

Article

Geopolitical Issues of Natural Resource Extraction: Implications for Sustainable Development

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ABSTRACT

Natural resource extraction remains one of the most politically consequential and environmentally contentious activities of the twenty-first century. It promises fiscal revenues, foreign exchange, employment, and industrial linkages, yet simultaneously fuels conflict, corruption, ecological degradation, and geopolitical rivalry. This paper narrows its scope to provide a more focused and comparative analysis of how governance quality, institutional design, and global power structures shape the political economy of extraction. Rather than treating cases broadly, it emphasizes three interlinked theoretical frameworks—the resource curse, the rentier state, and political ecology—and evaluates how they converge and diverge in explaining developmental outcomes. The study also develops the emerging ideas of the “green resource curse,” highlighting new dependencies created by renewable energy minerals, and “post-extractivism,” describing governance models that prioritize ecological sustainability and social equity. Country cases including Norway, Nigeria, Chile, the DRC, Venezuela, and Saudi Arabia are thematically analyzed through governance, environmental, and geopolitical dimensions, with figures explicitly linked to the discussion. The findings underscore that institutional integrity, participatory governance, and transparent fiscal management determine whether resources become a curse or catalyst for transformation. The paper concludes by outlining its limitations and highlighting its original contribution: bridging classic resource theories with contemporary green-transition politics and post-extractive development debates.

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Research Highlights

- Focused and comparative analysis on natural resource extraction.
- Convergence or divergence of resource curse, rentier state, and political ecology.
- Evaluation of whether resources become a curse or catalyst for transformation.
- Bridging classic resource theories with contemporary green-transition politics and post-extractive development debates.

1. Introduction

Natural resources have long shaped state formation, economic growth, and international relations. Hydrocarbons, minerals, and forests not only underpin industrialization but also sustain authoritarian regimes and global inequalities. The political economy of extraction therefore

constitutes one of the most enduring puzzles in development studies. Scholars like [1, 2] have emphasized that the problem is not resource abundance per se, but how political institutions manage rents, taxation, and accountability. When states depend on unearned revenues rather than citizen taxation, elites often consolidate power through



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patronage, resulting in what [3] call the *Rentier State*. Empirical evidence shows that oil-dependent economies experience lower democratic quality and slower diversification [4–6]. While these foundational theories remain central, the current global context demands a re-examination of how extraction interacts with governance, environmental change, and energy transition. The focus of this review is therefore sharpened to explore the institutional and geopolitical determinants of extraction politics rather than providing a broad descriptive survey.

At the same time, the international dimension of extraction has intensified with globalization. Transnational corporations, sovereign wealth funds, and multilateral lenders shape national resource policies through capital flows and regulatory norms. The rise of critical minerals essential for renewable energy—lithium, cobalt, nickel, and rare earths—has created a new geopolitical race reminiscent of the twentieth-century oil rivalries [7, 8]. This transition has reframed energy security as both an environmental and a geopolitical issue, producing what recent scholars call a *Green Resource Frontier*. These developments intertwine climate politics with traditional energy security, forcing states to balance decarbonization with fiscal dependence on hydrocarbons.

Domestically, extraction determines fiscal capacity, regional equity, and environmental regulation; internationally, it determines power hierarchies within global capitalism. As [9] note, the control of extraction sites and trade routes remains central to geopolitical strategy. From Nigeria's Niger Delta militancy to Chile's lithium diplomacy, the interplay of domestic politics and global markets demonstrates that natural resources are profoundly political commodities.

However, earlier studies often treated economic and ecological perspectives separately. This paper contributes by integrating political ecology with economic theories of the resource curse and rentier state, showing how power, inequality, and environmental degradation interact within extractive systems. Despite the centrality of extraction to both domestic and international politics, the twenty-first century presents new challenges that demand adaptive governance and structural transformation. The global push toward decarbonization has shifted the focus from hydrocarbons to minerals that underpin renewable technologies. While this transition promises environmental benefits, it also introduces a new set of vulnerabilities and ethical dilemmas. This tension between sustainability goals and extractive dependence—is at the heart of what this paper terms the *Green Resource Curse*, where renewable energy minerals reproduce old patterns of dependency and inequality. Resource-rich developing countries are under pressure to meet growing global demand for lithium, cobalt, and rare earths, yet these extractive processes often occur in contexts of weak governance, fragile labor protections, and environmentally sensitive landscapes. Without proactive regulatory oversight, these new “green” resources risk replicating patterns of exploitation that characterized the fossil fuel era.

Effective governance is thus central to avoiding the reproduction of extractive injustices. Institutional quality, transparency, and rule of law are far more predictive of positive developmental outcomes than resource abundance alone. Countries like Norway demonstrate how disciplined fiscal management, sovereign wealth funds, and stringent environmental regulation can transform resource rents into long-term prosperity. Conversely, the Democratic Republic of the Congo and Venezuela exemplify how resource wealth, if poorly managed, can exacerbate corruption, conflict, and inequality. Strengthening institutional capacity involves not only formal legal mechanisms but also participatory structures that empower local communities, protect workers, and ensure equitable distribution of benefits. To organize these insights more clearly, the paper groups country cases thematically into three dimensions—governance and institutions, environmental and social impacts, and geopolitical strategy—rather than by region. This structure allows a deeper, comparative understanding of why certain governance models succeed while others fail.

Economic diversification is another essential pillar of post-extractive development. Overreliance on resource rents exposes states to commodity price volatility, which can destabilize public budgets, hinder social investment, and reinforce elite capture. By investing in renewable energy industries, manufacturing, and knowledge-based sectors, resource-dependent economies can reduce dependency while creating sustainable employment. These strategies represent core components of *post-Extractivism*, a framework that redefines development around ecological sustainability, social inclusion, and intergenerational justice. Policy instruments such as carbon taxation, green industrial subsidies, and environmental royalties can align economic incentives with sustainability objectives, ensuring that extraction supports rather than undermines broader development goals.

International cooperation is equally critical. The governance of minerals central to renewable energy is inseparable from global supply chains, international finance, and trade regimes. Multilateral frameworks such as the OECD Due Diligence Guidance and initiatives led by the UN and World Bank seek to enhance corporate accountability and prevent labor abuses in mining. However, voluntary compliance is insufficient. Binding agreements that integrate social, environmental, and human rights standards across borders are necessary to ensure that green energy transitions are ethically and ecologically sustainable. Global collaboration also enables technology transfer, capacity building, and financing for developing nations, allowing them to participate more equitably in emerging clean-energy markets.

Finally, the politics of extraction is inherently moral as well as material. Decisions about which resources to exploit, how to manage rents, and how to distribute benefits reflect values and power relations as much as economic calculus. Achieving sustainable and just outcomes require rethinking the very metrics of progress. Beyond

GDP growth, measures of social well-being, ecological integrity, and intergenerational equity should guide policy choices. Post-extractivist strategies, including those inspired by Latin American concepts such as *Buen Vivir*, demonstrate that development need not come at the expense of environmental and social justice. Post-extractivist approaches, such as Latin America's concept of *Buen Vivir*, are discussed later in the paper as pathways that connect justice, ecology, and governance reform. By integrating governance reform, economic diversification, and ethical accountability, the global political economy of extraction can evolve toward a model that reconciles prosperity with planetary limits.

2. Theoretical and Historical Context

2.1. Resource Curse and Rentier State Perspectives

The resource-curse hypothesis posits that resource-rich countries often exhibit poor governance, corruption, and conflict. Refs. [1, 4] found statistically that mineral exporters grow more slowly than diversified economies, partly due to “*Dutch disease*,” where resource inflows appreciate currency and undermine manufacturing. Ref. [5] expanded this to political institutions, arguing that oil booms promote rentier mentalities and weaken bureaucratic capacity. Ref. [3] conceptualized rentier states as relying on external rents rather than domestic taxation, creating a social contract based on distribution instead of representation. These theories remain influential, though scholars such as [10] caution that institutional histories condition the effect of resources. Figure 1 illustrates the cyclical volatility of crude-oil production between 2000 and 2024, supporting the resource-curse argument that price swings destabilize fiscal policy and reinforce rent-seeking.

While these models share the assumption that resource wealth tends to undermine institutional quality, they differ in explanatory emphasis: the “resource curse” highlights economic distortions and growth traps, whereas the “rentier state” centers on political incentives and fiscal dependence. Integrating the two perspectives reveals that resource rents distort both markets and state–society relations, producing hybrid forms of authoritarian stability and elite capture. Contemporary scholarship refines this debate by showing that the outcomes of resource wealth are mediated by institutions, path dependency, and policy choices rather than determined by geology. Norway's disciplined fiscal management contrasts sharply with Venezuela's rentier populism, illustrating how institutional design transforms rents into either prosperity or fragility. This comparative logic underpins the paper's analytical framework, linking economic and political dimensions of the curse.

While the resource-curse hypothesis provides a compelling framework, contemporary scholarship emphasizes that the outcomes of resource wealth are not predetermined. Institutional quality, governance capacity, and policy choices mediate the impact of resource dependence. Norway, for example, has effectively avoided the classic resource curse by investing oil revenues in a sovereign wealth fund, enforcing fiscal discipline, and maintaining transparent political institutions. In contrast, countries with weaker institutions, such as Venezuela or the DRC, demonstrate how resource abundance can exacerbate corruption, social inequality, and conflict. These contrasts underscore that resources are neither inherently a curse nor a blessing; they are embedded within political, social, and economic contexts that determine their developmental consequences.

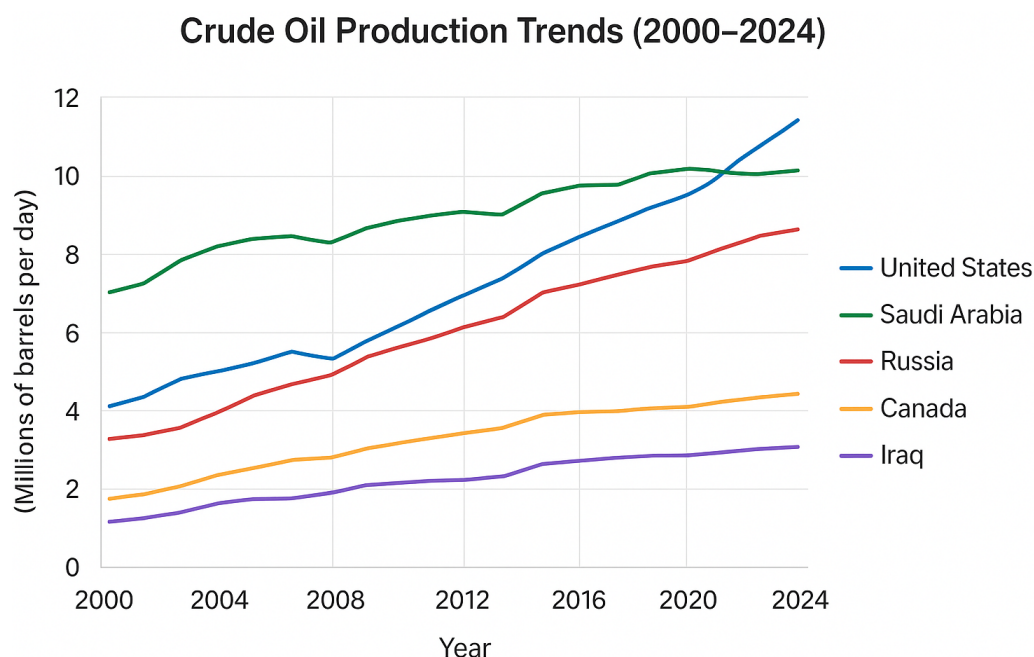


Figure 1. Crude oil production trends (2000–2024). (Figure is prepared based on the data taken from [11].)

Furthermore, the emergence of renewable energy minerals adds complexity to the traditional resource-curse paradigm. Lithium, cobalt, and rare earths are concentrated in a few states, making them strategically important for global energy transitions. However, extraction often occurs under conditions of weak labor protections, environmental degradation, and limited local economic benefits. This “green resource curse” highlights the need for proactive governance, responsible supply chains, and equitable benefit-sharing to avoid replicating the challenges associated with hydrocarbons. This dynamic constitutes what this study terms the “green resource curse”—a pattern in which the global shift toward low-carbon technologies reproduces historical asymmetries of extraction under a sustainability label. Examples from the Democratic Republic of Congo’s cobalt sector and Chile’s lithium triangle demonstrate how green commodities can generate new dependencies unless accompanied by robust governance and ethical supply-chain regulation. As global demand for critical minerals grows, policymakers must design institutions and legal frameworks that link resource rents to sustainable development, social welfare, and environmental stewardship, ensuring that resource wealth becomes a driver of prosperity rather than a source of vulnerability.

2.2. Political Ecology and Colonial Legacies

Political ecology complements economic explanations by emphasizing power and environmental degradation. Refs. [12, 13] argue that extraction reconfigures ecologies to serve global capital, often dispossessing marginalized groups. The colonial legacy of extractive institutions—seen in the Belgian Congo’s rubber concessions or Britain’s mining enclaves—established path dependencies of exploitation [14–17]. Post-colonial states inherited administrative

structures designed for rent extraction rather than inclusive development. Unlike the resource curse literature, which focuses on macroeconomic performance, political ecology exposes how extraction reproduces spatial and social hierarchies through control over land, labor, and nature. It links environmental degradation directly to political power, revealing that ecological crises are not externalities but outcomes of governance choices.

