



The Capitalogenic Security Trilemma: Ecological (In)security as a Structural Condition of the Modern World-System

David M. Fields

State of Utah, Department of Commerce
david.mathew.fields@gmail.com

Adem Y. Elveren

Department of Economics, History, and Political Science, Fitchburg State University
ademyavuzelveren@gmail.com

Abstract

This article introduces the capitalogenic security trilemma, that is, a reconceptualization of the tension among social, trade, and national security in which ecological (in)security figures as a constitutive structural condition of the modern world-system rather than a contextual backdrop. Drawing on Moore's world-ecology, we locate the source of ecological (in)security in capitalism's appropriation of unpaid natures, and we specify two transmission mechanisms through which this contradiction stratifies the trilemma across the core-periphery hierarchy: the balance of payments constraint—the monetary form through which peripheral states are disciplined into extractivism—and unequal ecological exchange—the biophysical form through which the material preconditions of security are transferred to the core. Core militarization is the coercive technology through which the frontiers of appropriation are held open. The contribution to the world-systems literature is a unified theoretical model in which the monetary and biophysical asymmetries of the world-system, hitherto theorized in parallel, are shown to be two forms of a single circuit of appropriation, such that core security and peripheral insecurity are jointly produced rather than separately determined, with direct implications for the (in)efficacy of reform.

Keywords: Balance Of Payments Constraint, Capitalocene, Cheap Nature, Core-Periphery, Metabolic Rift, Militarization, Unequal Ecological Exchange, World-Ecology, World-Systems Analysis.



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I. Introduction

The security trilemma posits that the simultaneous maximization of social security (welfare and redistribution), trade security (stable market access and export revenue), and national security (military capacity and strategic autonomy) is not uniformly attainable across all states in the world economy (Elveren and Fields, 2025). For states possessing full monetary sovereignty, that is, the core, the trade-offs are primarily political in character, subject to policy contestation and redistributive negotiation. For peripheral states lacking that sovereignty, however, the same trade-offs are transmuted into structurally binding material constraints. Yet the framework, as currently constituted, describes this asymmetry more fully than it explains it. The research problem addressed in this article is therefore the following: why do the security objectives present themselves as negotiable trade-offs in some states and as a coercive, self-undermining circuit in others?

Several literatures each hold a portion of the answer, and none holds it whole. The security trilemma literature acknowledges ecological pressure but treats it as context (an intensifying backdrop against which the familiar trade-offs unfold) rather than as a structural determinant of the trade-offs themselves (Elveren and Fields, 2025). The world-ecology literature, centered on Moore's capitalocene thesis, provides a powerful account of capitalism's constitutive ecological contradiction but contains no theory of security and no account of the state-level mechanisms through which that contradiction differentiates national policy space (Moore, 2015, 2017). Finally, the post-Keynesian literature on international currency hierarchy and the sociological literature on unequal ecological exchange document, respectively, the monetary and biophysical asymmetries of the world economy, but they have developed largely in parallel, without integration into a common causal architecture, with Ricci (2023) constituting the nearest, and partial, exception.

The gap is consequential. Absent an integrated account, peripheral ecological degradation is persistently misdiagnosed as a failure of governance, institutional quality, or policy design, and remedial effort is correspondingly directed at symptoms (transparency initiatives, technical assistance, incremental regulatory reform) while the structural circuit that generates the degradation is left intact. For scholarship, the cost is a security literature that cannot explain the stratification of its own central dilemma; for policy, the cost is measured in decades of climate and development interventions that presuppose a policy space the periphery does not possess.

The contribution of this article is the capitalogenic security trilemma: a unified analytical model in which the world-ecological contradiction identified by Moore is transmitted to the security calculus of states through two specified mechanisms: monetary, in the form of the balance of payments constraint, and biophysical, in the form of unequal ecological exchange. Their joint operation stratifies the trilemma across the core-periphery hierarchy. Ecological

(in)security thereby enters the analysis as an active determinant rather than a passive backdrop: it is the structural condition that dictates whether the trilemma's three objectives function as genuine policy alternatives or as a coercive circuit in which the pursuit of one systematically undermines the prerequisites of the others. The framework is formalized in four propositions and a summary comparison with the conventional trilemma in Section 6.

Four theoretical traditions supply the inputs to this model, and their roles should be stated precisely, since the originality of the article resides not in their selection but in their integration. Moore's (2015, 2017, 2023) capitalocene thesis contributes the foundational categories (appropriation, Cheap Nature, commodity frontiers) that locate ecological (in)security in the structural relations of accumulation rather than in policy failure. The post-Keynesian theory of monetary sovereignty and currency hierarchy (Ingham, 2004; Prates, 2020; Vera, 2006) contributes to the financial transmission mechanism through which peripheral states are disciplined. The literature on unequal ecological exchange (Dorninger et al., 2021; Ricci, 2023; Rice, 2007) contributes the biophysical transmission mechanism through which peripheral ecological value is transferred to the core. And the world-systems research tradition, crystallized in Hopkins and Wallerstein's (1977) analysis of commodity chains, core-periphery hierarchy, cyclical rhythms, and secular trends, contributes the long-run historical frame within which these mechanisms are shown to be regime-specific enforcement technologies of a constant appropriative logic (Davies, 2025).

The remainder of the article proceeds as follows. Section 2 develops the capitalocene framework, establishing appropriation and Cheap Nature as the primary explanatory mechanisms and ecological (in)security as the principal axis of global stratification. Section 3 theorizes the balance of payments constraint as the monetary form through which peripheral ecological discipline is enforced. Section 4 demonstrates that unequal ecological exchange constitutes the biophysical form of the same discipline. Section 5 situates the trilemma within successive world-ecological regimes of appropriation. Section 6 formalizes the capitalogenic security trilemma in four propositions, contrasts it with the conventional framework in Table 1, and derives the implications for reform. The final section concludes by specifying the contribution to the world-systems and world-ecology literatures and the research agenda that follows.

2. Capitalocene, Expropriation, and the Stratification of Ecological (In)Security

Jason W. Moore's capitalocene thesis supplies the positive theoretical architecture upon which the capitalogenic security trilemma is constructed, and its central categories must therefore be stated with precision at the outset. For Moore (2015, 2017), capitalism is not an economic system that interacts with an external nature but a world-ecology: a way of organizing nature in which accumulation proceeds through the dialectic of exploitation and appropriation. Exploitation, the

extraction of surplus value from commodified labor power, is possible on a world scale only because it rests upon a far larger sphere of appropriation: the uncapitalized work of human and extra-human natures (unpaid care work, soils, forests, fossilized photosynthesis, atmospheric sinks) that capital secures at little or no cost. The condition of world profitability is therefore Cheap Nature: the continual delivery of the “Four Cheaps” of labor power, food, energy, and raw materials through the opening of commodity frontiers (Moore, 2015; Patel and Moore, 2017). When frontiers are exhausted, that is, when nature ceases to be cheap, the costs of production rise and accumulation enters crisis.¹ Ecological (in)security, as we deploy the term, is the security-theoretic expression of this dialectic: core states enjoy managed ecological security to the degree that appropriation is displaced onto frontiers located overwhelmingly in the periphery, while peripheral states inherit the exhaustion, degradation, and volatility that frontier extraction leaves behind.

