**Promoting a Human-Rights-Centered Just Energy Transition for Communities in Zambia's Mineral Resource Areas: A Critical Review of Policies, Challenges, and Pathways**

**Abstract**

The global transition towards clean energy has placed mineral-rich countries like Zambia at the forefront due to their vast reserves of critical minerals such as copper and cobalt. However, the benefits of mineral extraction remain unequally distributed, with communities in Zambia’s mineral resource areas facing persistent human rights violations, environmental degradation, and socio-economic marginalization. This study critically examines the policies, challenges, and pathways for ensuring a *human-rights-centered Just Energy Transition (JET)* in Zambia, emphasizing equity, sustainability, and social justice. The study adopts a rigorous literature review approach, applying theoretical frameworks such as the Rights-Based Approach, Resource Curse Theory, and Sustainable Development Theory to analyze governance gaps, social impacts, and environmental risks associated with mineral extraction. The research identifies key human rights concerns, including land displacement, labour rights violations, pollution, and inadequate community participation in decision-making. Furthermore, policy weaknesses—such as weak enforcement of Free, Prior, and Informed Consent (FPIC), lack of corporate accountability, and ineffective environmental governance—exacerbate these challenges. The findings underscore that Zambia’s energy transition must be designed to equitably distribute benefits while addressing the adverse effects of resource extraction. Policy recommendations include strengthening environmental governance, embedding FPIC into legal frameworks, ensuring corporate accountability, and enhancing community engagement in energy transition policies. Additionally, fostering multi-stakeholder collaboration among the government, private sector, and civil society is crucial to implementing a fair and inclusive transition. This study highlights the urgent need for Zambia to adopt policies that balance economic growth with human rights protection and environmental sustainability. By integrating social justice principles into its energy transition strategy, Zambia can ensure that mineral resource development contributes to sustainable livelihoods, equitable benefit-sharing, and a truly just transition for all communities.

***Keywords****:* Just Energy Transition, Human Rights, Resource Governance, Social Justice, Environmental Justice, Zambia, Critical Minerals, Sustainable Development.

**1. Introduction**

**1.1 Background**

The global push for a *Just Energy Transition* (JET) aims to address climate change by shifting to renewable energy sources while ensuring equity, inclusiveness, and sustainability, particularly for vulnerable communities. Zambia, with its vast reserves of copper and cobalt, plays a pivotal role in the global energy transition, as these minerals are essential for clean energy technologies such as batteries, electric grids, and renewable energy infrastructure [1]. However, the benefits of mineral extraction have not been equitably distributed, particularly for communities living in Zambia’s mineral-rich regions, such as the Copperbelt and North-Western provinces. These areas face significant challenges, including human rights violations, such as land displacement, loss of livelihoods, and poor working conditions [2]. Additionally, environmental degradation, including pollution and deforestation, has undermined the health and well-being of these communities. Despite the mining sector's substantial contribution to Zambia’s economic growth, local populations remain marginalized, with limited participation in decision-making processes and few tangible benefits [3]. This stark imbalance highlights the need for policy frameworks that address these inequalities and align resource extraction with the principles of a *Just Energy Transition [19,20]*.

The study seeks to critically examine how the JET can prioritize the protection and promotion of human rights for communities affected by mineral extraction in Zambia. Specifically, it will analyze the socio-economic and environmental impacts of mineral resource extraction, such as health risks, land degradation, and economic vulnerabilities, while identifying gaps in existing policies and institutional frameworks [4,18]. The study aims to propose actionable **strategies** for a fairer and more equitable energy transition, ensuring that Zambia’s mineral wealth contributes to both local development and global clean energy goals. The research addresses three critical questions: What are the human rights implications of mineral extraction in Zambia’s resource areas? How can the energy transition be implemented equitably to ensure affected communities benefit? What policies and frameworks are needed to promote a human-rights-based approach to the JET?