During the 1980s–1990s, neoliberal reforms deepened these legacies. Structural-adjustment programs by the IMF and World Bank liberalized mining codes, privatized state enterprises, and prioritized foreign investment over community rights [18–21]. As shown in Figure 2, resource rents as a share of GDP vary widely across cases, confirming that the intensity of rent dependence—not resource abundance itself—explains divergent institutional trajectories. Thus, political ecology broadens the debate by embedding resource governance within historical and transnational power relations—an essential bridge between classical economic theories and contemporary sustainability concerns.

The consequences of these historical and policy legacies are evident in contemporary resource governance. Resource extraction continues to produce uneven development and ecological degradation, disproportionately affecting Indigenous communities, rural populations, and low-income groups. Mining and oil operations frequently result in deforestation, soil erosion, water contamination, and loss of biodiversity, while affected communities often receive minimal economic benefit. Such patterns illustrate that environmental injustices are integral to, not separate from, the political economy of extraction. Therefore, achieving sustainable outcomes requires aligning ecological stewardship with distributive justice.

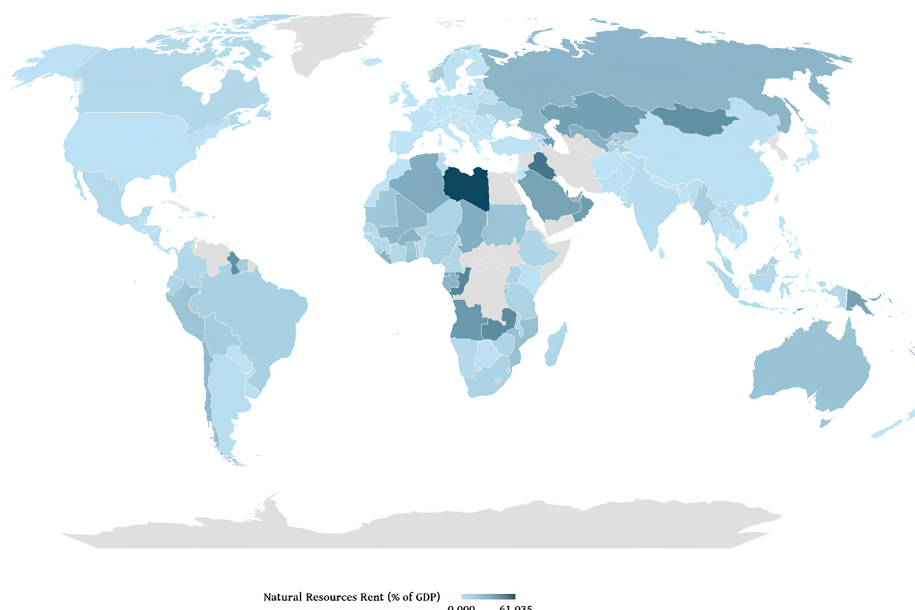


Figure 2. Natural resource rents (% of GDP) for selected countries. (Figure is prepared based on the data taken from [22].)

Addressing these challenges requires governance that integrates environmental stewardship, community participation, and accountability mechanisms capable of curbing elite capture. Participatory environmental assessments, binding social and labor standards, and mechanisms for redistributing resource rents can mitigate the extractive pressures on marginalized groups. Moreover, global frameworks such as the Extractive Industries Transparency Initiative (EITI) and multilateral agreements on responsible sourcing offer pathways to enforce compliance and encourage ethical extraction practices. By combining ecological awareness with institutional analysis, political ecology connects the moral, social, and environmental dimensions of extraction—setting the stage for later discussion of post-extractivism.

2.3. Global Reordering and Energy Transition

The twenty-first century introduced new forms of extraction politics. The *Paris Agreement 2015* triggered massive investments in clean-energy minerals, concentrating geopolitical power in a handful of suppliers such as Chile, Indonesia, and the DRC. The International Energy Agency (2023) projects that demand for lithium and cobalt will quadruple by 2040. This surge, while central to decarbonization, risks reproducing the same dependency structures of fossil capitalism [23, 24]. Thus, the “green transition” introduces a paradox: the quest for sustainability fuels a new extractive frontier with its own political tensions. This section reframes energy transition as a political-economic transformation rather than a purely technological shift. Critical-mineral extraction operates through global supply chains governed by asymmetric power between producers and consumer states. As such, the transition from oil to minerals extends, rather than replaces extractive geopolitics.

The rapid expansion of critical minerals has intensified both domestic and international governance challenges. Resource-rich developing countries often lack the institutional capacity to manage extraction sustainably, making them vulnerable to environmental degradation, corruption, and social conflict. Artisanal and small-scale mining, particularly in the DRC and parts of Latin America, has become a flashpoint for labor exploitation, including child labor, unsafe working conditions, and gendered inequalities. These conditions reflect a broader pattern in which global demand for “green” technologies can externalize environmental and social costs onto communities least able to resist extraction pressures. Without strong regulatory frameworks, national governments may be unable to capture rent effectively, ensure environmental compliance, or distribute benefits equitably, reproducing extractive patterns familiar from the fossil fuel era.

International governance mechanisms play a crucial role in mediating these pressures, yet they face structural limitations. Voluntary initiatives such as the OECD Due Diligence Guidance for Responsible Supply Chains and certification schemes for “conflict-free” minerals improve transparency and corporate accountability but

often lack enforceability. Multilateral cooperation is therefore essential, including binding trade regulations, cross-border monitoring, and support for local capacity-building. Sovereign wealth funds, fiscal rules, and industrial policies must also be designed to ensure that resource rents are reinvested into sustainable development, economic diversification, and social infrastructure. Countries that combine strong institutions with strategic long-term planning, like Norway’s management of petroleum wealth, illustrate the potential for resource governance to align environmental, economic, and social objectives. This analysis links directly to the later discussion on global governance (Section 4), showing how institutional design determines whether the energy transition becomes a platform for justice or a new phase of resource imperialism.

The green extractive frontier also reshapes geopolitical competition. As demand for lithium, cobalt, and rare earths grows, supplier countries gain strategic leverage, creating new alignments and dependencies in global markets. China’s dominance in rare earth processing, for instance, has amplified its influence over technology supply chains, while lithium-rich nations like Chile and Argentina navigate pressures to balance foreign investment with domestic industrial development. These dynamics mirror historical oil rivalries, demonstrating that the political economy of extraction remains central to questions of power, sovereignty, and global inequality. This emerging “mineral geopolitics” links sustainability discourse with questions of sovereignty and technological dependence, revealing that energy transition politics mirror historical oil rivalries.

At the same time, ethical and ecological considerations demand a rethinking of resource politics. Post-extractivist frameworks, inspired by indigenous philosophies such as *Buen Vivir*, offer models for integrating ecological balance, social justice, and long-term prosperity into resource governance. By prioritizing community participation, environmental integrity, and intergenerational equity, these approaches challenge the growth-at-all-cost logic that has characterized both fossil and early green extractive industries. Circular economic strategies, material recycling, and innovations in supply-chain efficiency can reduce pressure on newly exploited deposits while promoting sustainable industrial transformation. Incorporating circular-economy principles and material recycling can further mitigate pressures on new deposits, linking post-extractivism to pragmatic policy tools.

Ultimately, the twenty-first century’s green resource frontier highlights the moral and political stakes of extraction. Achieving a genuinely sustainable energy transition requires governance that links environmental stewardship, equitable benefit-sharing, and robust international oversight. Without these interventions, the shift to renewable technologies risks reproducing the injustices and dependencies of the fossil fuel era, undermining both climate goals and social equity. Balancing the imperatives of decarbonization with the principles of justice and sustainability is therefore the defining challenge of contemporary resource politics, one that will shape not only the future

of energy systems but also the legitimacy of global governance structures themselves. This synthesis of classical theories with contemporary ecological perspectives defines the paper's conceptual contribution: it situates the “green resource curse” and “post-extractivism” as extensions—and critiques—of the traditional resource-curse paradigm.

3. Domestic Political Problems of Natural Resource Extraction

The domestic political implications of natural resource extraction manifest through a complex interplay of fiscal structures, institutional integrity, environmental regulation, and social contestation. Extraction transforms the very foundations of governance by centralizing rents in the state, weakening taxation, and encouraging patron-client systems that sustain elite dominance. Refs. [2, 5, 6] emphasize that such dynamics are not mere economic phenomena, but deeply political processes embedded in state formation. The fiscal autonomy generated by natural resource rents allows ruling coalitions to suppress opposition and undermine accountability [25, 26]. To examine these dynamics more clearly, this section reorganizes the country cases thematically around three interrelated dimensions: (1) governance and institutional design; (2) environmental and social impacts; and (3) political contestation and reform outcomes. This thematic approach highlights how governance quality and power distribution mediate the developmental consequences of extraction across diverse contexts.

These dynamics have significant implications for social policy and citizen engagement. When governments rely primarily on resource rents rather than broad-based taxation, the social contract shifts from one of representation to one of redistribution. Populations may receive subsidies, public sector employment, or infrastructure investments, but they have limited influence over decision-making, creating a feedback loop in which citizens are less empowered to demand accountability. This structure also fosters elite capture, whereby powerful actors monopolize resource wealth to consolidate political authority and maintain stability, often at the expense of broader social and environmental well-being.

Environmental and social contestation frequently emerges in response to this concentration of power. Communities affected by extraction, including Indigenous groups and rural populations, often mobilize against land dispossession, pollution, and inequitable distribution of benefits. These forms of resistance highlight the inherent tensions between state-centered resource management and local rights, and they underscore the importance of participatory governance mechanisms. Policies that integrate environmental assessment, community consultation, and benefit-sharing can help mitigate conflict while enhancing legitimacy.

Moreover, domestic institutions play a decisive role in mediating these pressures. States with strong legal frameworks, independent judiciaries, and transparent fis-

cal management are better able to balance resource exploitation with accountability and social equity. Conversely, weak institutions exacerbate vulnerability to corruption, environmental degradation, and social unrest, demonstrating that the political effects of resource wealth are contingent on governance quality rather than resource endowment alone.

3.1. Nigeria: Oil, Corruption, and the Rentier State

Nigeria remains an archetype of the resource curse. Since the discovery of commercial oil in Oloibiri in 1956, petroleum has dominated the economy, accounting for over 80% of government revenue and 90% of exports [27]. The oil boom of the 1970s intensified rent-seeking and entrenched authoritarian rule. Successive regimes—from military juntas to civilian administrations—used petroleum revenues to finance clientelist networks rather than productive diversification [16, 28]. Nigeria exemplifies the rentier-state logic outlined by [3]: fiscal autonomy derived from external rents erodes the social contract, replacing taxation with patronage. This dynamic aligns with the broader resource-curse framework, where volatility and elite capture reinforce each other.

The Niger Delta, despite producing over 95% of Nigeria's crude oil, endures severe ecological degradation, unemployment, and poverty. Militant groups such as the Movement for the Emancipation of the Niger Delta (MEND) and the Niger Delta Avengers have targeted pipelines to demand compensation and autonomy [28]. The 2021 Petroleum Industry Act attempted to improve governance by creating a Host Community Development Fund, yet local communities allege persistent exclusion from decision-making [8]. Nigeria thus exemplifies how extraction can generate both immense wealth and chronic instability through rentierism, elite capture, and environmental neglect. Figure 3 spatially links Nigeria's dense oil-field clusters to regions of environmental degradation in the Niger Delta, visualizing how rentier governance concentrates both wealth and pollution, a key insight from political-ecology analysis.

The Nigerian case illustrates that addressing the resource curse requires more than revenue management; it necessitates systemic reforms in governance, accountability, and social inclusion. Despite the creation of funds and regulatory bodies, persistent corruption, opaque contracting, and weak enforcement reveal the structural resilience of rentier politics. Political ecology helps explain this endurance: control over oil landscapes reproduces both ecological harm and power hierarchies, linking environmental degradation directly to elite rule.

Moreover, Nigeria's experience underscores the ecological consequences of extractive dependence. Oil spills, gas flaring, and pipeline leaks have destroyed farmland, polluted waterways, and caused long-term health hazards for residents. Environmental degradation, coupled with limited alternative livelihoods, exacerbates poverty and migration pressures. International and domestic advocacy networks, alongside multilateral frameworks like the EITI,

have pressured both government and oil companies to adopt stricter environmental standards. However, enforcement remains uneven, revealing the limitations of regulatory frameworks in contexts where economic rents and political power are concentrated in elite hands.

Finally, Nigeria demonstrates that resource wealth alone does not guarantee development. Without inclusive governance, diversified economies, and meaningful community participation, petroleum riches can entrench inequality, social unrest, and ecological harm. Lessons from Nigeria are instructive for other resource-rich states: effective extraction policy requires coupling fiscal oversight with environmental regulation, participatory governance, and strategic long-term planning to ensure that resource wealth translates into sustainable, equitable development.