Rather than framing capitalism as an external system acting upon a pre-given nature, Moore (2015) reconceives it as a world-ecology: a historically specific configuration of power, production, and reproduction in which nature and society are mutually constitutive rather than externally related. From this standpoint, ecological crisis is not an external rupture but an inherent contradiction: the system’s very effectiveness in harnessing and exploiting the web of life systematically erodes the ecological conditions that make such harnessing possible. Capitalism does not act upon nature; it operates through and by means of specific socio-natural configurations. As Moore (2023) argues, to deny the relations behind the climate crisis is scarcely less serious than denying the crisis itself; ecological crisis is an endogenous product of capitalist logic, not its externally imposed nemesis.

The analytical priority of appropriation is clarified by contrast with the prevailing ontology of ecological crisis, the Anthropocene. By attributing environmental degradation to humanity per se, the Anthropocene narrative obscures the historically specific class and imperial

¹ The exhaustion of Cheap Nature is a historically specific product of capitalist social relations and should not be conflated with a general thermodynamic or entropic limit on production as such. A strand of environmental and even Marxist theory, following Georgescu-Roegen’s (1971) proposed “fourth law” of thermodynamics, holds that closed material systems are subject to an irrevocable dissipation of low-entropy matter that sets a physical ceiling on recycling and, by extension, on continued accumulation (e.g., Burkett, 2005). Schwartzman (2008) demonstrates that this “fourth law” conflates isolated and closed systems and is inconsistent with established thermodynamic science; the earth’s economy is closed to matter but open to a vast influx of low-entropy solar energy; with current anthropogenic energy consumption equaling only a small fraction of the solar flux reaching the land surface, the binding constraint on accumulation is energy-limited rather than entropy-limited. On this reading, the exhaustion of specific commodity frontiers under the existing fossil-fuel-dependent regime of accumulation is a contingent feature of a particular, historically specific world-system, not a fixed physical boundary on production as such. The capitalogenic security trilemma developed here is accordingly best read as a claim about the socially organized exhaustion of appropriated natures, not as an appeal to entropy or other physical limits as an independent causal force.

relations principally accountable for that degradation: a species that did not act in common is made to answer in common (Malm and Hornborg, 2014; Moore, 2023). The difficulty is not merely terminological. The Anthropocene is predicated upon a dualistic separation between “society” and “nature” as ontologically distinct domains, a dualism that persists even in its most sophisticated critical articulation, John Bellamy Foster’s metabolic rift theory. Leveraging Karl Marx’s analysis of soil nutrient depletion, Foster (1999, 2000) argues that capitalism institutionalizes a constitutive rupture in the metabolic exchange between human society and the natural world. Notwithstanding its critical contributions, this formulation implicitly presupposes a pre-existing, external “Nature” that is subsequently disrupted by “Society,” a boundary that constrains the theory’s capacity to explain ecological crisis as an endogenous product of capitalism’s own logic rather than a collision between two separate entities. It is precisely this limitation that the categories of appropriation and Cheap Nature overcome; that is, crisis is located not in the rupture of a boundary between domains but in the exhaustion of the relations through which capital organizes the web of life. By locating biophysical crises in one analytical box and accumulation crises in another, metabolic rift theory renders environmental degradation a consequence of capitalist development rather than constitutive of it (Moore, 2011).²

Read through the lens of appropriation, the cross-national panel research of Jorgenson and Clark (2012) acquires a significance that its own Anthropocene-inflected framing partially obscures. Analyzing 86 countries between 1960 and 2005, they find that for core states a modest decoupling obtains between accumulation and total carbon dioxide emissions, whereas for the periphery no decoupling is detected and the effect of extractive production on emissions intensifies over time. Within an Anthropocene ontology this asymmetry registers merely as differential national performance; within the world-ecology framework it is the statistical signature of a single relation: the displacement of appropriation’s material costs onto peripheral frontiers, which permits the appearance of core “greening” precisely because degradation is organized elsewhere. The finding thus corroborates the capitalocene thesis on its own terms: what is measured is not humanity’s aggregate footprint but the geographically stratified metabolism of capital.

² This adjudication, however, remains highly contested within the domain of Marxist ecology. Operating from the premise of a substance monist property dualism, Malm (2018) defends the analytical dichotomy between society and nature, contending that the conflation of these spheres obscures the primary essence of ecological crisis theory, namely, the historically specific social relations that set fossil energy in motion and thereby engender ecological instability. Although the framework proposed herein does not necessarily purport to resolve this debate, it adopts the world-ecology perspective to demonstrate that ecological (in)security is fundamentally tethered to the structural dynamics of global capital accumulation, as opposed to an undifferentiated conception of humanity in the abstract.

Foster and Clark (2020) further this argument through a reinterpretation of the metabolic rift, incorporating greater material specificity. They contend that any division between nature and society should be conceptualized not as a rupture within an external nature, but rather as the consequence of the systematic expropriation of the environmental prerequisites necessary for the world-ecology of capitalism to physically reproduce itself: a historically specific form of social organization that structures the appropriation of nutrients and labor power from peripheral regions to sustain wealth extraction by the core. This mechanism concurrently generates unequal ecological exchange and establishes the structural correlation between environmental catastrophe and the global stratification of deprivation.

Historical evidence substantiates this structural logic with empirical exactitude. Clark and Foster's (2009) examination of the nineteenth-century guano and nitrates trade provides a salient historical illustration. As industrial agriculture in Europe led to the depletion of soil nutrients, itself a consequence of the spatial separation between urban and rural areas institutionalized by capitalism, core states remediated this deficiency by appropriating the accumulated ecological reserves of peripheral regions. The guano deposits of Peru, which had formed over millennia through the complex interplay of avian populations, ocean currents, and coastal geomorphology, were extracted at rates that precluded natural replenishment. Consequently, ecological stability in the core was attained directly through, and at the expense of, the ecological depletion of the periphery.

