAUSES BECOME REGULATORY TAKINGS

The ISA's governance structure distributes authority across three principal organs: the Assembly, the Council, and the Legal and Technical Commission. The Assembly, comprising all member states, sets general policy and approves the budget; the Council, composed of 36 elected members weighted toward major maritime consumers and producers, approves exploration contracts and exploitation regulations; and the Legal and Technical Commission (LTC), a body of technical experts appointed by the Council, drafts environmental standards and evaluates contractor applications. Critically, exploitation regulations must be approved by the Council before the LTC can operationalise them.

Yet the ISA operates under a conflicting dual mandate: it is tasked with both facilitating deep-sea mining and ensuring effective protection of the marine environment from its harmful effects (Deep Sea Conservation Coalition, 2021; UNCLOS, Arts. 145, 151). Political deadlock within the Council, therefore, cascades directly into legal uncertainty for contractors. It is this institutional sequencing, combined with the unresolved tension between its competing objectives, that creates a structural condition in which, under certain conditions, expropriation claims become legally plausible. That structural condition is measurable. The ISA has approved over 30 exploration contracts, yet exploitation regulations, the Mining Code, remain unfinished. Draft iterations from the ISA's draft exploitation regulations (ISBA/25/C/WP.1, 2019) through the most recent consolidated texts (e.g., ISBA/29/C/23, 2024) reveal sustained disagreement over three contested provisions.

The cumulative impact assessment threshold (Yu et al., 2025; ISA, 2024); the financial payment model for distributing seabed revenues under the Common Heritage principle (Singh, Jaeckel, & Ardron, 2025); and the operationalisation mechanism for the two-year rule that Nauru invoked in 2021 (1994 Agreement, Annex, Section 1(15); ISA, 2024). The result is a legal asymmetry: investors carry binding exploration obligations (environmental reporting, expenditure commitments, equipment deployment) without corresponding procedural entitlements to advance toward production. This asymmetry is not an administrative inconvenience. It is the structural condition that transforms precautionary moratoria from legitimate environmental measures into potential regulatory takings. However, this transformation is not automatic; it depends on the duration, proportionality, and procedural quality of the regulatory measure in question. Furthermore, environmental guidelines governing the exploration phase (ISBA/19/C/17) are substantively weaker than the environmental impact assessment standards anticipated for exploitation. Investors cannot anticipate compliance costs they cannot yet read. UNCLOS Annex III, Article 3(4)(c) provides contractors with procedural rights to fair treatment but not title to minerals.

This leaves unstated the criteria by which exploitation applications may be denied. This ambiguity itself invites discretionary and politically influenced decision-making. This is precisely what FET prohibits. A compounding dimension of this gap is the mismatch between exploration and exploitation environmental regimes. This makes it impossible for investors to anticipate compliance thresholds with certainty. This analysis does not assume the ISA is directly subject to investment treaty obligations. Liability would arise through sponsoring states whose participation in ISA decision-making, or failure to ensure regulatory coherence, becomes attributable under applicable treaties and the due diligence obligations in UNCLOS Article 139. Regulatory paralysis at the international level thus concentrates liability at the state level, where investment treaty obligations operate.

The scientific evidence bears directly on the proportionality analysis that tribunals will apply. Proportionality, in this context, requires an assessment of: (i) the severity of the environmental risk compared to the economic burden imposed on the investor; (ii) whether less restrictive regulatory alternatives were reasonably available; and (iii) the extent to which the investor's legitimate expectations, grounded in the regulatory framework at the time of investment, have been frustrated. Recent research on the Clarion–Clipperton Zone (CCZ), which is the most heavily contracted nodule-mining region, confirms that sediment plumes (clouds of disturbed seabed particles that smother organisms and alter chemical conditions) together with noise and light generated by seabed extraction, cause measurable harm to marine life across distances well beyond the immediate extraction footprint (Levin et al., 2020). The impact of the discharge plumes on mid-water ecosystems (the water column between the surface and the seabed) is poorly quantified (Drazen et al., 2023), and cumulative long-term and trans-boundary effects remain insufficiently understood (Amon et al., 2022). Miller et al. (2021) observe that this evidentiary deficit has produced governance inertia because there is no agreed-upon environmental baseline. The resulting paradox is palpable. The same scientific uncertainty that justifies precautionary pauses also constrains the evidentiary basis required to calibrate their proportionality.

International investment law acknowledges that expropriation does not require formal seizure. Tribunals apply a contextual analysis that considers economic impact, regulatory purpose, proportionality, and procedural quality (*Metalclad Corporation v. United Mexican States*, 2000). Even measures enacted for legitimate public purposes may require compensation where their economic effect is sufficiently severe (*Técnicas Medioambientales Tecmed S.A. v. Mexico*, 2003). Tienhaara (2018) demonstrates that environmental regulatory exceptions rarely shield states where measures impose disproportionate burdens relative to their stated objectives. Public purpose remains relevant, but not determinative. The central inquiry is whether the burden imposed on the investor is commensurate with the public interest pursued.