3.2. Norway: Institutional Strength and Social Democracy

Norway provides an instructive contrast, demonstrating how resource wealth can reinforce democracy rather than undermine it. Oil discoveries in the North Sea in 1969 could have produced rentier pathologies, yet Norway's preexisting institutions—parliamentary democracy, egalitarian social contracts, and strong regulatory agencies—channeled rents toward long-term welfare [5, 29]. Figure 4 demonstrates how Norway's sovereign-wealth accumulation parallels improvements in governance indicators, providing empirical support for the claim that institutional design can convert rents into intergenerational assets.

By separating ownership (the state), regulation (the Norwegian Petroleum Directorate), and commercial operations (Equinor), Norway insulated policy from political

interference. The Government Pension Fund Global, now exceeding USD 1.5 trillion, invests oil revenues abroad to prevent overheating and ensure intergenerational equity. Transparency is institutionalized through open reporting, parliamentary oversight, and civic participation. Refs. [5, 29] argue that Norway's success stems not from oil itself but from a social-democratic culture valuing collective ownership and trust. In contrast to Nigeria, the state's fiscal autonomy strengthened rather than eroded accountability. Unlike the rentier state, Norway maintains a tax-based social contract, resource rents supplement rather than substitute civic responsibility.

From a comparative standpoint, Norway operationalizes a “reverse resource curse”: institutional strength converts rents into social capital. The case thus validates the proposition that political institutions, not resource endowment, determine development trajectories. Norway's experience highlights the importance of long-term planning and institutional foresight in managing resource wealth. By committing to a clear framework for fiscal discipline, environmental oversight, and public accountability, the state has avoided the short-termism and elite capture that characterize many resource-dependent economies. Strategic investment in human capital, infrastructure, and social welfare has ensured that oil revenues translate into broad-based prosperity rather than narrow enrichment. Furthermore, Norway's approach demonstrates the value of insulating policy from political cycles: by placing oil wealth in a sovereign wealth fund with strict fiscal rules, the government limits the risk of profligate spending during boom periods, ensuring stability across generations.

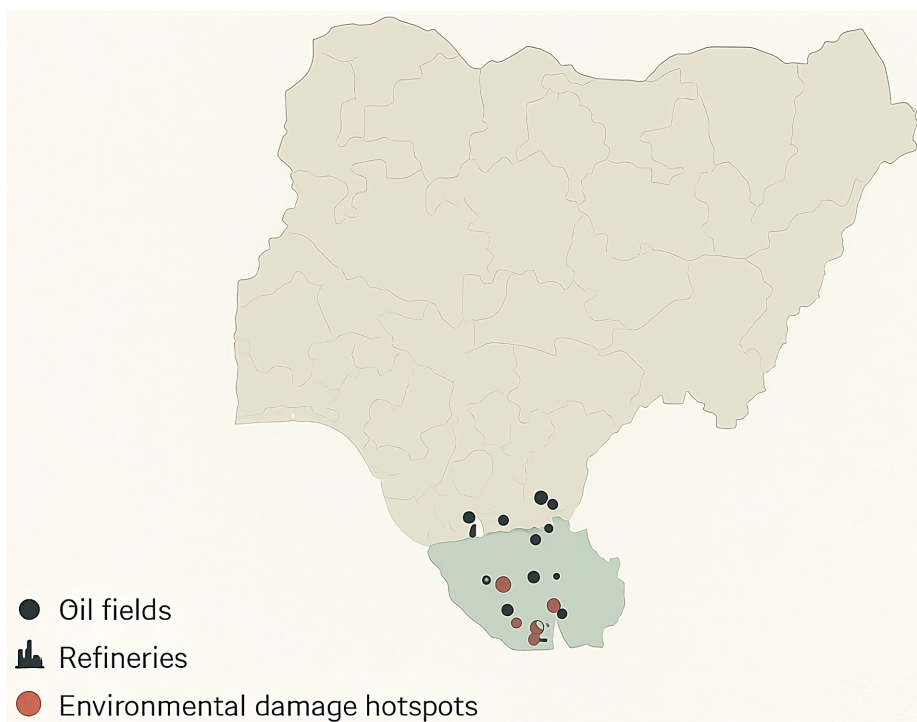


Figure 3. Nigerian oil fields, refineries, and environmental damage hotspots in the Niger Delta. (Figure is prepared based on the data taken from [8].)

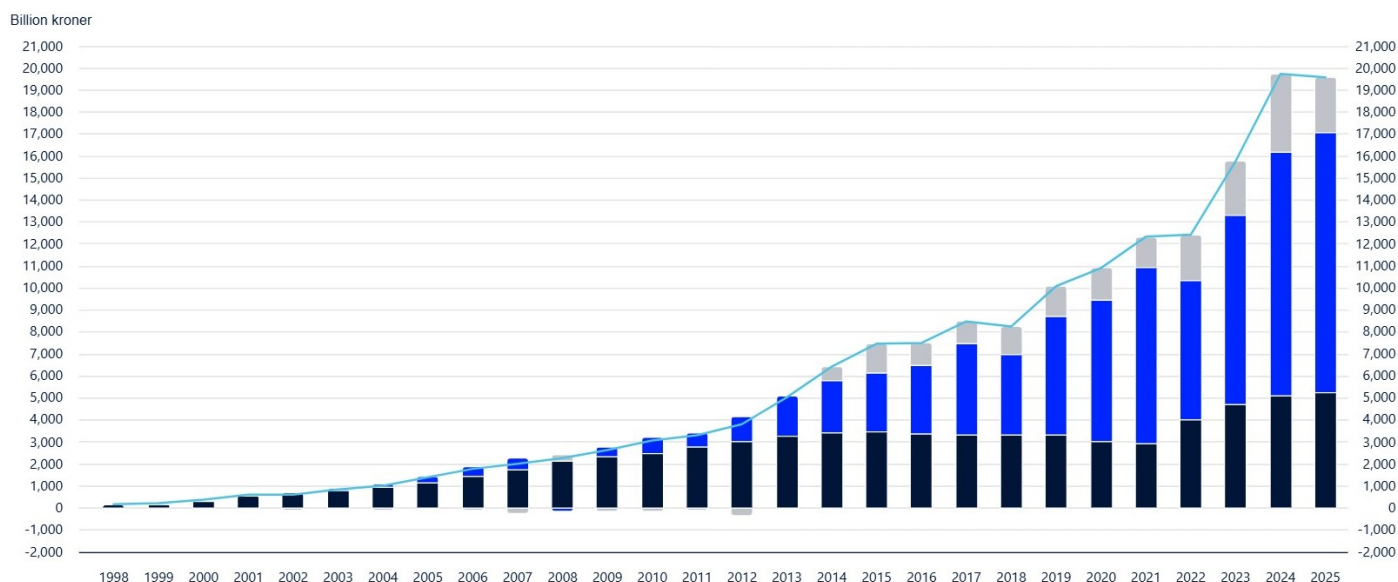


Figure 4. Norway's sovereign wealth accumulation, 1998–2024. (Figure is prepared based on the data taken from [30].)

The Norwegian case also underscores the role of civic engagement and trust in the resource governance equation. High levels of public scrutiny, media freedom, and parliamentary oversight create incentives for officials to manage resources responsibly. Social norms that emphasize collective welfare, egalitarianism, and transparency reinforce institutional mechanisms, producing a virtuous cycle in which resource wealth strengthens democratic quality rather than undermining it. Norway thus provides a practical blueprint for resource-rich states seeking to avoid the pitfalls of the resource curse, illustrating that resource abundance can be harnessed to promote accountability, equity, and long-term sustainability.

3.3. Venezuela: Populism, Decline, and Authoritarianism

Venezuela, once Latin America's richest country, now exemplifies the destructive intersection of populism and rentier dependency. Oil nationalization in 1976 created PDVSA as a symbol of sovereignty, but successive governments used petroleum revenues to finance populist redistribution and political patronage [31, 32]. Under Hugo Chávez, the Bolivarian Revolution expanded welfare programs during the 2000s oil boom while centralizing power in the executive. However, as oil prices collapsed after 2014, fiscal deficits ballooned and production plummeted from 3.2 million barrels per day in 1998 to less than 700,000 by 2024 [22, 33]. Figure 5 juxtaposes Venezuela's collapsing oil output with runaway inflation, vividly showing how fiscal populism and rentier dependence transform external shocks into systemic crisis.

Mismanagement, corruption, and international sanctions have produced one of the worst humanitarian crises in modern history. PDVSA's decay symbolizes the failure of state capitalism under weak institutions. Refs. [34, 35] note that the regime's reliance on oil rents to fund populism eroded state capacity, leading to autocratic consol-

idation. Venezuela's trajectory confirms the rentier-state thesis: when redistribution replaces productivity, political loyalty supplants merit, and collapse becomes inevitable once the rent stream dries.

The Venezuelan case underscores the dangers of concentrating resource rents in the executive without robust institutional checks. Overreliance on petroleum revenues discouraged economic diversification, stifled private sector development, and entrenched clientelism. Social programs funded by oil wealth created short-term legitimacy but failed to build sustainable development capacity, leaving the economy vulnerable to price shocks. Environmental and infrastructural neglect further compounded the crisis, as decades of underinvestment in maintenance and technology degraded production capabilities.

The Venezuelan trajectory synthesizes the resource-curse and rentier-state theses: external rents replace productive investment, while populist redistribution undermines fiscal discipline. Political ecology extends this critique by showing how extractive urbanization and environmental neglect—polluted rivers, deforestation, and refinery emissions—magnify social inequality. Moreover, Venezuela illustrates how resource dependency can exacerbate geopolitical vulnerability. International sanctions and declining global oil prices exposed the country's fiscal fragility, demonstrating that rentier states are particularly sensitive to external shocks when domestic institutions are weak. The combination of centralized control, patronage networks, and overdependence on a single commodity created a feedback loop of economic contraction, social unrest, and political authoritarianism. As such, Venezuela serves as a cautionary tale for resource-rich countries, highlighting the importance of institutional resilience, fiscal discipline, and economic diversification to prevent rentierism from undermining both development and democratic governance.

3.4. Democratic Republic of Congo: Conflict Minerals and Extractive Violence

The DRC holds some of the world’s largest reserves of cobalt, coltan, and copper—essential for batteries and renewable technologies—but remains one of the poorest nations on earth. The paradox is rooted in governance

fragility and conflict. Armed groups, local warlords, and foreign corporations vie for control of mining sites, particularly in Katanga and North Kivu [36]. Figure 6 overlays conflict intensity with cobalt and coltan mining zones, confirming that extraction in weakly governed regions perpetuates violence—an empirical manifestation of the green-resource-curse mechanism.

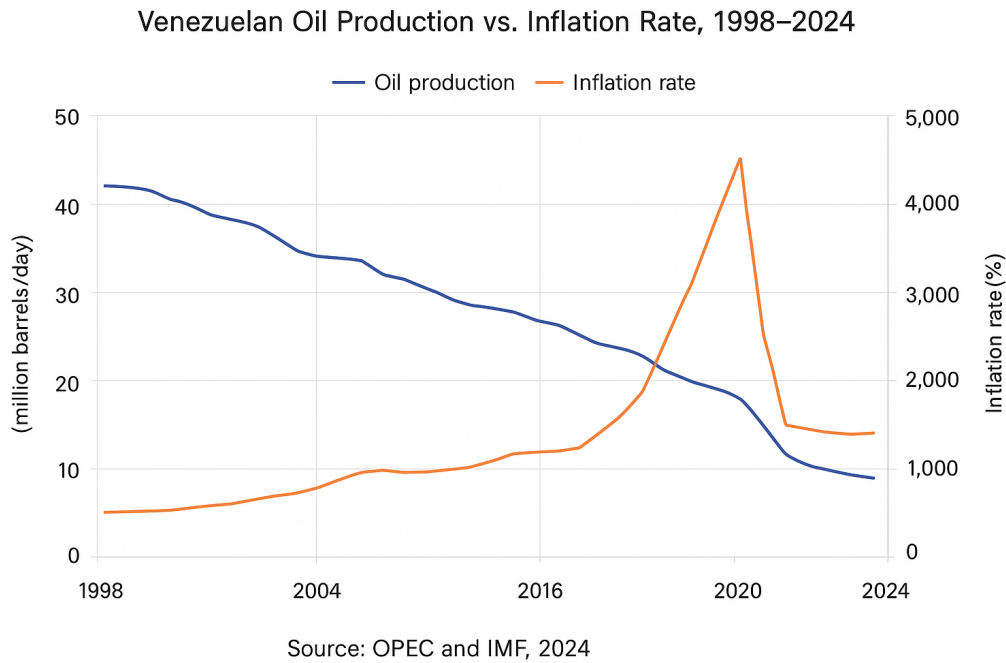


Figure 5. Venezuelan oil production vs. inflation rate, 1998–2024. (Figure is prepared based on the data taken from [22, 33].)