By focusing on Zambia’s key mining regions, the study provides insights into the specific challenges faced by local populations and contributes to strengthening national policies that align with **Sustainable Development Goals (SDGs)**, such as clean energy (SDG 7), decent work (SDG 8), and reduced inequalities (SDG 10). Ultimately, the research aims to offer practical solutions for **sustainable resource governance**, emphasizing inclusive participation, environmental protection, and equitable benefit-sharing to ensure Zambia’s energy transition is both just and transformative for all stakeholders.

### ****1.2 Just Energy Transition (JET)****

The **Just Energy Transition (JET)** refers to the process of transitioning from fossil fuels to renewable energy in a way that is socially, economically, and environmentally equitable. It prioritizes addressing **climate change** while ensuring that no community is left behind.

* **Definition of JET**: A transition that promotes inclusiveness, reduces inequalities, and ensures environmental sustainability by addressing the needs of vulnerable populations, particularly in resource-dependent regions.
* **Key Principles of JET**:
	+ **Equity**: Fair distribution of benefits and burdens across all communities, especially marginalized ones.
	+ **Inclusivity**: Active involvement of all stakeholders, including local communities, in decision-making processes.
	+ **Sustainability**: Adoption of long-term environmental, economic, and social practices to ensure resilience and development.

Table 1: Principles of a Just Energy Transition

|  |  |
| --- | --- |
| **Principle** | **Description** |
| **Equity** | Fair allocation of energy transition benefits and burdens to affected groups. |
| **Inclusivity** | Participation of diverse stakeholders in decision-making processes. |
| **Sustainability** | Long-term resilience by balancing environmental, social, and economic goals. |

**2. STUDY METHODS**

**2.1 Literature Review Process**

This section presents the inclusion and exclusion criteria used to select the relevant literature for reviewing policies, challenges, and pathways related to promoting a human-rights-centred just energy transition in Zambia’s mineral resource areas. The study critically evaluates the existing literature to derive comprehensive insights and actionable recommendations for advancing the energy transition in these regions.

**2.1 Inclusion and Exclusion Criteria**

The inclusion criteria were designed to ensure the selection of high-quality, relevant studies. The thematic relevance of the literature was emphasized, focusing on just energy transition frameworks, policies, and implementation strategies within Zambia or other similar Sub-Saharan African mineral-rich regions. The prioritization of studies addressing human rights considerations in energy transitions, particularly to social, economic, and environmental justice, as well as the impact of energy policies on marginalized communities, was noted. The geographic focus was another crucial factor, with preference given to studies that specifically addressed Zambia’s energy sector, mining industry, and policy landscape, or comparative studies offering transferable insights to the Zambian context. The sources selected for inclusion in the review were drawn from peer-reviewed journal articles, conference proceedings, policy briefs, and government reports from credible institutions such as the International Energy Agency (IEA), World Bank, United Nations (UN), and Zambia’s Ministry of Mines and Energy. Methodological rigor was a key consideration, with a preference for empirical studies employing qualitative, quantitative, or mixed-methods approaches, as well as systematic reviews and well-structured policy analyses. Publications from the last 10–15 years (2010–2025) were prioritized to ensure contemporary relevance, although historical studies were considered if they provided foundational theories or significant legal precedents. English-language publications were generally preferred, but exceptionally relevant non-English studies translated into English were also considered.

On the other hand, the exclusion criteria aimed to filter out irrelevant or low-quality literature. Studies that did not align thematically with the human rights focus of energy transitions, such as those discussing energy transitions without addressing human rights or social justice concerns, were excluded. Research focusing solely on general mining policies without specific relevance to just energy transitions were also omitted. Geographic mismatch was another factor contributing to exclusion, particularly in cases where the studies focused on regions with socio-economic or resource governance structures vastly different from Zambia, or on global studies lacking specific insights applicable to Zambia or comparable economies. The credibility of the publication sources was scrutinized, leading to the exclusion of non-peer-reviewed materials such as blog posts, opinion pieces, and unverified reports, as well as studies with methodological flaws or unsupported conclusions. Additionally, studies older than 15 years were generally excluded unless they provided valuable historical context or legal precedents. Research that merely replicated findings from other sources without adding new insights was also omitted. Language and accessibility constraints further contributed to exclusion, as non-English studies without available translations and restricted-access documents not publicly available for review were not considered.