Hopkins and Wallerstein (1977) furnish the world-systemic scaffolding within which these categories acquire their long-run historical force, and their four organizing concepts each perform distinct analytical work in the present framework. Commodity chains (the sequences of extractive and productive operations culminating in a final consumable) trace the concrete routes along which appropriated natures travel from frontier to core, revealing that what conventional economics designates as international trade is a structured transfer of ecological value. The core-periphery hierarchy names the durable positional inequality that determines which states organize chains and which are organized by them: the core has consistently maintained its advantage not through superior so-called factor endowments but through the systematic underpricing of peripheral inputs, which persistently fails to register their degraded thermodynamic and regenerative value. Cyclical rhythms (the long alternations of world-economic expansion and stagnation) govern the tempo at which commodity frontiers are opened, exhausted, and replaced, while secular trends (the system's cumulative directional movements, including the progressive commodification of the web of life) register the long-run exhaustion of cheap natures that the capitalocene thesis elevates to a foundational principle. These four concepts are deployed systematically in Section 5, where the trilemma is situated within successive world-ecological regimes of appropriation.

Building on this, Battistoni (2025) demonstrates that world capitalist profitability fundamentally depends on the appropriation of uncompensated natural work in the periphery, which she identifies as essentially free gifts. These gifts include the mutually constituted labor and photosynthetic work performed by flora, the reproductive functions of ecological systems, and the sustained fertility of soils developed over extended periods. Historically specific imperial-class dynamics mitigate global accumulation costs by characterizing the vast majority of socially necessary material resources in the periphery as naturally occurring and thus without financial cost. As the availability of these cheap natures decreases, nevertheless, the internal contradictions embedded within the metabolic rationale of the modern world-system become progressively more evident, constituting what amounts to a global ecological crisis.

Core states achieve a form of managed ecological security precisely by externalizing their ecological burdens: appropriating concentrated natural materials from peripheral regions and displacing pollution onto peripheral environments and communities. As Patel and Moore (2017) demonstrate, this is not an incidental feature but a structural condition of core ecological stability, achieved through, and at the direct expense of, peripheral ecological insecurity. The differential between core agglomerations and peripheral regions reflects the socioeconomic inequity inherent in world-ecology, not merely differential levels of economic development (Rice, 2007; Roberts, Grimes, and Manale, 2003).

The frontiers on which Cheap Nature depends do not open themselves. Appropriation on a world scale presupposes a coercive apparatus capable of holding extractive zones open against the resistance of those who inhabit them, and it is at this point that the national security term of the trilemma enters the world-ecological argument directly rather than as a parallel concern. Peripheral expropriation represents a deliberate and actively managed process fundamentally facilitated by the national security apparatuses of the globe's core states. These institutions function not merely as defensive forces, but as active geopolitical instruments specifically engineered to guarantee secure resource access for core economies and to rigorously enforce the structural subordination of peripheral nations (Elveren 2019). This imperialism is sustained and enforced primarily through overwhelming military strength, which is the essential tool wielded by powerful core nations to sustain their economic and political hegemony over less developed peripheral states. This projection of power is crucial for managing and containing the inevitable geopolitical rivalries that emerge amongst the core states themselves. Core states are comprehensively integrated into the institutional frameworks of peripheral nations, representing a world-historical crystallization of the particular past of imperialist conquest (Gore, 2026).

The persistent penetration entails the continuous provision of advanced military apparatus, extensive training curricula, and the sustained deployment of military consultants and technical specialists to peripheral nations. A direct outcome of these entrenched, asymmetrical

relationships is the solidification of internal mechanisms within the periphery, designed for the preservation, advancement, and defense of core states' interests (Smith and Smith, 1983:43). This ensures that the geopolitical trajectory of the periphery remains consistent with the dictates of the core. The expansive scope and intricate nature of this core military-industrial complex are clearly evidenced by the evolving strategies of its arms manufacturers. Headquartered in core countries, these manufacturers have increasingly externalized resource-intensive production through outsourcing (Akçagün-Narin and Elveren, 2023; Marshall, 2020). This expansion of subcontracting and internationalization has, in turn, intensified the linkages between the military and civilian sectors in the periphery (Dunne et al., 2007a, 2007b; Dunne and Sköns, 2010). Marshall (2020) further underscores the industry's progressively globalized character, which now encompasses a broad spectrum of activities, including offsets, licensing agreements, arms exhibitions, leasing arrangements, promotional financing, military assistance programs, technology transfers, and initiatives to establish defense engineering departments in foreign academic institutions. Collectively, these activities constitute a global division of military labor (Elveren, 2025).

Military assets operate as economic sinkholes, demanding continuous reinvestment and modernization while generating little durable productive capacity of their own; it is precisely this dissipative character that makes militarization an ecologically untenable outlet for core surplus extraction.³ The dissipation is not borne where the value is captured: because the production of advanced weapons systems is concentrated in a handful of exporting states, the returns accrue to core producers while the fiscal, ecological, and strategic costs of maintaining, upgrading, and replacing those systems are displaced onto importing states, whose profit rates the same expenditure tends to depress (Chen and Elveren, 2026). The two functions are therefore one function seen from two positions: the mechanism that relieves the core's accumulation problem is the mechanism that reproduces the hierarchy through which the periphery is subordinated.

The national security objective of the core is pursued precisely as the guarantee of continued access to frontiers, so that the third term of the trilemma is not external to the world-ecological circuit but one of its constitutive instruments. Militarization is the enforcement technology of Cheap Nature, that is, a conspicuous element of a coercive apparatus for engendering peripheral ecological insecurity (Albert, 2025a). This point matters because it clarifies what the capitalogenic security trilemma is not, that is, a coordination failure among otherwise benevolent global actors that diplomacy or better international regimes could resolve, but a structural derivative of exploitative international relations and of the world-ecology's own

³ The capital-intensiveness of national militaries (expenditure per soldier) and their relative size (military participation rate) exert positive and nontrivial short-run and long-run effects on carbon emissions (Jorgenson et al. 2025).

constitutive contradictions. Its resolution therefore requires structural transformation, not a superficial adjustment of norms.

3. The Balance of Payments Constraint as Enforcer of Peripheral Ecological Discipline

The balance of payments constraint (BOPC), that is, a deficit of monetary sovereignty, constitutes the means by which the periphery serves as a zone of expropriation. Beyond the issue of core military oppression and the enduring legacies of colonialism, peripheral states are unable to finance domestic expenditure by issuing liabilities in their own currency without immediately facing the threat of capital flight, exchange rate depreciation, and external financing crises (Goodhart, 1998). As demonstrated by Elveren and Fields (2025), this structural prerequisite transforms the security trilemma from a set of political trade-offs into a condition of coercive material subservience.