Moratoria occupy a particularly ambiguous position in this analysis. Framed as temporary and precautionary, they preserve formal legal rights while suspending economic activity. Duration and indefiniteness, therefore, become decisive legal variables. A suspension maintained without a defined timeline, review mechanism, or criteria for termination may progressively acquire the functional character of a permanent prohibition (Dolzer & Schreuer, 2012). An investor can be substantially deprived where he is unable to generate revenue or make meaningful commercial progress. In capital-intensive extractive sectors, where investments involve long development timelines and irreversible sunk costs, this threshold of substantial deprivation may be reached earlier than in other industries. This logic is reflected in cases such as *Burlington Resources Inc. v. Republic of Ecuador* (2012).

In the context of deep-sea mining, where purpose-built assets have no alternative uses, and the ISA is the sole regulatory pathway to commercialisation, prolonged delay can progressively erode and ultimately destroy investment value. In addition to expropriation, extended moratoria may independently breach the FET standard. Unlike indirect expropriation, FET does not require proof of substantial deprivation. A regulatory framework that becomes incoherent, procedurally unpredictable, or indefinitely suspended may violate FET even below the expropriation threshold (*Saluka Investments BV v. Czech Republic*, 2006). In the ISA context, legitimate expectations do not arise from any guaranteed right to exploitation. They arise from the procedural integrity and temporal progression embedded in UNCLOS and reinforced by the two-year rule. Where that progression is indefinitely stalled, the coherence of the regulatory framework itself is placed in question.

Applied to the ISA context, prolonged regulatory suspension shifts the legal inquiry from environmental justification to the quality and reliability of the decision-making process. This analysis does not suggest that all moratoria are legally indefensible. Short-term, scientifically grounded, and procedurally bounded pauses fall within recognised regulatory authority. The legal difficulty arises where moratoria become extended repeatedly, left open-ended, or maintained without credible pathways to resolution. At that point, duration and economic impact converge to satisfy the threshold of substantial deprivation, and environmental purpose alone is unlikely to preclude liability. With this framework established, the analysis evaluates the legal sustainability of the primary defensive doctrines invoked by states: the police powers and the doctrine of necessity.

PRICE OF UNSTRUCTURED PRECAUTION: WHY REGULATORY DEFENCE FAILS

States confronting indirect expropriation claims arising from environmental moratoria typically invoke two defensive doctrines: the police powers doctrine, which recognises states' authority to regulate in the public interest without incurring compensation obligations, and the plea of necessity under customary international law, which excuses otherwise wrongful conduct where a state faces a grave and imminent peril with no alternative means of response. Both doctrines are well established. Neither was designed to operate within the structural conditions that define the deep-sea mining regime, persistent scientific uncertainty, a monopolistic regulatory authority, and irrevocably committed capital, and under those conditions, both encounter limits that current jurisprudence makes demonstrable. The doctrine of police powers does not provide blanket immunity, as seen in *Odyssey Marine Exploration v. Mexico* (2024). It protects institutional regulation, not its misapplication. Therefore, a moratorium issued in the absence of defined scientific thresholds, review mechanisms, or procedural timelines cannot easily be characterised as a good faith regulatory measure. It instead acquires the features of arbitrariness that the doctrine is intended to exclude. The difficulty is not that environmental regulation exceeds state authority; it is that regulatory paralysis undermines the conditions under which that authority remains legally protected.

Once a measure results in substantial economic deprivation, the inquiry shifts toward proportionality (*Técnicas Medioambientales Tecmed S.A. v. Mexico*, 2003, para. 122). Proportionality requires that the economic burden imposed on the investor bear a reasonable relationship to the public interest pursued, taking into account the availability of less restrictive alternatives and the extent to which the investor's legitimate expectations have been frustrated. In the deep-sea mining context, where sunk costs are irrecoverable and no alternative regulatory pathway exists, this assessment is especially demanding. Empirical studies reinforce this doctrinal position. Tienhaara (2018) shows that tribunals subject environmental measures with significant economic impacts to close proportionality scrutiny, finding them inconsistent with investment protections even where their environmental objectives were legitimate. An indefinite or repeatedly extended moratorium imposes a cumulative burden on the investor, yet the public benefit it delivers remains contingent on unresolved scientific questions. The longer the suspension persists without regulatory development, the more difficult it becomes to justify the burden it imposes.