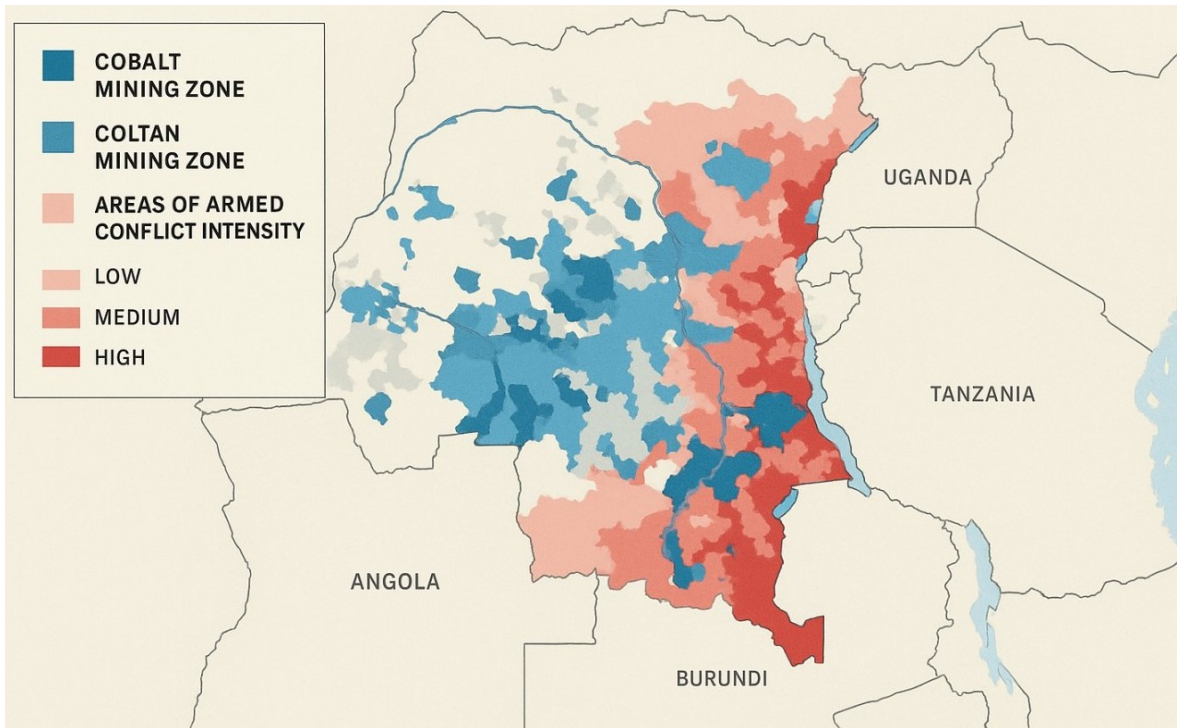


Figure 6. Cobalt and coltan mining zones and areas of armed conflict intensity. (Figure is prepared based on the data taken from [37].)

The 2010 U.S. Dodd-Frank Act (Section 1502) sought to curb the trade in “conflict minerals” by requiring corporate disclosure, yet implementation produced unintended consequences: artisanal miners were excluded from markets, exacerbating poverty [38, 39]. Meanwhile, global demand for electric-vehicle batteries intensifies exploitation and environmental harm. The DRC’s predicament underscores that without robust governance and equitable benefit-sharing, even “green” resources reproduce extractive violence. This situation encapsulates the emerging “green resource curse”: minerals vital to decarbonization sustain extractive violence under weak governance.

The DRC’s experience highlights the multifaceted challenges of resource governance in fragile states. Weak regulatory institutions, limited state presence in remote regions, and endemic corruption allow resource wealth to fuel conflict rather than development. Artisanal miners, who provide a critical portion of cobalt supply, often operate without access to basic safety equipment, fair compensation, or social protection. At the same time, large-scale industrial operations frequently displace communities, degrade land and water systems, and emit pollutants with long-term health consequences. These dynamics underscore the need for integrated approaches that combine environmental protection, social inclusion, and economic opportunity.

Political ecology clarifies that the DRC’s crisis is not simply a failure of markets but a continuation of colonial extraction logic, i.e., control of territory through resource militarization. International mechanisms can help, but they require careful calibration. Certification schemes, supply-chain traceability, and responsible sourcing initiatives can improve accountability, yet if poorly designed, they risk excluding the most vulnerable stakeholders. Partnerships between governments, civil society, and multinational corpo-

rations must focus on capacity-building, equitable contract design, and local economic empowerment. For instance, investments in cooperatives, education, and infrastructure can enhance the ability of artisanal miners to participate in formal markets, ensuring that resource wealth contributes to poverty reduction rather than entrenching inequality.

The DRC also illustrates the limits of market-driven solutions to the so-called “green transition.” While global demand for cobalt and coltan is driven by climate imperatives, the rush to secure critical minerals can reinforce the same power asymmetries and exploitative practices that characterized the fossil fuel era. Addressing these risks requires not only transparency and regulation but also international cooperation to support governance reform, human rights enforcement, and environmental stewardship. Only through a holistic approach that links extraction to long-term development objectives can the DRC—and other resource-rich, fragile states—avoid the dual traps of conflict and ecological degradation while contributing meaningfully to global decarbonization.

3.5. Chile: Lithium and Democratic Extraction

Chile’s experience with lithium offers a middle path between state control and market efficiency. As the world’s second-largest lithium producer, Chile’s Salar de Atacama is crucial for the global energy transition [40]. Unlike Venezuela’s populism or Nigeria’s rentierism, Chile’s democratic institutions have maintained fiscal prudence. The state-owned company CORFO manages concessions with private partners like SQM and Albemarle, ensuring revenue-sharing and environmental monitoring. In Figure 7, the parallel rise of lithium output and groundwater depletion in Chile’s Atacama Desert illustrates the environmental trade-offs of green-mineral expansion, underscoring the need for participatory environmental governance.

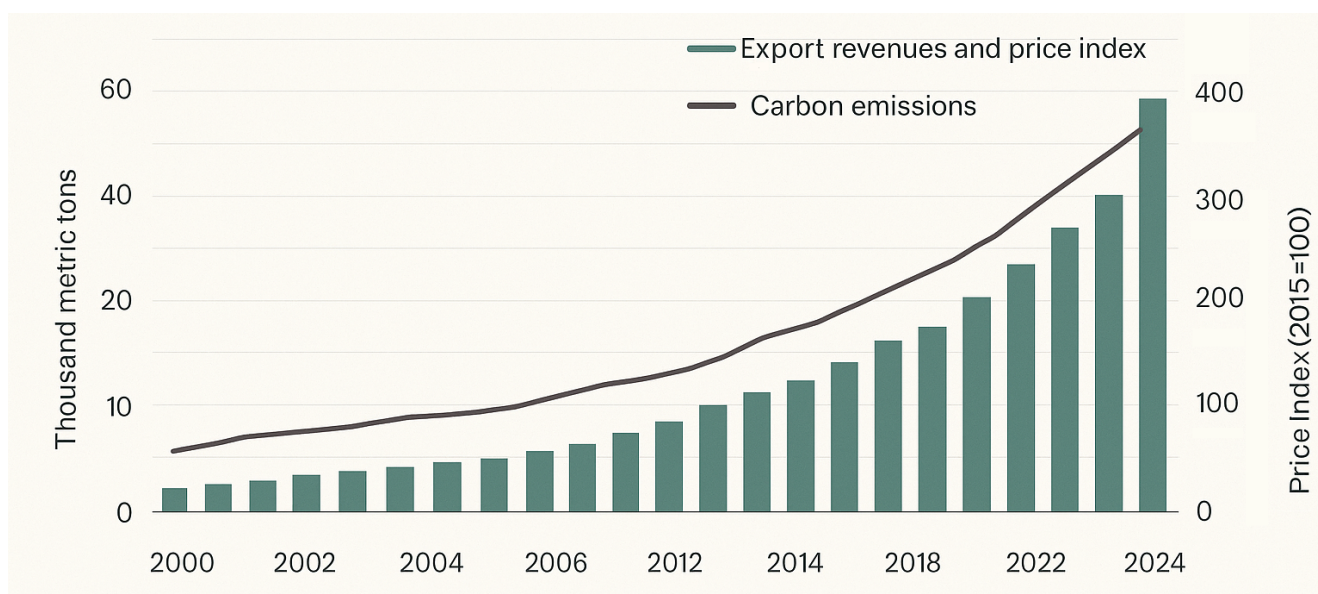


Figure 7. Chile lithium production, export revenues, and price index, 2000–2024. (Figure is prepared based on the data taken from [40].)

However, tensions persist between indigenous communities, environmental NGOs, and corporations over water use and ecosystem degradation in the Atacama Desert [41]. President Boric's 2023 National Lithium Strategy proposes greater public control, reflecting a shift toward "resource nationalism" within a democratic framework. Chile thus illustrates the struggle to align ecological sustainability with economic sovereignty.

Chile's model demonstrates the potential for hybrid governance systems that combine market efficiency with strong state oversight. By regulating private operations, establishing revenue-sharing mechanisms, and monitoring environmental impacts, the government seeks to balance profitability with social and ecological responsibility. The CORFO framework enables Chile to capture economic rents from lithium while avoiding some pitfalls of resource dependence, such as overreliance on a single actor or the erosion of democratic institutions. Strategic fiscal policies, including taxation and royalties, ensure that lithium wealth contributes to national development priorities rather than being concentrated among a few corporate actors. From a theoretical standpoint, Chile embodies a transitional form between rentier and post-extractivist governance: rents are captured through taxation and invested in social programs while environmental accountability becomes part of the national development narrative.

Nevertheless, the social and environmental dimensions remain contentious. Political ecology highlights that lithium extraction, though tied to the green economy, can reproduce extractive injustices if community rights and ecological thresholds are not enforced. The Atacama Desert is an ecologically fragile zone, where water-intensive lithium extraction threatens both local communities and biodiversity. Indigenous groups, who hold ancestral rights to land and water, frequently contest mining operations, demanding recognition, compensation, and participatory decision-making. NGOs and international observers have criticized inadequate consultation processes and the cumulative environmental impacts of extraction. Addressing these challenges requires integrating community rights, ecosystem preservation, and long-term sustainability into resource management frameworks, highlighting the limitations of conventional state-market approaches.

Chile's experience also provides lessons for the global green transition. As demand for lithium surges to meet electric vehicle and renewable energy targets, governance models that balance economic sovereignty, social inclusion, and environmental stewardship become increasingly vital. By institutionalizing accountability, promoting equitable benefit-sharing, and fostering dialogue with affected communities, Chile illustrates how resource wealth can be leveraged to support sustainable industrial development while mitigating the social and ecological risks associated with extraction. Its evolving lithium strategy demonstrates that even within democratic frameworks, managing critical minerals requires continual negotiation between profit, policy, and planetary limits.

4. International Dimensions: Geopolitics and Global Governance

Extraction is never confined to national borders. Global commodity chains, multinational corporations, and interstate alliances shape the politics of who extracts, who profits, and who bears the costs. The twentieth century's oil geopolitics have evolved into a twenty-first-century competition over critical minerals, technological dominance, and energy security [9].

The global governance of extractive industries now involves a complex web of actors, including private corporations, international financial institutions, multilateral agreements, and non-governmental organizations. Multinationals often wield disproportionate influence over regulatory frameworks and production practices, particularly in resource-rich but institutionally weak states. Meanwhile, consumer nations leverage trade agreements, investment incentives, and strategic partnerships to secure access to essential minerals, creating dependencies that replicate traditional extractive hierarchies. This dynamic reflects the enduring logic of the rentier state at a transnational scale, where external rents and asymmetric bargaining power substitute for domestic accountability. This dynamic is evident in the control of cobalt supply chains, dominated by firms operating in the DRC, or in China's near monopoly over rare earth processing.

Moreover, the globalization of extraction intersects with environmental and social justice concerns. Local communities frequently bear the costs of mining—land dispossession, water contamination, and labor exploitation—while profits flow outward to distant investors. International frameworks such as the Extractive Industries Transparency Initiative (EITI) and OECD Due Diligence Guidance seek to redistribute accountability along these chains, yet enforcement challenges persist. These global initiatives exemplify what political ecologists call "scalar justice," where responsibility must be shared across local, national, and global levels of governance to prevent environmental harm from being externalized onto vulnerable populations. Addressing these inequities requires multilateral cooperation, legally binding standards, and mechanisms to ensure that global demand does not perpetuate the injustices historically associated with extractive economies.

4.1. OPEC, Oil Power, and the Global Market

Founded in 1960, OPEC unified oil-exporting states seeking sovereignty over production. Its control of approximately 80% of proven reserves allows significant influence over global prices [42–44]. Saudi Arabia, wielding substantial spare capacity, operates as the cartel's swing producer. The formation of OPEC+ in 2016, including Russia, reflects a geopolitical alignment bridging the Middle East and Eurasia. Figure 8 shows the oil production share of OPEC and non-OPEC countries. OPEC's formation institutionalized a collective rentier strategy, transforming resource

dependency into geopolitical leverage. Figure 8 compares OPEC and non-OPEC production shares from 2000 to 2024, linking collective producer coordination to fluctuations in global oil prices and demonstrating how rentier power operates at the international level.

Yet OPEC's cohesion remains fragile. Member states face diverging fiscal needs, and geopolitical tensions—such as Saudi–Iran rivalry—often disrupt coordination [45, 46]. As global demand plateaus with the energy transition, the organization's leverage could wane, prompting efforts toward diversification and investment in petrochemicals and renewables. The group's recent push into renewable energy and hydrogen cooperation indicates a slow transformation from a fossil rentier alliance to a mixed energy cartel, seeking to retain influence in a decarbonizing world.