The relationship between the BOPC and the world-ecological framework of Section 2 must be specified precisely, since the causal architecture of the argument depends upon it. The BOPC is not an independent cause of peripheral ecological degradation standing alongside capitalist appropriation; it is the historically specific monetary form through which the imperative of Cheap Nature is enforced upon peripheral states in the period following formal decolonization. Where the high-imperial regime secured appropriation through colonial administration and direct coercion, the contemporary regime secures it through the international currency hierarchy: the peripheral state that cannot issue internationally accepted liabilities must earn them, and the path of least resistance to foreign exchange runs through the commodity frontier. The constraint, in other words, is the mechanism by which world-ecological discipline is exercised without an occupying army. This specification, developed in the emerging literature on the monetary dimensions of ecologically unequal exchange and subordinate financialization (Althouse, Guarini, and Porcile, 2020; Kaltenbrunner and Paineira, 2018; Svartzman and Althouse, 2022), reverses any appearance that external imbalance is the prime mover: the imbalance is itself produced by a world-ecological division of labor that assigns the periphery the role of extractive frontier, and the currency hierarchy converts that assignment into a continuously binding budget constraint (Salah and Ament, 2025). The BOPC, in essence, constitutes a global color line (Alami, Bhagat, and Guermond, 2026).

Monetary sovereignty, properly understood, is a fundamental attribute of core state power, namely, the capacity to finance domestic fiscal operations through the unique legal authority to issue fiat currency. This enables states to pursue robust macroeconomic stabilization largely unconstrained by the need to secure tax revenue or foreign exchange (Ingham, 2004; Wray, 2015). The United States serves as the prime exemplar of this capacity: as the issuer of the global reserve currency, it is able to sustain substantial governmental expenditure, accumulate

external liabilities, and manage its national debt with a degree of latitude unavailable to states at the periphery (Fields and Vernengo, 2013). This condition surpasses mere exorbitant privilege; it signifies a profound monetary underpinning of the skewness inherent in the capitalogenic security trilemma.

Core states, like the United States, retain the capacity to countercyclically expand domestic expenditure, regulate capital flows, and absorb external shocks without relinquishing macroeconomic autonomy. Conversely, peripheral states confront a structural dilemma wherein any endeavor to implement autonomous fiscal or monetary policy precipitates capital outflows, exchange rate depreciation, and subsequent inflationary pressure, thereby swiftly nullifying the domestic benefits of expansionary policy. This implies that the pursuit of social security, one dimension of the trilemma, is structurally constrained for peripheral states in ways that do not apply to core states, irrespective of the policy intentions of peripheral governments.

The deficit of monetary sovereignty imposes three interconnected structural limitations upon peripheral economies (Prates, 2020). First, the incapacity to establish their currency as a reliable store of value perpetually exposes peripheral states to capital flight and exchange rate volatility, particularly during periods of global financial turbulence. Second, the instability of their currency as a unit of account diminishes its efficacy for domestic contracts, pricing, and long-term investment planning, often necessitating that firms and governments denominate obligations in foreign currency. Third, and most saliently for the argument advanced herein, the absence of a key currency mandates that peripheral states acquire foreign exchange, primarily US dollars, to settle international trade and service external debt, thus generating chronic current account deficits and persistent exposure to external financing crises (Cline, Fields, and Vernengo, 2026).

This vulnerability to external financial shocks is compounded by the absence of an effective international lender of last resort, the structural demand for safe assets in reserve currencies, and the punitive terms typically attached to balance of payments financing from international financial institutions. These conditions ensure that peripheral states remain perpetually vulnerable. Such shocks invariably intensify the pressure toward ecological resource extraction as declining commodity prices, rising debt service obligations, or capital outflows compel governments to accelerate environmentally destructive export volumes to compensate for deteriorating terms of trade (Vernengo, 2006; Vernengo and Perez Caldentey, 2020).

Due to the BOPC, the long-term economic growth rate of peripheral economies is bound by the ratio of their export growth to their income elasticity of import demand (Thirlwall, 1979). Formally, the balance-of-payments-constrained growth rate is given by $y_B = x/\pi$, where y_B denotes the maximum growth rate consistent with an external balance, x the growth rate of export volume, and π the income elasticity of demand for imports; since the export growth is a

product of the world income growth rate and the income elasticity of demand for the periphery's exports ($x = \varepsilon z$), the constrained growth rate can equivalently be written $y_B = \varepsilon z / \pi$. Where peripheral exports face weak external demand (low ε), while import demand rises steeply (high π), and since both the income elasticity of foreign demand and the growth of world income lie beyond peripheral control, the only remaining margin on which foreign-exchange earnings can be raised is x itself, the volume of exports. For commodity-dependent economies this means forcing up physical tonnage, expanding extraction faster than the income-elasticity relation alone would warrant and so accepting deteriorating terms of trade, such that biophysical throughput rises with ecological degradation and resource depletion as the direct result.⁴ For the periphery, whose export basket sits precisely at this unfavorable conjunction of elasticities, the world-system thus drives a secular intensification of ecological damage. The dynamic substantiates Prebisch's (1950) contention regarding the extent to which international trade generates divergent, self-reproducing, and unequal developmental trajectories across a core-periphery hierarchy.

The empirical literature confirms this structural logic. The ratio of external debt service to export earnings functions as a robust predictor of carbon intensity: peripheral states exhibiting higher debt burdens and greater export dependence consistently manifest elevated rates of ecological distress, indicating that debt-driven production systematically externalizes environmental costs (Roberts et al., 2003). Rice (2007) further demonstrates that per capita ecological footprints in less developed countries are strongly associated with trade dependence on economically dominant partners, suggesting that the structure of that dependence, not merely its intensity, produces ecologically dispossessive outcomes. These findings substantiate the theoretical mechanism: the BOPC does not simply constrain fiscal space; it actively shapes the ecological content of economic activity by making extraction the path of least resistance for foreign exchange generation. This dynamic is precisely explicated by Vera (2006), whose North-South extension of Thirlwall's (1979) model shows that, when the income elasticity of peripheral export demand is low and net financial transfers are negative, the balance-of-payments-consistent growth rate for peripheral states can only be sustained by

⁴ This answers a methodological caution raised by Hahnel (2013), who warns that ecological and Marxist arguments frequently assume their conclusion by inferring physical-throughput growth directly from the growth of value, when value is not matter and real output can, in principle, be decoupled from throughput. The balance of payments constraint supplies precisely the institutional mechanism such arguments require, that is, it is not that peripheral growth must in the abstract raise throughput, but that a specific structure, by fixing the income-elasticity and world-income terms beyond peripheral control, leaves physical export volume as the sole adjustable margin. The throughput intensification is thus derived from the currency hierarchy rather than assumed from growth as such.

intensifying the volume of resource-intensive exports, thereby entrenching ecological destruction.