**2.3 Methodological Approach**

The methodology for this literature review was structured to ensure a rigorous and comprehensive selection process. A multi-stage filtering process was employed to assess thematic relevance, geographic focus, and publication credibility. Initial searches were conducted through academic databases, policy archives, and institutional repositories. Each identified study underwent a preliminary screening based on the title and abstract, followed by a full-text review to confirm its alignment with the inclusion criteria. Any ambiguities or borderline cases were resolved through consensus among researchers. This structured approach was designed to enhance the reliability of the findings and ensure that the selected studies meaningfully contributed to understanding the policies, challenges, and pathways of a human-rights-centred just energy transition in Zambia’s mineral resource areas.

By applying strict inclusion and exclusion criteria, this meta-analysis ensured a high-quality, thematically relevant, and methodologically sound literature review. The approach taken ensured that only contemporary and well-researched studies informed the discussion, leading to credible insights and actionable recommendations. This study contributes to the ongoing discourse on just energy transitions by providing a critical evaluation of existing policies, identifying key challenges, and suggesting pathways to ensure a human-rights-centred approach in Zambia’s mineral resource areas.

**3. COMPREHENSIVE STUDY INSIGHTS**

#### **3.1 Food Security and The Just Energy Transition**

Food insecurity in Zambia is often exacerbated by climate-induced variability such as droughts, floods, and extreme weather events, which affect agricultural productivity. The transition to renewable energy, such as solar and wind power, could stabilize the energy supply for irrigation, processing, and storage of food, addressing these climatic shocks. However, this transition must be equitable to avoid displacing vulnerable farming communities. Large-scale land acquisitions for renewable energy projects, for instance, risk exacerbating land scarcity and disrupting livelihoods dependent on smallholder agriculture, a primary source of food production. The World Bank president said without electricity it will be difficult to harness the potential Zambia has to use innovative ways of food production,

#### **3.2 Domestic Resource Mobilization and Energy Access**

Domestic resource mobilization (DRM) plays a pivotal role in enabling a just energy transition. Zambia faces challenges in financing renewable energy infrastructure while maintaining fiscal sustainability. Effective domestic resource mobilization through taxation, natural resource revenue management, and public-private partnerships can facilitate investments in decentralized energy systems. Investments in off-grid solar solutions, for example, can empower rural communities, improving access to energy for agriculture, such as powering water pumps and cooling systems for food storage. Targeted resource mobilization policies that integrate agriculture-energy synergies will enhance food security while reducing Zambia's dependency on external funding [5]. Zambia should be the architect of its future, the West-Africa relations will never work, if they could finance over $65 billion to Ukraine just in 2022, then why do they find it difficult to offer Zambia and the entire Africa the needed resources and technology to actualize the just energy transition, which they solely need amidst the devastating impact of Climate Change. Once Zambia realizes it is the master of its destiny, the better for all.

#### **3.3 Energy Democracy and Community Empowerment**

Energy democracy ensures that decision-making processes on energy production and consumption are participatory and equitable. For Zambian communities, especially rural ones, energy democracy can empower local populations to control energy solutions that align with their food production priorities. Community-driven renewable energy cooperatives can reduce costs, increase access, and ensure energy directly benefits agricultural activities[6]. The localization of energy systems supports smallholder farmers by enabling irrigation, mechanization, and efficient food processing, thereby improving food availability and affordability. Without an inclusive energy framework, however, energy transitions risk deepening existing inequalities, further limiting marginalized communities' access to energy.