OPEC's evolving role illustrates the complex interplay between resource wealth, geopolitical strategy, and energy transition pressures. Historically, the cartel's ability to influence global oil markets hinged on collective compliance and coordinated production cuts. However, competing domestic priorities and differing exposure to fiscal pressures often undermine cohesion. States heavily reliant on oil rents, such as Venezuela or Iraq, face acute economic vulnerabilities that can incentivize overproduction, while wealthier members like Saudi Arabia or the UAE possess greater fiscal buffers, allowing them to act strategically in global markets.

The rise of OPEC+ reflects a strategic recalibration in which non-traditional oil exporters, including Russia, align with core OPEC members to stabilize markets. This align-

ment enhances collective market power, yet introduces new complexities, as divergent political goals and sanctions regimes complicate decision-making. Furthermore, the accelerating energy transition, driven by climate policies and renewable energy adoption, threatens to erode oil demand growth, challenging OPEC's long-term leverage. In response, members increasingly pursue diversification strategies, including petrochemical expansion, sovereign wealth fund investments, and renewable energy projects, to hedge against declining oil dependence.

Theoretically, OPEC embodies the tension between rentierism and strategic autonomy: it shows that collective resource management can shift the terms of dependency, but without structural diversification, such power remains contingent on volatile markets. Political ecology adds a further dimension—illustrating that global oil governance, while empowering some states, externalizes ecological costs onto extractive peripheries. OPEC's trajectory underscores that global resource governance is inseparable from domestic political economy. Oil rents underpin state budgets, influence patronage networks, and shape foreign policy, while coordination—or its absence—reverberates through global energy security and economic stability. The cartel's future will depend on its capacity to reconcile internal disparities, adapt to shifting consumption patterns, and strategically navigate a decarbonizing global economy. As such, OPEC is not merely a market actor but a geopolitical institution whose stability, coherence, and adaptability will continue to shape both regional and global energy landscapes in the twenty-first century.

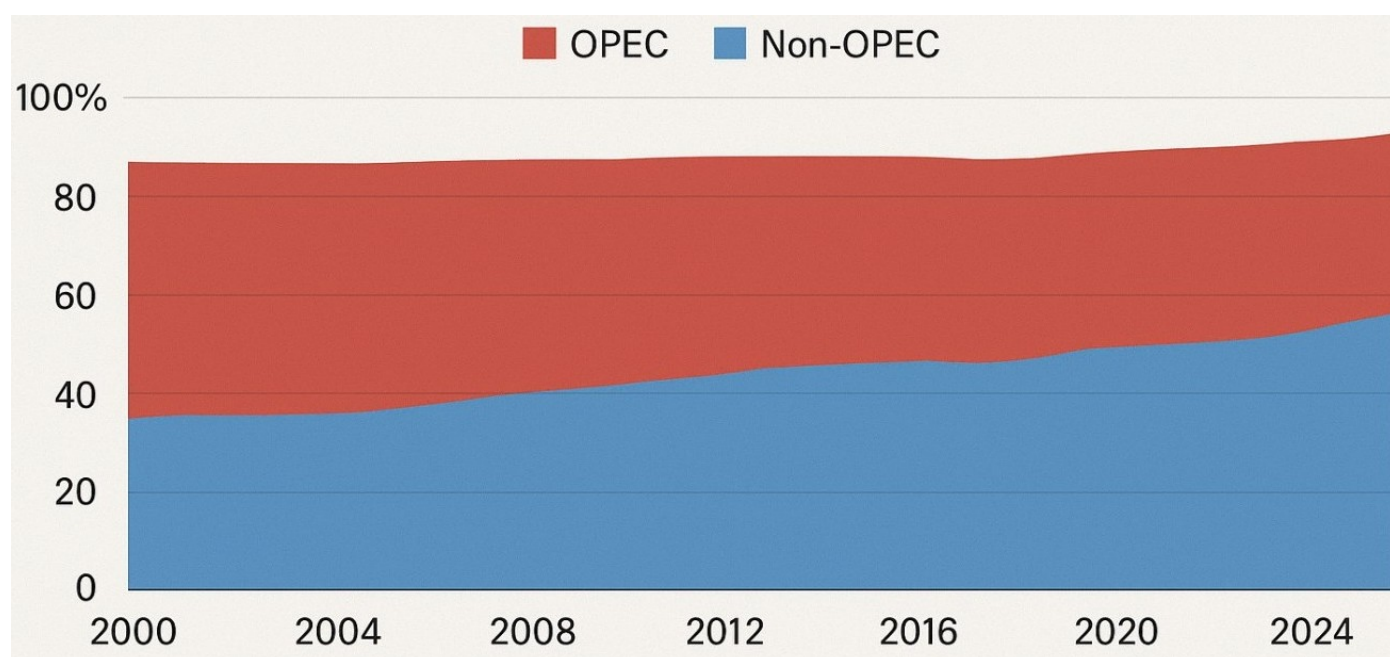


Figure 8. OPEC and non-OPEC oil production shares, 2000–2024. (Figure is prepared based on the data taken from [11].)

4.2. China's Resource Diplomacy and the Belt and Road Initiative

China's meteoric rise as global resource power reshaped extraction geopolitics. Through the Belt and Road Initiative (BRI), launched in 2013, Chinese state-owned enterprises invested heavily in Africa, Latin America, and Central Asia's resource sectors [47, 48]. These investments combine infrastructure finance with long-term resource offtake agreements, securing access to critical materials such as copper, cobalt, and lithium. As depicted in Figure 9, the concentration of Chinese Belt-and-Road mining projects across Africa and Latin America evidence Beijing's strategy of resource securitization, extending rentier logic through geoeconomic statecraft. The map underscores how China's state-capitalist model integrates extraction, infrastructure, and diplomacy into a unified strategy of resource securitization. This strategy exemplifies what scholars' term "geoeconomic statecraft": the use of financial and infrastructural instruments to secure strategic materials. It effectively globalizes the rentier logic—accumulating external rents through overseas control rather than domestic extraction.

While the BRI offers developing states alternatives to Western finance, critics highlight opaque contracts, environmental degradation, and debt dependency [49]. For instance, Zambia's copper sector faces heavy Chinese influence through state loans and joint ventures, raising sovereignty concerns. Yet others, such as Brautigam (2019), argue that Chinese finance can promote development if recipient countries strengthen governance frameworks [50].

China's engagement illustrates a new form of resource statecraft in which finance, infrastructure, and extraction are bundled into long-term strategic relationships. Unlike traditional extractive partnerships dominated by Western multinational corporations, Chinese actors often operate through state-to-state agreements, enabling flexibility in project timelines and repayment terms. This model can facilitate rapid investment in resource-rich countries that struggle to attract conventional capital, providing much-needed infrastructure and industrial development. However, it also shifts bargaining power toward the investor state, potentially constraining domestic policymaking and reducing public oversight.

The environmental and social implications of BRI-linked resource projects further complicate this dynamic. Large-scale mining operations in fragile ecosystems, such as lithium extraction in South America or copper projects in Central Africa, often strain local water supplies, degrade land, and disrupt traditional livelihoods. Civil society groups frequently report limited consultation with affected communities, highlighting the risks of social exclusion and environmental injustice. Governance frameworks, both domestic and international, therefore play a critical role in ensuring that Chinese-financed extraction supports sustainable development rather than reinforcing exploitative patterns. Political ecology reveals that this model reproduces extractive hierarchies: while marketed as South–South cooperation, it frequently mirrors older North–South dependencies, displacing ecological risks onto marginalized populations.



Figure 9. Chinese overseas mining investments, 2013–2024. (Figure is prepared based on the data taken from [11, 22].)

When coupled with strong domestic governance, such as in Chile's lithium partnerships or Indonesia's nickel industrialization, Chinese investment can catalyze value addition and technology transfer. Thus, the BRI's developmental impact depends less on Chinese intent than on recipient-state capacity and global regulatory enforcement. Ultimately, China's rise underscores the interplay between global demand for critical minerals and geopolitical competition. As renewable energy technologies drive surging demand for cobalt, lithium, and copper, states like China leverage financial, infrastructural, and political instruments to secure long-term access. For resource-dependent countries, navigating this landscape requires balancing immediate developmental benefits against potential loss of sovereignty, social equity, and environmental integrity. The challenge is not solely economic but inherently political: designing institutional mechanisms capable of capturing rents, regulating environmental impacts, and integrating local communities into the benefits of extraction while engaging with a powerful external actor shaping twenty-first-century resource geopolitics.

4.3. The Green Transition and Emerging Resource Rivalries

The shift from fossil fuels to renewables has not diminished resource politics—it has merely changed its composition. The International Energy Agency (2023b) estimates that clean energy technologies require six times more mineral inputs than fossil fuel systems [51]. Lithium, cobalt, and rare earths have become new strategic commodities,

intensifying competition among states. Figure 10 charts the geographic concentration of lithium, cobalt, and nickel production, reinforcing the argument that green-energy supply chains replicate earlier fossil-fuel hierarchies and new forms of dependency.

The “green resource curse” framework helps interpret these rivalries: while renewable technologies promise decarbonization, they create new dependencies and governance dilemmas. In weak institutional settings, the rush for critical minerals can reproduce corruption, inequality, and ecological harm—an ironic replay of fossil-era extractivism. Political ecology extends this critique by emphasizing that the material foundations of the green transition are socially uneven. Demand for electric vehicles and batteries in the Global North drives extraction pressures in the Global South, externalizing environmental costs and labor exploitation. Without equitable governance and circular-economy innovation, the transition risks becoming a new phase of green colonialism. Countries such as Indonesia have imposed export bans on raw nickel to promote domestic value addition, asserting “resource sovereignty” [7, 22]. However, this strategy often triggers disputes with multinational corporations and trading partners, revealing the tension between industrial policy and free trade. The green transition, rather than resolving extraction politics, has reconfigured it: from oil diplomacy to mineral mercantilism. These policies illustrate the emergence of a post-rentier logic in global extraction: rather than relying solely on raw rent capture, states are pursuing industrial and technological upgrading to secure long-term resilience.

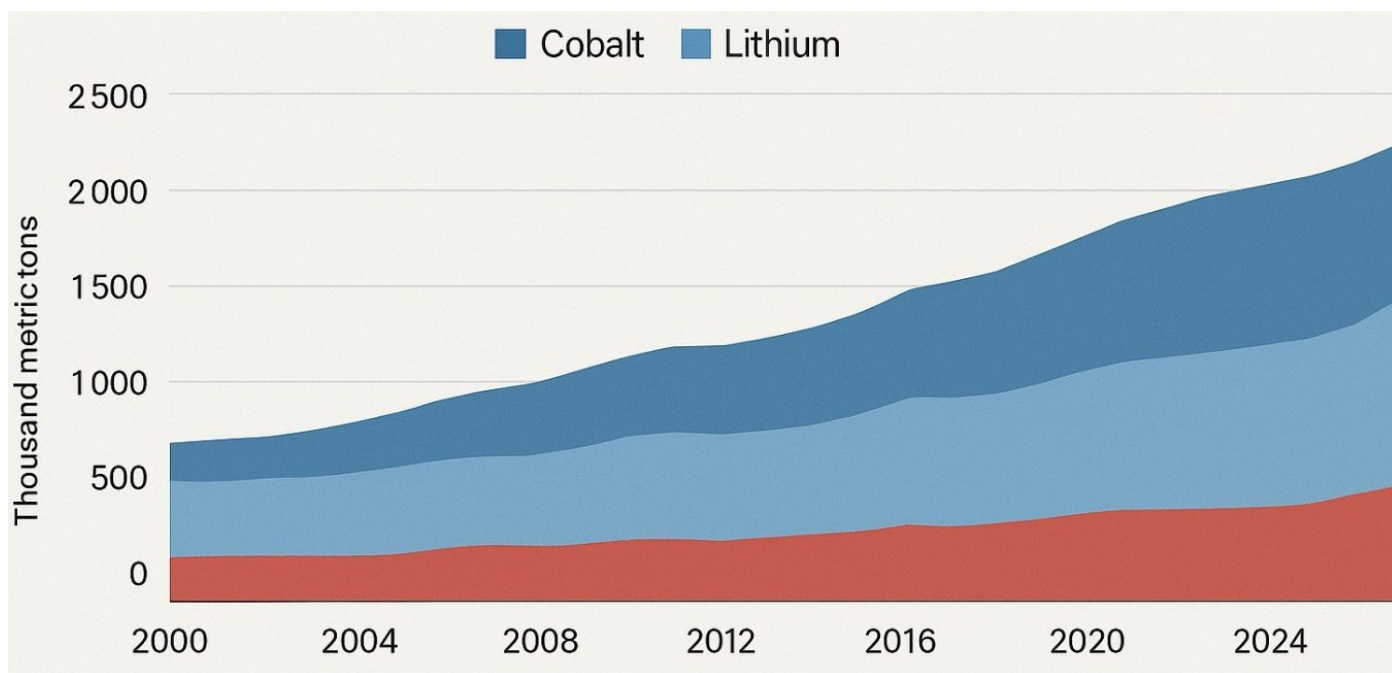


Figure 10. Global cobalt, lithium, and nickel production by country, 2000–2024. (Figure is prepared based on the data taken from [11].)