This aligns with the Dutch Disease dynamic, as articulated by Grazini, Guarini, and Oreiro (2024), which is intrinsic to peripheral economies. The constraint imposed by the balance of payments fosters economic incentives that promote the conversion of vital resources for the environmentally harmful export of primary commodities. This subsequently accelerates a decline in the carbon absorption capacity of peripheral ecosystems, ultimately jeopardizing long-term sustainability.

The comparative political economy of Argentina and Ecuador provides a particularly illuminating case study. Vernengo and Bradbury (2011) demonstrate that Argentina's Convertibility Plan, a fixed one-to-one exchange rate regime with the US dollar implemented in 1991, illustrates how a lack of monetary sovereignty transforms the security trilemma into a coercive circuit. Because Argentina was precluded from issuing its own internationally accepted currency to finance external imbalances, it became structurally reliant on foreign capital inflows. When global financial markets contracted following the East Asian and Russian crises of 1997–1998, the resulting sudden reversal of capital flows necessitated simultaneous monetary and fiscal austerity, thereby exacerbating the recession rather than mitigating it. Interest payments on foreign-denominated debt became the preponderant fiscal expenditure, entirely displacing socioecological outlays.

Ecuador's formal adoption of dollarization in 2000 was a still more complete relinquishment of monetary sovereignty. It set in motion a structural dependence on remittances from an emigrant population to offset external financial obligations, a form of the BOPC rooted in colonial legacy (Godé, Vatn, and Gómez-Baggethun, 2026), which came to restructure the country's social reproduction around the sustained outmigration of working-age residents. By fixing its currency irrevocably to the US dollar, Ecuador became a paradigm case of the extractive economy, that is, caught permanently between diverting resources to meet external financial obligations, chiefly through intensified resource extraction, and pursuing sustainable long-run growth (Riofrancos, 2020).

Ultimately, the capitalogenic security trilemma constitutes a self-defeating circuit. The pursuit of trade security in the periphery via resource extraction compromises the ecological foundations of social security. The fiscal austerity mandated to service external debt diminishes the state's capacity for both social provision and ecological stewardship. This outcome is not attributable to flawed policy design but rather represents a structurally enforced consequence of the financial architecture of the capitalist world economy. In this sense, the constraint does not merely coexist with the appropriation of Cheap Nature; it is the form that appropriation assumes under the contemporary monetary regime.

4. Unequal Ecological Exchange as Structural Resource Drain

The financial discipline enforced by the balance of payments constraint finds its material counterpart in unequal ecological exchange (UEE). UEE constitutes more than a quantitative dichotomy in physical flows between the periphery and the core; it represents the systemic transfer of ecological value via exchanges characterized by a structurally determined asymmetry (Ricci, 2023). This is not merely a market imperfection remediable through enhanced pricing mechanisms. Rather, it functions as the biophysical manifestation of the imperial logic constitutive of the capitalist world economy. UEE operates as the mechanism through which core economies appropriate a net flow of minerals, biomass, fossil fuels, potable water, and atmospheric absorptive capacity at prices that systematically fail to provide adequate compensation for the organizational complexity and regenerative potential simultaneously diminished. In the vocabulary of Section 2, UEE is appropriation rendered measurable: the trade statistics through which it is documented constitute the empirical trace of the unpaid work of Cheap Nature.

The concept of UEE is deeply rooted in the world-systems tradition. Hopkins and Wallerstein (1977) posit that asymmetric trade relationships constitute the principal mechanism perpetually sustaining the core-periphery division of labor, notwithstanding significant historical shifts in the organization of production processes and ongoing reconfigurations of the regions and activities that define this dynamic. Bunker (1985), for instance, demonstrates that the extraction and export of natural resources from peripheral countries entails a vertical flow not only of exchange value but, critically, of energy and matter toward more developed nations, thereby compromising the socioecological conditions within the extractive economies. Clark and Foster's (2009) analysis of the guano/nitrates trade, referenced previously, offers a concrete exemplar of this pattern: Peru exported concentrated ecological value (the cumulative result of millennia of avian metabolism under specific coastal conditions), receiving in compensation monetary payments that financed not domestic advancement but rather the debt obligations incurred through the very colonial structure that set in motion the trade inequity.

Contemporary empirical evidence affirms the continued operation of these dynamics. Dorninger et al. (2021) furnish the most exhaustive assessment to date, establishing that net biophysical transfers are perpetually and markedly undervalued in conventional economic evaluations. Standard trade statistics register monetary values but fundamentally fail to incorporate the complete scope of ecological depletion and environmental encumbrance inherently embedded within exported physical materials and goods. Consequently, standard accounts of international trade systematically understate the authentic magnitude of the ecological deficit and environmental degradation borne by peripheral states. This understatement is compounded by the conventions of cross-national sociological research on UEE, which, as

Theis, Sikirica, and Betancourt (2024) demonstrate, typically restricts analysis to lower-income nations and operationalizes peripheral status through aggregate income classifications rather than through direct analysis of the specificities of peripheral extraction in commodity-specific trade networks, thus potentially misidentifying the precise geographic sites where biophysical transfers documented by Dorninger et al. (2021) are concentrated. For the trilemma, the implication is direct: the trade security that peripheral states purchase through export earnings is systematically overpriced in ecological terms, since the accounts through which that security is measured omit the depletion it entails.

Rammelt and Ylla-Catala (2025) update and substantially extend this evidence. Drawing on material flow analysis covering 187 countries from 1970 to 2024, they demonstrate that high-income countries accumulated 290 gigatons of raw material equivalents as net imports over this period, while upper-middle-income, lower-middle-income, and low-income countries net-exported 164, 53.1, and 9.6 gigatons respectively. In relative terms, low-income countries consumed 13.3 percent less raw materials than they extracted domestically, while high-income countries consumed 25.4 percent more. Crucially, their analysis also documents a reversal: the decline in high-income countries' net imports that began with the 2007–2008 financial crisis reversed after 2015, with net imports rising again to reach 6.3 gigatons in 2024. This finding confirms that the structural dynamics of ecological unequal exchange are not merely historical features but remain actively operative and are intensifying. These flows are the statistical signature of appropriation on a world scale: what Moore theorizes as the unpaid work of Cheap Nature appears in the material flow accounts as a sustained net biophysical drain from periphery to core (see also Hickel et al., 2022).