The necessity defence under customary international law is more restrictive still. As articulated in *CMS Gas Transmission Co. v. Argentina* (2005), necessity requires that the measure adopted be the only means available to safeguard an essential interest against a grave and imminent peril. Each element of this test imposes a stringent evidentiary burden. Imminence requires urgency incompatible with long-cycle ecological risk, and the 'only means' criterion fails wherever reasonably available regulatory alternatives exist, staged development frameworks, adaptive management protocols, or structured compensation mechanisms. Applied to environmental moratoria in deep seabed mining, this standard exposes a fundamental tension. Climate change and marine ecosystem degradation undoubtedly constitute grave concerns. Yet they unfold over extended temporal horizons, making it difficult to characterise any specific moratorium as a response to an imminent peril in the strict legal sense. More significantly, the scientific uncertainty that underpins

precautionary arguments simultaneously weakens the necessity defence. Where the impacts of seabed mining remain incompletely understood, it is difficult to demonstrate that a total or indefinite suspension is the only available response.

As the scientific literature reviewed in Sections 2.0 and 3.0 confirms, this uncertainty cuts in both directions. It justifies precautionary restraint but simultaneously undermines the claim that indefinite suspension is the only available response. Brauch (2022) argues that climate-based necessity defences remain normatively compelling but doctrinally fragile, particularly given the stringent “only means” requirement. Request for an Advisory Opinion submitted by the Commission of Small Island States on Climate Change and International Law (2024) reinforces states’ obligations under UNCLOS to prevent and control marine pollution, including greenhouse gas emissions, but does not address investor protection within the ISA regime. This creates an asymmetry: environmental obligations expand while investment protections remain unchanged. The result is not reduced liability but its reallocation. In this context, neither the police powers doctrine nor the necessity defence can reliably shield states where moratoria become indefinite, procedurally indeterminate, or disproportionate. The limitation is structural: both doctrines presuppose functioning regulatory systems, not a centralised regime in which rule-making is stalled.

Accordingly, the legal defensibility of moratoria turns on institutional design. Measures grounded in evidence, subject to periodic review, and constrained by clear timelines are more likely to satisfy proportionality and good faith than open-ended suspensions. The authority to regulate in the public interest is undisputed. What determines legal defensibility is institutional design. A moratorium is defensible where it is grounded in published scientific evidence identifying specific ecological risks, subject to mandatory independent review at defined intervals, and bounded by a sunset clause requiring affirmative renewal against stated criteria. Where those conditions are absent, environmental motivation alone will not preclude liability. The conclusion proposes the precise legal architecture required to meet that standard.

CONCLUSION

This article has argued that open-ended moratoria on deep-sea mining create legally actionable exposure under international investment law and that this exposure is not incidental but structural. It arises from the ISA's failure to finalise exploitation regulations and the consequent absence of any institutional framework for disciplining precautionary restraint. Three conclusions have been established across the preceding analysis. First, ISA-approved exploration contracts constitute conditionally protected investments. Investors hold no proprietary title to in-situ minerals, but they hold a legally cognisable bundle of contractual rights, procedural entitlements, and legitimate expectations.

Second, moratoria that are indefinite, scientifically unanchored, and maintained without review mechanisms cross the threshold from legitimate environmental regulation into compensable indirect expropriation and FET breach. Environmental motivation, however normatively compelling, does not substitute for the proportionality, procedural integrity, and temporal discipline that investment tribunals require. Third, neither the police powers doctrine nor the plea of necessity can bear the legal weight placed upon them in a

monopolistic regulatory environment where investors have no alternative jurisdiction and no exit. Both doctrines were designed for different conditions; neither accommodates the prolonged systemic uncertainty of the kind the ISA regime now produces.

The governance remedy is clear. The ISA Council must codify binding criteria for legitimate moratoria. Concretely, the Council should adopt a Moratorium Governance Protocol as a binding procedural instrument under its existing authority, establishing four operational requirements. First, any suspension must identify a specific and articulable ecological risk supported by peer-reviewed scientific evidence. Second, every active moratorium must undergo mandatory independent scientific review every twelve months, with findings published and open to contractor response. Third, each moratorium must expire automatically at a defined date unless renewed by affirmative Council vote against stated scientific criteria. Fourth, where continuation extends beyond two consecutive review cycles without resolution, a structured compensation assessment must be triggered. These conditions do not foreclose precaution. They give it the legal architecture that investment law demands and the common heritage principle requires. The two-year rule, triggered in 2021 and missed without institutional consequence, demonstrated precisely what happens when procedural commitments are treated as aspirational. Its failure must not become a template. Where the ISA Council fails to act, arbitral tribunals will fill the governance vacuum, transferring authority over deep seabed policy from maritime institutions to investment arbitrators. That transfer is neither inevitable nor acceptable. What is required is the political will to build the legal architecture before litigation forecloses the space in which institutional reform remains possible.

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