Together, OPEC's adaptation, China's resource diplomacy, and green-mineral rivalries depict a global system in transition—from fossil capitalism to a mineral-intensive green economy. Yet the central question remains unchanged: who controls the rents, and at what social and ecological cost? The next sections on governance challenges and policy responses address this dilemma directly, arguing that without coordinated global regulation, the green transition risks deepening rather than resolving extractive injustices. This reconfiguration highlights the complex interplay between economic development, environmental objectives, and geopolitical strategy. States are increasingly leveraging critical minerals to negotiate trade advantages, attract investment, and secure technological leadership, while balancing domestic industrialization goals with international market pressures. Simultaneously, the ecological and social costs of extraction remain pronounced, particularly in developing countries with weak governance. Without robust regulatory frameworks, supply-chain traceability, and equitable benefit-sharing, the rush for green minerals risks reproducing patterns of exploitation and inequality historically associated with fossil fuel extraction. The green transition thus embodies both an opportunity for sustainable industrial development and a potential perpetuation of extractive injustices.

5. Governance Challenges and Policy Responses

Governance remains the decisive factor in transforming resource wealth into sustainable development. The extractive sector generates high revenues but also high temptations—clientelism, opacity, and regulatory capture are recurring problems across the Global South [5]. Despite reforms, the paradox of plenty persists because the political logic of rent distribution prioritizes short-term patronage over long-term planning. This section deepens the discussion by linking existing governance debates with the frameworks of the resource curse, rentier state, and political ecology. It emphasizes how transparency, fiscal management, environmental regulation, and global cooperation together define whether extraction produces prosperity or inequality. Figures in this section are interpreted analytically rather than descriptively, connecting visual data directly to institutional performance and policy outcomes.

Addressing these governance challenges requires a multifaceted approach that integrates institutional design, legal frameworks, and societal oversight. First, strong fiscal institutions are essential to manage volatility and prevent the diversion of rents. Sovereign wealth funds, stabilization mechanisms, and transparent budgetary processes can buffer economies against commodity price swings while promoting intergenerational equity. Norway's Government Pension Fund Global exemplifies how fiscal discipline, technocratic management, and political consensus can transform resource rents into long-term social dividends. By contrast, countries with weak oversight or politicized management, such as Venezuela or Nigeria, illustrate the consequences of underdeveloped fiscal institu-

tions: economic instability, social unrest, and the entrenchment of elite power.

Second, regulatory institutions must enforce environmental and social standards effectively. Extraction generates significant ecological and human costs, from oil spills in the Niger Delta to lithium-related water scarcity in Chile. Environmental impact assessments, community consultation procedures, and legally binding benefit-sharing agreements are critical tools, yet their efficacy depends on both political will and enforcement capacity. Governance frameworks that integrate local voices, indigenous rights, and civil society monitoring help align extraction with sustainable development goals, reducing the risk of conflict and environmental degradation.

Third, transparency initiatives, while necessary, are insufficient on their own. Programs like the Extractive Industries Transparency Initiative (EITI) and OECD due diligence guidelines enhance visibility of payments and contracts, but structural power imbalances often limit their impact. Civil society engagement, media freedom, and independent oversight bodies are crucial to transform disclosure into accountability. In addition, legal mechanisms that sanction corruption or mismanagement ensure that transparency is not merely symbolic.

Finally, governance reform must consider economic diversification and long-term development strategies. Resource-dependent economies that fail to invest in human capital, manufacturing, and renewable sectors remain vulnerable to price shocks and rentier pathologies. Countries such as Chile, Norway, and Botswana demonstrate that integrating strategic investment, fiscal prudence, and social participation allows resource wealth to support sustainable development rather than perpetuating dependence.

Ultimately, the political economy of extraction is as much about power as it is about resources. Effective governance requires institutions that can resist short-term political pressures, enforce equitable distribution, and align resource management with social and environmental objectives. Without such frameworks, resource wealth risks reproducing cycles of inequality, conflict, and ecological degradation. Conversely, well-designed governance transforms extraction from a potential curse into a platform for inclusive prosperity, demonstrating that institutional integrity, not resource abundance alone, determines the trajectory of development.

5.1. Transparency and the EITI Framework

The Extractive Industries Transparency Initiative (EITI) has been a major innovation in promoting accountability. Established in 2003, it requires member countries to disclose payments by companies and revenues received by governments [8]. Over fifty nations now participate, including Nigeria, the DRC, and Chile. Empirical studies show modest improvements in fiscal reporting and citizen oversight [52]. Figure 11 shows that countries with sustained EITI participation score higher on corruption-control indices, confirming that transparency mechanisms

can strengthen governance when paired with domestic oversight.

Nevertheless, transparency alone cannot overcome structural political incentives. Norway demonstrates how institutionalized openness—parliamentary scrutiny, regular publication of petroleum accounts, and public access to contracts—builds trust and prevents elite capture. Nigeria's EITI compliance has not prevented oil theft, while the DRC's publication of payments did little to stop conflict financing [37]. This contrast shows that transparency is necessary but insufficient; it must operate within a culture of accountability supported by free media, an active civil society, and effective judiciary.

To be effective, transparency initiatives must be paired with robust enforcement, institutional capacity, and civic engagement. Disclosure mechanisms can improve governance only when civil society, media, and judicial bodies can act on the information provided. This requires investment in monitoring systems, capacity-building for regulatory agencies, and legal frameworks that penalize misreporting or embezzlement. Additionally, linking transparency to participatory budgeting, local development projects, and benefit-sharing agreements can ensure that

resource wealth translates into tangible gains for communities rather than merely enriching political elites. In this way, EITI and similar initiatives can evolve from symbolic reporting tools into instruments that genuinely enhance accountability and equitable management of natural resources. Political ecology adds that accountability should also include ecological and social metrics—tracking emissions, land use, and community impacts—so that citizens can evaluate both fiscal and environmental governance.

5.2. Fiscal Rules and Sovereign Wealth Funds

One of the most successful governance instruments is the establishment of sovereign wealth funds (SWFs) to stabilize revenues and preserve intergenerational equity. Norway's Government Pension Fund Global remains the benchmark, but many others—such as Chile's Economic and Social Stabilization Fund and Botswana's Pula Fund—demonstrate the value of institutionalized savings. As Figure 12 indicates, exporters with operational stabilization funds experience smaller budgetary swings, supporting the case for institutionalized savings and countercyclical fiscal rules.

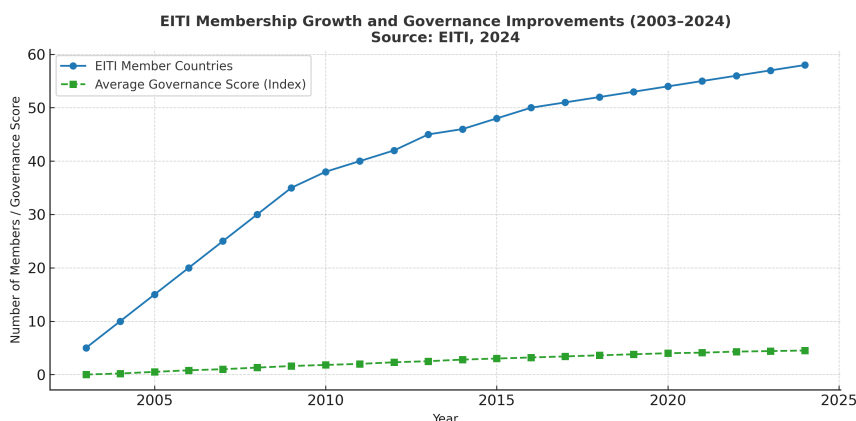


Figure 11. Number of EITI member countries and average governance score improvements, 2003–2024. (Figure is prepared based on the data taken from [8].)

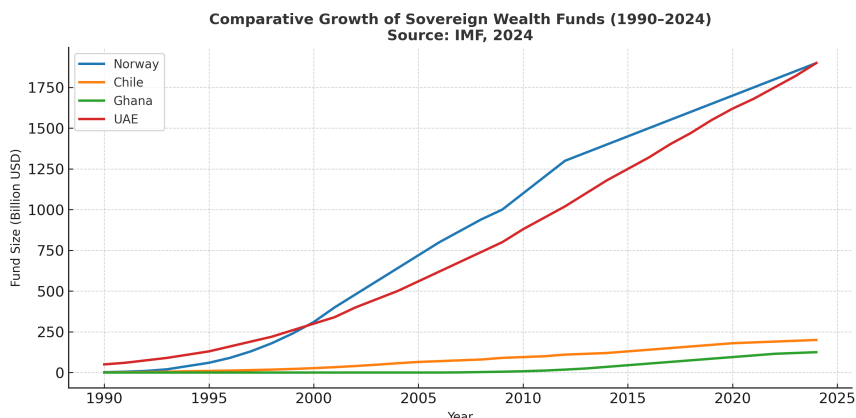


Figure 12. Comparative growth of sovereign wealth funds (Norway, Chile, Ghana, and UAE), 1990–2024. (Figure is prepared based on the data taken from [53].)

Fiscal rules can mitigate volatility by capping expenditure during booms and drawing down savings during busts. However, their success depends on political discipline. Ghana's Petroleum Revenue Management Act 2011 introduced a Heritage Fund and Stabilization Fund, yet parliamentary oversight remains limited [54]. In contrast, Norway's framework benefits from transparent budgeting, technocratic management, and broad political consensus [29]. These examples confirm that fiscal discipline reflects governance culture: where rules are institutionalized, savings endure; where populist or clientelist incentives prevail, funds erode.

Sovereign wealth funds can also serve as instruments for strategic development beyond stabilization. By investing in infrastructure, education, and green technologies, SWFs can support economic diversification and long-term resilience. However, effectiveness depends not only on sound fiscal rules but also on governance structures that ensure accountability, transparency, and insulation from political interference. Countries with weak institutions or high elite capture risk diverting SWF resources toward short-term patronage rather than sustainable development. Integrating independent oversight, robust reporting standards, and public engagement into fund management can enhance credibility and secure public trust. Properly managed, SWFs transform resource rents from a potential curse into a durable tool for equitable growth and intergenerational equity.

Economic diversification is equally vital. The post-extractivist perspective argues that rent revenues should

finance low-carbon industrialization, innovation, and social infrastructure rather than perpetuate dependence on volatile commodities. Chile's use of lithium revenues to fund renewable research illustrates how extraction can support ecological transition. Political ecology complements this view by highlighting distributive equity: diversification policies must address regional inequalities and support communities historically marginalized by extraction, ensuring that sustainability does not replicate extractive injustice.

5.3. Environmental Governance and Social Conflict

Extraction often ignites conflict between local communities and national elites over land rights, compensation, and ecological damage. Environmental impact assessments (EIAs), community development agreements (CDAs), and benefit-sharing mechanisms have become standard requirements in many jurisdictions [55]. Yet enforcement remains uneven.

In Peru's Andean mining corridor, protests against copper projects have paralyzed operations despite formal consultations [56]. In the Niger Delta, oil spills have devastated ecosystems, leading to lawsuits against multinationals like Shell in both Nigerian and European courts [16]. These conflicts reveal the limits of technocratic governance in contexts where local livelihoods and global profits collide. Figure 13 demonstrates that higher environmental-regulation capacity correlates with improved human-development outcomes, linking ecological governance directly to social welfare.



Figure 13. Map of global mining protest hotspots, 2000–2024. (Figure is prepared based on the data taken from [37].)

These cases underscore that legal compliance alone is insufficient to address the social and environmental dimensions of extraction. Genuine conflict mitigation requires participatory governance, transparent decision-making, and mechanisms that integrate local knowledge into project planning and monitoring. When communities perceive that their voices, rights, and environmental concerns are disregarded, grievances escalate into protests, blockades, and litigation, which can stall projects and generate broader social instability. International frameworks, such as the EITI and the OECD Due Diligence Guidance, can provide oversight and promote corporate accountability, but their effectiveness depends on robust domestic enforcement and the inclusion of affected communities as active stakeholders in governance processes. Oil spills, gas flaring, and toxic waste in these regions reveal how ecological degradation and governance failure reinforce each other.

Political ecology reframes environmental governance as a question of justice: it demands that communities affected by extraction exercise meaningful control through mechanisms such as free, prior, and informed consent (FPIC), environmental tribunals, and benefit-sharing arrangements. These tools reassert citizens' agencies in shaping resource policies. A gender dimension also emerges here—women often bear disproportionate health and livelihood costs from pollution and displacement. Inclusive governance therefore requires gender-sensitive policies and representation within environmental decision-making bodies.

5.4. Indigenous Rights and Decolonial Perspectives

The politics of extraction intersect with questions of sovereignty and indigenous rights. From Canada's First Nations to Bolivia's Aymara, communities resist dispossession through transnational networks and litigation [56, 57]. The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) codifies free, prior, and informed consent (FPIC) as a legal principle, yet implementation remains contested [58].