Rammelt and Ylla-Catala (2025) also present a specific financial dimension that directly links ecological unequal exchange to the capitalogenic security trilemma. By calculating domestic value added per unit of raw material equivalent exported, they find that in 2022, the average low-income country must export 6 tons of raw material equivalents to earn what a high-income country earns from one ton. For net-exporting low-income countries trading with net-importing high-income countries, this ratio rises to 12.7 tons. This demonstrates that the international monetary hierarchy operates as a multiplier of unequal ecological exchange, amplifying the magnitude of effective transfers beyond what physical flows alone would suggest.

Building on this, Godé et al. (2026) demonstrate that core countries imported labor time equivalent to seven units for every unit they exported to certain trading partners in the periphery, as the latter countries exported labor time at ratios exceeding 10:1 relative to their labor imports. This net export of embodied labor time correlates negatively with social and ecological outcomes, most notably life expectancy, thereby establishing an empirical link between resource extraction and the decline of social security, which constitutes a core element of the

capitalogenic security trilemma.⁵ Furthermore, nations that allocate over 25 percent of their domestic labor force to production supporting core accumulation consistently fail to satisfy fundamental social and environmental criteria, confirming that unequal exchange, across both its ecological and labor dimensions, functions as a structural mechanism for both social and natural dispossession.

This integration of monetary and ecological analysis is what distinguishes the present account from parallel literatures that treat financial dependency and ecological degradation as separate phenomena requiring separate remedies. Ricci (2023) offers a particularly important contribution by demonstrating that monetary hierarchy and ecological exchange are symmetrical. The bifurcation of monetary stratification and ecologically unequal exchange constitutes a singular, unified asymmetry; this process entrenches peripheral, ecologically degrading, and export-dependent structures as a structural necessity. Rather than operating as parallel phenomena, the monetary and biophysical drains constitute dual manifestations of a single, unified circuit (Salah and Ament, 2025). The implications for the security trilemma are therefore conclusive: UEE systematically diminishes the natural and social productive capacity requisite for peripheral states to independently pursue any of the trilemma's objectives. Peripheral ecological insecurity is not a residual vulnerability that subsequent security improvements might ameliorate; rather, it constitutes the structural mechanism through which the capitalogenic security trilemma perpetually regenerates itself.

The capitalogenic trilemma, therefore, constitutes not merely a descriptive framework for analyzing policy trade-offs but a diagnosis of the fundamental, self-reinforcing circuit of peripheral dispossession. By obligating peripheral states toward resource extraction for the purpose of acquiring foreign exchange, this circuit systematically compromises their social security and undermines the ecological foundations upon which any sustainable national security must be established. To fully appreciate the capitalogenic security trilemma, however, its internal mechanisms should be contextualized within a broader, long-run historical trajectory of the modern world-system, that is, the capitalist world-ecology.

⁵ The erosion of social security across the periphery serves as a persistent empirical theme within the scholarly discourse of the world-systems tradition. To this point, the foundational study by Evans and Timberlake (1980) illustrates that dependence on core capital accelerates income inequality, not primarily via the inhibition of economic growth, but through the systemic deformation of peripheral labor into a bifurcated and heavily marginalized stratum. The social inequities cataloged by Godé et al. (2026) thus signify the modern articulation of these long-standing structural processes.

5. The Capitalogenic Security Trilemma in World-Historical Perspective

The preceding analysis has elucidated the internal mechanics of the capitalogenic security trilemma. A comprehensive theoretical explanation, however, necessitates the contextualization of these mechanisms within the world-historical trajectory of the modern world-system. The capitalogenic security trilemma does not emanate from post-World War II institutional configurations or recent neoliberal policy determinations; rather, it constitutes a structural logic engendered and sustained across the long wave of capitalist development (Arrighi, 1999; Mandel, 1995; Wallerstein, 1984). It is within this rhythm that the conditions generating the capitalogenic security trilemma must be situated.

Following Moore (2015), we organize this trajectory not as a chronicle of events but as a succession of regimes of appropriation, each defined by the frontiers it opens, the enforcement mechanism through which peripheral extraction is secured, and the mode of exhaustion that precipitates its supersession. Read in this grammar, each historical episode discussed below functions not as illustration but as evidence for a specific claim: the trilemma's stratified structure is reproduced across regimes whose enforcement technologies differ while their appropriative logic remains constant.

Davies (2025) furnishes a cogent assessment of this trajectory. The British Industrial Revolution, which Davies (2025) analyzes comprehensively, articulates the world-systemic rationale with particular clarity. Industrial Britain did not constitute a nationally autonomous development: its operations were fundamentally predicated upon the appropriation of "ghost acres" from peripheral regions: raw cotton derived from slave plantations in the Americas, potash extracted from North American old-growth forests, and grain sourced from the Baltic. The ensuing ecological transformation induced by British industrialization was genuinely global in scope, restructuring peripheral ecologies across the Americas, Africa, and Asia via the commodity chains that provided its requisite inputs. The geographical distribution of ecological stress in the early nineteenth century corresponds to the map of contemporary core-periphery trade relations (Kiliç, 2025).

This world-historical perspective yields two analytically significant implications. First, the trilemma undergoes phase-specific modulations as the world-ecology transitions between regimes of appropriation. Under the high-imperial regime of the late nineteenth century, frontier extraction was enforced through explicit colonial administration and direct military coercion, and the exhaustion of established frontiers (soils, guano islands, forest reserves) propelled the scramble for new ones. Under the post-World War II regime, enforcement passed to Cold War geopolitics and the structural leverage of core-based transnational corporations within global commodity chains, as cheap oil and the industrialization of peripheral agriculture opened new frontiers of appropriation. Under the neoliberal regime consolidated in the 1970s and 1980s,

enforcement operates primarily through the international monetary hierarchy and debt-driven adjustment (the mechanism theorized in Section 3) as capital, confronting the progressive closure of terrestrial frontiers, presses into the remaining commons of atmosphere, ocean, and genome. Across all three regimes the enforcement technology varies; the structural logic of achieving core ecological security through the maintenance of peripheral ecological insecurity persists.

Second, this world-historical perspective establishes the theoretical basis for assessing claims about the reversibility of the capitalogenic security trilemma. If the trilemma were merely the product of specific neoliberal policy choices, reversing those choices might suffice to address it. However, if, as we argue, the trilemma is a structural feature of the modern world-system reproduced across successive phases of its development, then institutional reforms confined within the existing financial and trade architecture (however necessary as partial measures) cannot by themselves overcome it. This conclusion, arrived at through world-historical reasoning, reinforces the conclusion reached through the synchronic analysis of the balance of payments constraint and unequal ecological exchange: addressing the capitalogenic security trilemma requires confronting the systemic logic of capital accumulation itself, not merely its most recent institutional expression.