Bolivia's attempt under Evo Morales to nationalize hydrocarbons and empower indigenous governance offered an alternative model, but dependence on extractive rents persisted [59, 60]. Post-extractivist theorists argue for transitioning economies toward ecological sustainability and local autonomy rather than endless extraction.

Achieving post-extractivist goals requires reimagining the social and ecological contract of resource governance. Policies must prioritize community participation, environmental protection, and the equitable distribution of benefits, rather than merely channeling rents to the state or elite actors. Investments in renewable energy, circular economies, and sustainable agriculture offer pathways to reduce dependence on extractive industries while fostering local resilience. Furthermore, legal frameworks like FPIC must be enforced alongside mechanisms for monitoring and accountability, ensuring that indigenous and local communities have meaningful authority over decisions

affecting their territories. In practice, this approach challenges conventional notions of growth and development, emphasizing ecological stewardship, cultural preservation, and long-term social well-being as metrics of success.

6. Global Environmental Politics and Post-Extraction Futures

The twenty-first century's ecological crisis compels a rethink of the political economy of extraction. Climate change, biodiversity loss, and pollution reveal that the costs of extraction extend beyond fiscal or governance metrics—they threaten planetary stability. Scholars now debate the emergence of a “post-extractive” paradigm emphasizing sustainability, circular economies, and energy justice [9, 41]. This section expands the discussion to connect international climate policy, green-transition politics, and post-extractive frameworks. It demonstrates that while the world moves toward decarbonization, new patterns of dependency—what this paper identifies as the “green resource curse”—risk reproducing old hierarchies under environmental branding. At the same time, emerging movements for post-extractivism and global governance reform illustrate pathways toward more just and sustainable futures.

6.1. The Paris Agreement and Carbon Constraints

The 2015 Paris Agreement set the stage for global decarbonization, but fossil fuel producers face severe adjustment dilemmas. For oil-dependent economies like Saudi Arabia, Nigeria, and Russia, the decline of hydrocarbon demand poses existential fiscal risks [7]. Saudi Vision 2030 seeks to diversify into tourism and technology, yet over 70% of state revenue still depends on oil [22]. Figure 14 details Saudi Arabia's budget composition from 2000 to 2024, showing how oil revenues still dominate fiscal income despite diversification efforts; the trend demonstrates the structural inertia of rentier finance under Vision 2030.

The International Energy Agency's *Net Zero by 2050* roadmap projects that oil demand must fall by 75% by mid-century. This scenario threatens not only exporting states but also import-dependent developing countries that rely on cheap energy for industrialization [22, 53]. Thus, the energy transition is both an environmental and geopolitical transformation.

6.2. The Green Resource Curse and Ethical Supply Chains

The rapid expansion of renewable technologies creates new ethical dilemmas. Mining for lithium, cobalt, and rare earths often occurs under exploitative labor conditions and environmental degradation [61]. For instance, the DRC supplies over 70% of global cobalt, yet child labor persists in artisanal mines [62].

Efforts to certify “responsible minerals” through supply-chain traceability systems, like the OECD Due Diligence Guidance, have improved oversight but face enforcement challenges [63]. Unless global governance

institutions enforce fair-trade standards, the green transition may replicate the injustices of fossil capitalism. Figure 15 maps global lithium and cobalt supply chains from extraction to consumption, visually connecting producer states in the Global South with manufacturing centers in the Global North and illustrating asymmetric value capture within “green” economies.

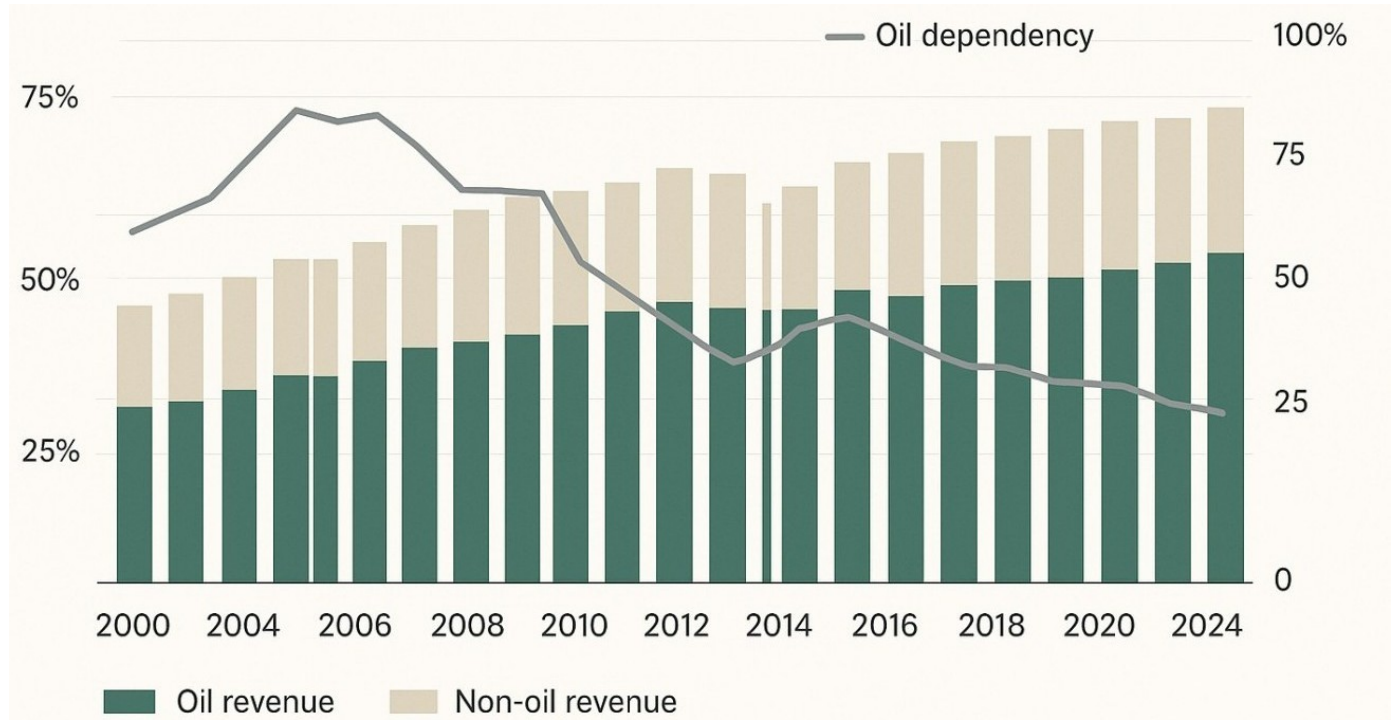


Figure 14. Saudi Arabia’s budget composition and oil dependency, 2000–2024. (Figure is prepared based on the data taken from [22, 53].)

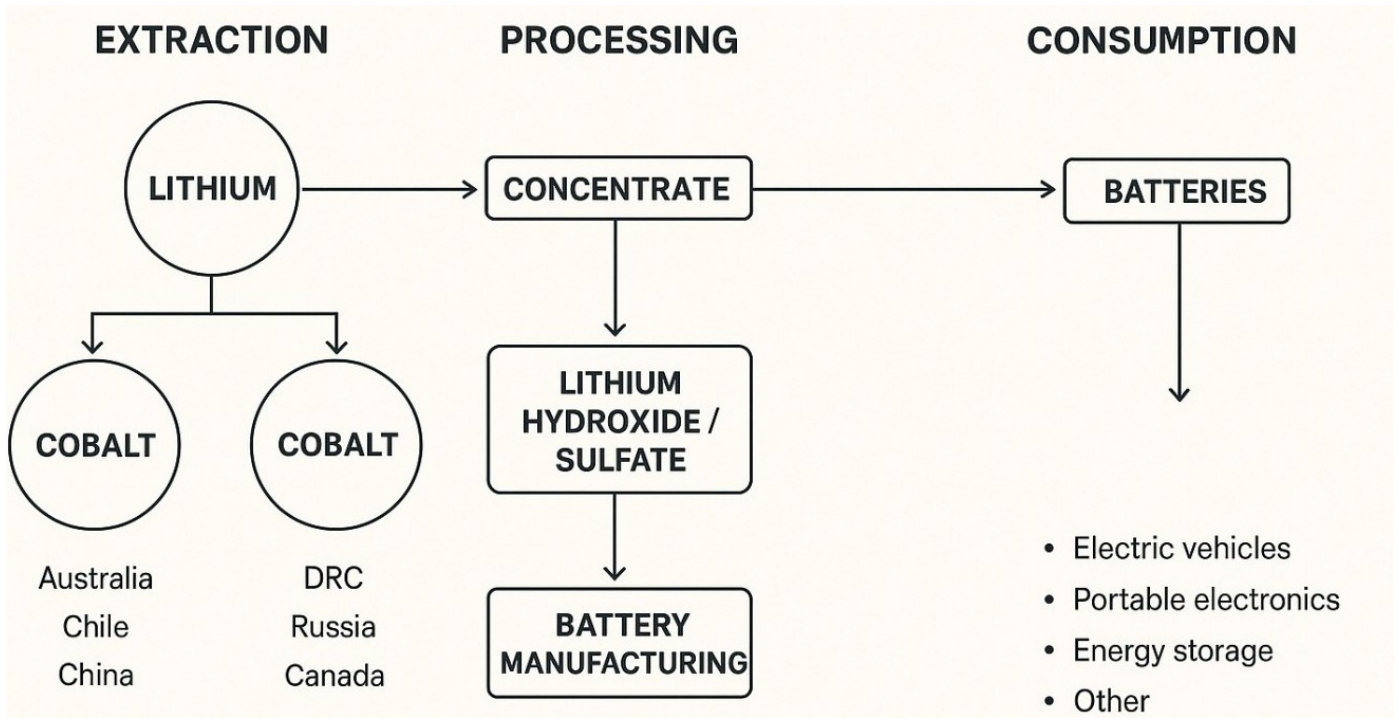


Figure 15. Global lithium and cobalt supply chains from extraction to consumption, 2024. (Figure is prepared based on the data taken from [11].)

Addressing these challenges requires a multi-scalar approach combining regulatory, economic, and technological interventions. At the international level, binding agreements that hold corporations accountable for human rights violations across their supply chains are crucial. Voluntary reporting initiatives, while valuable for transparency, often lack the teeth needed to prevent exploitation, especially in politically fragile contexts. National governments in resource-rich countries must strengthen labor laws, environmental regulations, and monitoring mechanisms while simultaneously investing in formalizing artisanal mining sectors to protect vulnerable workers.

Technological innovation can also play a role in improving accountability. Digital traceability platforms, blockchain-based mineral tracking, and real-time monitoring of mining operations can provide transparency and reduce the risk of unethical sourcing. However, technology alone cannot solve structural inequalities; it must be complemented by robust governance frameworks that empower local communities, enforce environmental standards, and redistribute benefits equitably.

Finally, the ethical dimension of renewable extraction demands rethinking consumption patterns in the Global North. The green transition cannot be achieved solely through technological substitution if demand for minerals continues to drive exploitation abroad. Policies promoting recycling, material efficiency, and circular economy principles can reduce dependency on newly mined resources while fostering sustainable production and consumption systems. By integrating ethical governance, technological innovation, and responsible consumption, the green transition can avoid reproducing the inequities of extractive capitalism and support a truly just and sustainable energy future.

6.3. Toward Post-Extractive Economies

Post-extractivism calls for structural transformation beyond the resource frontier. Latin American scholars such as [57, 60] advocate for *Buen Vivir*—an indigenous-inspired philosophy prioritizing ecological balance and collective well-being over GDP growth. Countries like Costa Rica, which phased out oil extraction while investing in ecotourism and renewables, offer prototypes of sustainable post-extraction pathways [55].

Transitioning from extraction requires diversifying revenue sources, reforming taxation, and fostering green industries. The European Union's Carbon Border Adjustment Mechanism (CBAM) and U.S. Inflation Reduction Act 2022 demonstrate how industrial policy can align environmental and economic goals [64]. Figure 16 compares GDP growth and carbon-emission paths of post-extractive versus extractive economies between 1990 and 2024, showing that diversified and post-extractive states achieve steadier growth with declining emissions—evidence that sustainability and prosperity can reinforce each other.

Post-extractivism is not merely an economic or technical endeavor; it constitutes a profound reorientation of political, social, and ecological priorities. At its core, it demands that states, institutions, and communities rethink the metrics of development. The *Buen Vivir* framework, with its emphasis on collective well-being and ecological balance, challenges the long-standing primacy of GDP as a measure of societal progress. Implementing such a vision requires embedding sustainability and social equity into national planning, public investment strategies, and legal frameworks, ensuring that long-term ecological resilience is valued alongside economic growth.