The capitalogenic security trilemma is thus a self-perpetuating cycle of dispossession, not an exogenous perturbation but a constitutive feature of the modern world-system's architecture. Read across the long run, it shows that the differential accumulation of capital in the core requires the constant reproduction of precarious, exploitative conditions in the periphery, sustaining the trilemma's security-instability feedback loops across centuries rather than within any single policy regime.

6. Pathways Beyond the Capitalogenic Security Trilemma

The preceding sections permit a formal statement of the capitalogenic security trilemma, articulated in four propositions. Proposition 1 (constitutive ecology): the trade-offs among social, trade, and national security are not defined over a neutral ecological backdrop; they are defined over a world-ecological process in which capital accumulation appropriates unpaid natures, such that ecological (in)security enters the trilemma as a constitutive term rather than an exogenous constraint.

Proposition 2 (monetary transmission): a state's position in the international currency hierarchy determines whether the trilemma's trade-offs are politically negotiable or materially binding; the balance of payments constraint is the monetary form through which the imperative of Cheap Nature is enforced upon states that cannot issue internationally accepted liabilities. Proposition 3 (biophysical transmission): unequal ecological exchange is the biophysical form of the same enforcement, transferring the material preconditions of security from periphery to core

such that core security and peripheral insecurity are jointly produced by a single circuit. Proposition 4 (coercive enforcement): the national security term of the trilemma is not external to this circuit but one of its constitutive instruments, since the frontiers on which appropriation depends are held open by force; core militarization is the enforcement technology of Cheap Nature, at once absorbing surplus that would otherwise precipitate realization crises in the core (Baran and Sweezy, 1966; Patnaik, 2010), and projecting the imperial power that secures peripheral extraction (Amin, 1976; Frank, 1969), so that the pursuit of core national security is itself a mechanism through which peripheral insecurity is reproduced. Together these propositions distinguish the capitalogenic security trilemma from its conventional predecessor, as Table 1 summarizes. With the framework thus formalized, the implications for reform follow directly.

The capitalogenic security trilemma does not result from policy failures or institutional deficiencies. Rather, it is fundamentally embedded within the structural configuration of the global political economy, manifesting through its monetary hierarchy, its imperial commodity chains, and its systemic dependence on the extraction of peripheral ecological value to sustain core accumulation and security. This architectural genesis carries significant implications regarding the efficacy of proposed remedies. Reforms confined within the extant financial and trade architecture (enhancing international collaboration, refining regulatory standards, augmenting governance transparency) only address the manifest symptoms of the trilemma while leaving its underlying structural determinants unaltered. While these measures may mitigate specific adverse effects at the periphery, they are incapable of disrupting the self-reinforcing dynamic through which peripheral ecological insecurity is structurally perpetuated. The risk extends beyond the potential insufficiency of these measures to their active recuperation; as Heron, Pedregal, and Lukić (2025) argue, technological and market-oriented responses to ecological crises adopt ecomodernist, green-imperialist forms, that is, they negate global material concerns and, in doing so, they preserve and reproduce a world-ecology grounded in the very global stratification such reforms ostensibly seek to address.⁶

⁶ This aligns with the broader current in the literature on ecologically unequal exchange. Specifically, Corsi et al. (2024) demonstrate that market-oriented and technological fix narratives eschew the actualities of geographic displacement of environmental burdens to the periphery. Apparent decoupling observed within the core signifies a spatial redistribution of environmental burdens rather than a substantive reduction in global ecologically disruptive throughput. This lends credence to the thesis advanced herein, that is, structural interventions confined to the extant architecture merely address symptoms, leaving the foundational mechanisms of the appropriative circuit of the world-ecology entirely intact.

Table 1. The Conventional versus the Capitalogenic Security Trilemma

Dimension	Conventional	Capitalogenic
Status of ecology	Contextual backdrop; at most a fourth sector” of security	Constitutive condition; the terrain on which all three objectives are defined
Nature of trade-offs	Policy choices available in principle to all states	Stratified by world-system position: political contestation in the core, coercive circuit in the periphery
Unit of analysis	The national state as autonomous decision-maker	The state as positioned within a world-ecological division of labor
Causal driver	Governance capacity, institutional design, policy preference	The accumulation imperative operating through the appropriation of Cheap Nature
Transmission mechanisms	A given national political calculus	Monetary: balance of payments constraint and currency hierarchy; biophysical: unequal ecological exchange; coercive: militarization and, thus, imperial projection
Temporality	Synchronic; trilemma as recurrent policy question, all factors being equal	World-historical; trilemma reproduced across successive regimes of appropriation
Symmetry	Symmetric: all states face structurally similar dilemmas	Asymmetric by construction: core security is produced through peripheral insecurity
Implied remedy	Improved coordination and governance reform	Structural transformation of the accumulation regime; reforms within the existing architecture are palliative

Several categories of structural transformation follow directly from the theoretical analysis, each targeting a distinct node in the capitalogenic circuit. The first category addresses the financial mechanism. Given that the BOPC is the primary instrument through which peripheral ecological discipline is enforced, measures that expand peripheral liquidity and reduce the coercive pressure of foreign exchange constraints are a necessary condition for any meaningful reform. These measures include expanded international liquidity provisions, such as expanded US Federal Reserve swap lines, which would alleviate the foreign exchange shortfalls compelling peripheral states to accelerate extractive exports (Pape, 2022). Institutionalized sovereign debt restructuring mechanisms are equally essential (Brooks and Helleiner, 2017).

Ultimately, these reforms would augment the fiscal space within which peripheral states can exercise genuine development choices rather than those enforced by external financial pressure.

Godé et al. (2026) propose a complementary set of measures predicated upon the labor dimension of unequal exchange. Their framework for global distributive justice posits that achieving a more equitable international distribution of labor time necessitates interventions aimed at rectifying the structural underpayment of peripheral labor. These interventions include coordinated global wage revaluation, the establishment of preferential tariff regimes for peripheral manufacturing, and reform of the governance structures of international trade institutions to address the asymmetric power relations that currently enable core states to dictate the terms of global exchange. These proposals are directly pertinent to the financial reforms previously identified, as the expansion of peripheral monetary sovereignty constitutes a prerequisite for affording peripheral states the policy latitude required to implement industrial and labor market policies oriented toward productive diversification rather than mere raw material extraction.

A second category of reform addresses the trade and ecological dimensions. Peripheral economies are structurally confined to serving as suppliers of primary commodities, the ecological costs of which are externalized from global market prices (Hornborg, 2025). Ameliorating this asymmetry necessitates not merely improved pricing for extant commodity exports but a fundamental restructuring of global trade relationships, shifting from arrangements that concentrate surplus in the core toward mechanisms that support diversified, localized, and ecologically resilient development that transcends the international divide (Dorninger et al., 2021). In practice, this entails supporting peripheral states' rights to impose export controls on critical ecological resources, to develop domestic processing capacity rather than exporting raw materials, and to implement industrial policies that facilitate productive diversification.

GDP accounting frameworks obscure ecological costs and thereby mask the true inequity of core-periphery exchange (Brinkman and Brinkman 2011). Ecological accounting systems that quantify the thermodynamic complexity, biodiversity, and regenerative capacity embedded in traded commodities, and that track how ecological costs are distributed across the global production system, could redefine the informational basis for international trade negotiations, sovereign debt assessments, and development financing decisions. By rendering transparent the concealed subsidies embedded in unequal ecological exchange, such frameworks could establish novel criteria for accountability at both the national and international levels. The relative raw material trade balance measure proposed by Rammelt and Ylla-Catala (2025), which expresses net ecological exchange as a proportion of domestic extraction rather than in absolute tonnage terms, offers one methodological basis for such an accounting system, one that more precisely

captures the disproportionate burden placed upon peripheral economies irrespective of the absolute scale of their resource sectors.

The system's capacity for self-reproduction also faces a tightening physical constraint, as the thresholds for sustained resource extraction are approached and, in places, exceeded; the depletion of readily accessible, high-energy-return resources sets a structural limit on continued extraction-intensive growth. Langman (2025) traces the political-cultural consequences of this convergence: new political subjectivities, formed under conditions of instability, do not yet openly challenge the existing order but operate as a submerged rejection of its norms and power arrangements. This latent resistance is likely to remain politically quiescent until systemic disruption becomes acute, at which point it could become an organized force. The ecological and economic contradictions traced here, in other words, are also generating the social and political conditions for an alternative, pluralistic socioecological order (Albert, 2025b); the challenge is how to organize that potential.

Since the capitalogenic security trilemma is structurally persistent as long as capital accumulation organizes the global economy and peripheral states remain subservient, addressing the root causes of the ecological crisis requires explicit action. This means making the concealed forces visible and pursuing alternative political-economic configurations centered on social and ecological reproduction instead of profit maximization. Such configurations entail expanding collective social provisioning, reinforcing democratic oversight of investment and production, and achieving the decommodification of human needs. This is not a utopian prescription, but an analytical conclusion derived directly from the underlying diagnosis.

7. Conclusion

This article proposed the capitalogenic security trilemma as a corrective to the conceptual limitations of the conventional security trilemma. The conventional framework treats ecology as backdrop, states as symmetrically situated decision-makers, and trade-offs as universally available policy choices; the capitalogenic framework, formalized in the four propositions and Table 1 of Section 6, demonstrates instead that ecological (in)security is constitutive of the trilemma, that the availability of trade-offs is stratified by position within the international monetary hierarchy, and that core security and peripheral insecurity are jointly produced by a single circuit of appropriation transmitted through the balance of payments constraint and unequal ecological exchange. Grounding the trilemma in Moore's capitalocene thesis establishes ecological (in)security as the structural precondition determining whether the trilemma's objectives constitute genuine alternatives or a coercive circuit; the post-Keynesian account of currency hierarchy clarifies why peripheral exclusion from the apex of that hierarchy is a structural condition of the world-system rather than a correctable policy deficiency; the empirics

of unequal biophysical transfer cement the material dimension of the argument; and the world-historical framing demonstrates that the trilemma is reproduced across successive regimes of appropriation rather than constituting a recent institutional pathology, a conclusion that carries direct implications for assessing the efficacy of reforms.

A central paradox thus emerges. Any effort to attain comprehensive security within the current global political economy is structurally self-defeating: the security gains of core actors are achieved by externalizing insecurity onto peripheral populations. Capitalism as a global system does not gravitate toward a stable equilibrium of distributed security; it is a mechanism of stratified insecurity, producing prosperity at one pole of the world economy through the systematic production of scarcity and instability at the other. The trilemma is therefore not a provisional condition awaiting resolution through further development, but an intrinsic structural feature of the system itself.

The argument presented holds specific implications for the broader world-systems research agenda. The capitalogenic security trilemma constitutes both a diagnosis and a mandate: a diagnosis of the structural conditions generating global insecurity, and a mandate to establish political-economic frameworks capable of prioritizing ecological stability and distributive justice over the zero-sum rationale of capital accumulation. Several directions for future research ensue. The theoretical framework developed herein would benefit from systematic empirical validation across a range of peripheral economies situated at varying positions within the monetary hierarchy and the commodity-chain structure of world trade. The long-wave periodization suggests that the specific configuration of the capitalogenic security trilemma fluctuates across phases of world-systemic development in ways that our synchronic analysis cannot fully encompass; a longitudinal study of these variations would significantly enrich both the theoretical and policy dimensions of the argument. Finally, the integration of labor-time appropriation into the security trilemma framework inaugurates a research agenda connecting the ecological and social dimensions of peripheral insecurity in ways that do not treat them in isolation. Holism is crucial for formulating resistance strategies that target the systemic roots of global inequality and ecological devastation simultaneously.

In this sense, empirical research would be enhanced through methodological frameworks that delineate extractive peripheries via historically specific relational structures of commodity exchange with the core, rather than relying solely on mere income proxies. As Theis et al. (2024) contend, the application of social network analysis and multi-regional input-output methods is particularly appropriate for identifying the precise geographic areas where the biophysical and labor transfers fueling the capitalogenic security trilemma are concentrated. This, in turn, permits a more accurate empirical corroboration of the theoretical assertions herein presented.

The capitalogenic security trilemma, when meticulously theorized, is not an issue of the environment alone, nor of finance, nor of geopolitics in isolation; rather, it constitutes an inherent structural feature of the modern world-system in its totality. Its resolution, as the world-systems tradition has steadfastly posited, necessitates not the rectification of particular policy deficiencies but the fundamental transformation of the structural logic from which they emanate, a transformation whose conditions are being generated by the internal contradictions of the system itself, provided that the agents of change fully comprehend the structural magnitude of the challenge confronting them.

About the Authors:

David M. Fields currently serves as an Economist at the Utah Department of Commerce, USA. His research ranges across classical political economy and the history of economic thought, heterodox macroeconomics, economic sociology, social theory, the dynamics of stratification and inequality, feminist theory and social reproduction, and world-systems and dependency analysis.

Adem Y. Elveren is a Professor of Economics at Izmir University of Economics, Izmir, Turkiye, and is also affiliated with the Fitchburg State University (Fitchburg, MA, USA).

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