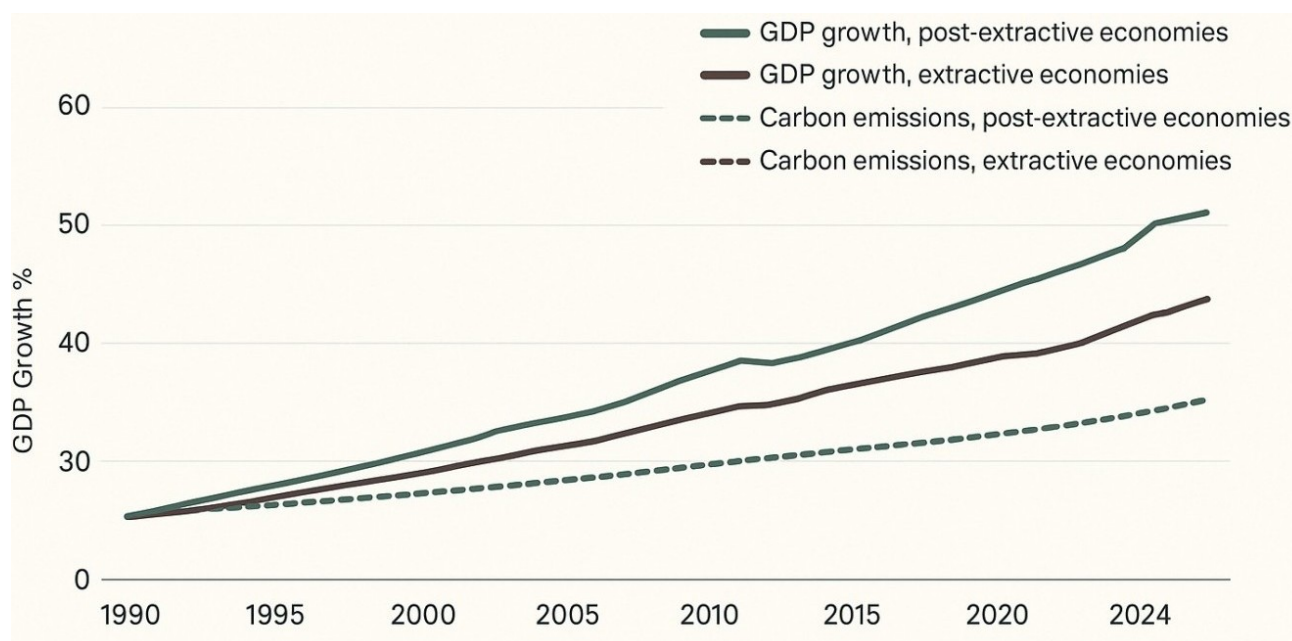


Figure 16. Comparative GDP growth and carbon emissions trajectories of post-extractive vs. extractive economies, 1990–2024. (Figure is prepared based on the data taken from [22].)

Revenue diversification is essential to reduce vulnerability to commodity price shocks and ecological crises. Resource-dependent nations often face structural dependence on extractive rents, which perpetuates economic instability and limits policy flexibility. By investing in alternative revenue streams such as progressive taxation, service-based sectors, ecotourism, and renewable energy, states can reduce reliance on extraction while strengthening social infrastructure. Costa Rica exemplifies this approach, demonstrating that redirecting capital from fossil fuels toward conservation, tourism, and renewables can create both economic resilience and ecological stewardship. Other Latin American and Caribbean nations have experimented with green fiscal policies, including carbon pricing, environmental royalties, and green bonds, which demonstrate the feasibility of linking public finance to sustainability objectives.

Industrial and technological policy are also critical to post-extractivist pathways. Mechanisms like the EU's CBAM and the U.S. Inflation Reduction Act not only encourage decarbonization but also stimulate domestic investment in green technologies. Industrial policy that integrates environmental objectives can promote circular economy models, foster resource efficiency, and generate green employment opportunities. Such strategies create synergies between ecological protection and economic dynamism, transforming sustainability from a constraint into a driver of innovation and growth.

Global coordination further strengthens post-extractivist strategies. The extraction of critical minerals—lithium, cobalt, rare earths—occurs within complex international supply chains often characterized by inequities and environmental harm. Multilateral cooperation, enforceable environmental standards, and technology-sharing agreements are therefore essential to prevent the replication of extractivist injustices in the renewable energy sector. Institutions such as the UNEP, the World Bank's Climate-Smart Mining Initiative, and regional development banks can facilitate knowledge transfer, provide financing, and harmonize regulations to ensure equitable participation in global green economies.

Ultimately, post-extractivism demands governance that integrates ecological integrity, social justice, and economic diversification. Legal frameworks, fiscal policies, participatory governance, and international cooperation must be coordinated to create resilient, sustainable, and inclusive societies. Achieving these objectives requires political will, moral commitment, and a willingness to challenge entrenched extractivist interests. By prioritizing both human and planetary well-being, post-extractivist strategies offer a pathway toward regenerative economies that transcend conventional resource dependence.

6.4. Global Governance for a Sustainable Extractive Future

Achieving just transitions demands multilateral cooperation. The United Nations Environment Assembly (UNEA) and the World Bank's Climate-Smart Mining Initiative aim to integrate sustainability across resource value

chains [55]. Strengthening corporate accountability, environmental taxation, and technology sharing are essential to decouple growth from degradation.

Ultimately, as [9] argue, the politics of extraction are inseparable from the politics of justice. The challenge for the coming decades is to transform extractive capitalism into regenerative economies that respect planetary boundaries and human dignity.

This transformation requires a reimagining of global economic governance and a redefinition of what constitutes development. Beyond transitioning from fossil fuels to renewables, a just transition must address the structural inequalities embedded in the global resource economy. Resource-rich nations in the Global South often find themselves locked in dependency through debt, unfavorable trade terms, and limited technological sovereignty. Overcoming this pattern demands coordinated reform of international financial institutions, trade regimes, and investment treaties to prioritize sustainability, equity, and self-determination.

At the national level, policy coherence is vital to ensure that climate goals, industrial strategies, and social welfare programs reinforce one another rather than compete. Governments must design fiscal and regulatory systems that capture a fair share of extractive rents and channel them into long-term human and ecological investments. Education, health care, and infrastructure development—funded by resource revenues—can create resilient foundations for diversified low-carbon economies. Equally, robust legal frameworks are required to uphold environmental rights, protect Indigenous territories, and prevent corporate impunity.

Ultimately, achieving justice in extraction means transforming not only how resources are governed but how value itself is defined. Regenerative economies center well-being, reciprocity, and ecological balance as measures of prosperity. Such a paradigm challenges the extractivist logic of endless growth and opens the possibility of a political economy rooted in care, stewardship, and shared responsibility for the Earth's future.

7. Conclusion

Natural resource extraction sits at the heart of the global political economy and the unfolding environmental crisis. It is not merely an economic activity but a constitutive process that shapes state formation, governance trajectories, and geopolitical alignments. From the oil fields of the Niger Delta to the copper belts of Zambia, the resource frontier has long defined patterns of accumulation, dependency, and resistance. The comparison across cases such as Nigeria, Norway, Venezuela, and the Democratic Republic of the Congo (DRC) demonstrates that the outcomes of extraction depend far less on the magnitude of resource endowments than on the quality of institutions, the integrity of governance, and the political will to manage wealth sustainably. In other words, resources themselves are not inherently a curse or a blessing; it is the social, political, and moral architecture surrounding them that

determines whether they generate prosperity or perpetuate inequality and conflict.

Nigeria and Venezuela illustrate the pitfalls of rentier politics, where oil wealth fostered state dependency on volatile revenues, eroded fiscal discipline, and entrenched elite capture. In both countries, resource rents became instruments of patronage, fueling corruption and distorting democratic institutions. By contrast, Norway offers a paradigmatic example of how disciplined governance and transparent fiscal management can transform resource abundance into a foundation for long-term welfare. The Norwegian model—anchored in its sovereign wealth fund, strict environmental regulations, and a culture of accountability—demonstrates that the “resource curse” is not inevitable. The DRC, on the other hand, exposes the darker side of extraction in contexts of weak statehood, foreign interference, and violent competition over mineral wealth. Its cobalt and coltan mines, critical to the global battery supply chain, are simultaneously sources of livelihood and sites of exploitation, underscoring how global demand for “green” technologies can reproduce colonial patterns of extraction under new guises.

As the world transitions toward decarbonization, the extractive frontier is expanding into new territories and materials. Lithium deserts in Chile, rare earth deposits in Inner Mongolia, and nickel reserves in Indonesia have become the new frontlines of the green economy. Yet, the political economy of this transition remains haunted by the legacy of fossil capitalism. This paradox defines what this paper terms the *green resource curse*: the risk that renewable-energy minerals reproduce rentier dependency, weak governance, and social inequity beneath a sustainability narrative. Without deliberate governance innovation, the push for renewable energy risks reproducing the same injustices—land dispossession, labor exploitation, and environmental degradation—that characterized the oil and coal eras. The paradox of decarbonization lies in its material dependence: clean energy technologies, from solar panels to electric vehicles, require vast quantities of minerals whose extraction can devastate ecosystems and communities if left unchecked.

The twenty-first century therefore demands a paradigm shift in resource politics—one that redefines extraction not as a purely technical or economic issue, but as a question of justice, democracy, and planetary stewardship. Environmental sustainability must be woven into the core of resource governance rather than treated as a secondary concern. Equitable benefit sharing, too, must move beyond rhetorical commitments toward tangible redistribution mechanisms that empower local communities. This entails not only fiscal reforms and social investments but also participatory decision-making processes that give affected populations a genuine voice in shaping the terms of extraction. Such an approach aligns with emerging post-extractivist thought, which calls for redirecting rents toward social well-being, ecosystem restoration, and economic diversification rather than continued accumulation.

Transparency initiatives such as the Extractive Industries Transparency Initiative (EITI) have made important strides, yet transparency alone is insufficient without enforceability and accountability. The comparative evidence synthesized in Figures 11–16 confirms that disclosure must be coupled with institutional sanction and citizen oversight to yield real change. What is required is a new generation of governance frameworks that link disclosure to sanction, participation to power, and sustainability to law. Similarly, sovereign wealth funds must evolve beyond being mere savings instruments into engines of intergenerational justice. They should be explicitly designed to invest in economic diversification, education, and green innovation, ensuring that natural resource wealth becomes a bridge to a post-extractive future rather than a crutch for rentier dependence. They should explicitly finance green innovation, education, and non-extractive sectors, operationalizing the transition from rentiers to regenerative economies.

On the global scale, resource regimes must internalize the true environmental and social costs of extraction. This means pricing carbon, biodiversity loss, and ecosystem degradation into the calculus of trade and investment. It also means reimagining international law to protect the rights of nature and the communities most affected by extraction. The global lithium-and-cobalt supply chains mapped in Figure 15 exemplify why such reforms are urgent: value capture remains concentrated in consumer economies, while ecological burdens fall on producer regions. The Global supply chains must become transparent and traceable, ensuring that the transition minerals powering the green economy are sourced responsibly. Multilateral institutions—from the World Bank to the United Nations—have a crucial role to play in setting binding standards, facilitating technology transfers, and financing sustainable alternatives. Figure 16 further shows that post-extractive economies combining diversification with emission reductions achieve steadier growth, indicating that sustainability and prosperity can be mutually reinforced under robust governance.

Yet, the political challenge of extraction is ultimately a moral one: how humanity chooses to balance prosperity with planetary limits. The current trajectory of consumption and growth remains ecologically untenable. Decarbonization, while essential, cannot simply replicate extractivist logics in new forms. Instead, it must invite deeper reckoning with the values underpinning the global economy—efficiency, profit, and expansion—and replace them with principles of sufficiency, regeneration, and care. This ethical transformation lies at the heart of post-extractivism, which reframes prosperity as living well within ecological limits rather than surpassing them. Achieving this transformation requires more than policy reform; it demands cultural and epistemic change, recognizing that the Earth is not a warehouse of resources but a living system with which human societies are intertwined.

The main contribution of this review is to bridge classical theories of the resource curse and rentier state with contemporary debates on political ecology, the green resource curse, and post-extractivism. It shows that sustainable development depends not only on technical management but on moral and institutional renewal. The sustainability of natural resource economies, and indeed the legitimacy of the global order itself, will hinge on how this moral reckoning unfolds. If governance innovations succeed in aligning extraction with justice and ecological balance, the energy transition could become a moment of renewal—a chance to redefine prosperity in harmony with the planet. If not, the world risks entrenching a new cycle of exploitation and inequality under the banner of sustainability.

7.1. Limitations and Future Directions

While this review offers a broad comparative synthesis, several limitations should be acknowledged. First, the analysis is primarily qualitative and relies on secondary literature and global datasets that vary in coverage and accuracy, especially for informal or artisanal extraction sectors. Second, the focus on national-level governance may obscure local variations in power, resistance, and environmental outcomes that require ethnographic or community-based research to capture fully. Third, the study's temporal scope—spanning the late twentieth to early twenty-first century—captures structural trends but cannot account for rapid policy shifts or new technological disruptions in real time. Finally, although the review integrates multiple theoretical traditions, further empirical testing is needed to evaluate the causal mechanisms linking resource governance, ecological sustainability, and social equity. These limitations do not weaken the findings but indicate areas where future interdisciplinary research can deepen and refine the framework proposed here.

Acknowledging its limitations, this review focuses primarily on macro-institutional dynamics; future research should combine local ethnographies, quantitative modeling, and environmental metrics to test and refine these theoretical linkages. The future of extraction, therefore, is not simply about managing materials but about reimagining the relationship between humanity, the state, and the Earth. It is this reimagining—anchored in integrity, accountability, and moral vision—that will determine whether the twenty-first century becomes an age of regeneration or repetition.

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