#### **3.4 The Role of Gender in Energy and Food Systems**

Gender plays a critical role in Zambia's energy transition, particularly in addressing food insecurity. Women form the backbone of Zambia's agricultural labour force, responsible for 60–80% of food production in rural areas. However, gender disparities in energy access, land ownership, and decision-making restrict women's ability to participate in and benefit from the energy transition. Prioritizing gender-responsive policies—such as supporting women-led energy initiatives, enhancing access to credit for clean energy technologies, and promoting gender-inclusive training programs—can amplify women's contributions to food systems [7]. Women’s energy production empowerment will improve household food security and foster community resilience against climate impacts. Zambia needs to remodel itself from a neo-liberal and patriarchal system to a community-based and regenerative mode of production, putting women at the centre of it all, reigniting women’s interconnectedness with the earth, while putting into consideration the need to formulate budgets that support sustainable farming in rural communities, hence reducing expenditure on social cash transfer.

### ****3.5 Human Rights Framework****

**3.5.1 The Role of Human Rights in a Just Energy Transition for Communities in Mineral Resource Areas**

Integrating human rights principles is crucial for fostering a Just Energy Transition, especially in communities situated in mineral resource areas, which often face significant injustices linked to resource extraction [8]. To ensure that energy transitions promote fairness, equity, and sustainability, it is imperative to centre human rights in policy frameworks and decision-making processes.

**Key Human Rights Principles:**

* **Free, Prior, and Informed Consent (FPIC):** This principle guarantees that affected communities have the right to make informed decisions and provide consent before the implementation of energy projects that may impact their land, resources, and way of life.
* **Social Justice:** A Just Energy Transition requires that all individuals and communities, particularly those historically marginalized, have equitable access to resources, opportunities, and decision-making power within energy systems.
* **Environmental Rights:** This principle upholds the right of communities to live in a clean, healthy, and sustainable environment, ensuring that energy transition processes do not contribute to environmental degradation or harm.

**3.5.2 The Intersection of Human Rights and Energy Transitions:**

Human rights are central to mitigating the negative social and environmental consequences of resource extraction, particularly in mineral-rich regions. An energy transition that neglects these rights risks deepening existing inequalities, displacing vulnerable communities, and exacerbating environmental damage. To avoid such outcomes [9], policies must be designed to uphold human rights, ensuring accountability, enabling participatory governance, and protecting the most vulnerable populations. This approach not only safeguards communities but also fosters a more equitable and sustainable energy future for Zambia’s mineral resource areas.

### ****3.6 Environmental Justice and Social Justice****

Environmental and social justice principles form the foundation for assessing fairness in resource governance and the impacts of the energy transition, particularly in mineral resource areas.

* **Environmental Justice** advocates for equitable access to natural resources and protection from environmental harm. It ensures that the burdens of resource extraction and energy transitions are not disproportionately shouldered by marginalized communities, thereby safeguarding their rights to a clean, healthy, and sustainable environment.
* **Social Justice** focuses on ensuring fairness in the distribution of economic and social opportunities. It upholds the right of affected communities to have equal participation in decision-making processes and to share the benefits of energy transitions, ensuring that they are not left behind in the transition to more sustainable energy systems.

Both principles are crucial for ensuring that energy transitions are both just and inclusive, particularly for communities in Zambia’s mineral resource areas, where the impacts of resource extraction and energy policies are often felt most acutely.

Table 2. Environmental and Social Justice in Energy Transitions

|  |  |
| --- | --- |
| **Concept** | **Focus Area** |
| **Environmental Justice** | Fair resource access, environmental protection, and harm mitigation. |
| **Social Justice** | Equitable economic opportunities, benefit-sharing, and participation. |

### ****3.7 Theoretical Lenses****

To better understand the complexities of the Just Energy Transition and its impact on human rights in mineral resource areas, this study will draw on several key theoretical frameworks. First, the **Rights-Based Approach (RBA)** will be utilized, which emphasizes the integration of human rights principles into development and governance processes. This approach promotes participation, accountability, and the empowerment of communities, ensuring fair and just resource governance. Second, **Resource Curse Theory** will be applied to explain the paradox where countries rich in natural resources, particularly minerals, experience slower economic growth, weaker institutions, and greater social inequalities. In the context of Zambia, this theory helps to understand how the country’s mineral wealth has not been equitably distributed among local communities, contributing to environmental degradation and social challenges. Finally, the study will incorporate **Sustainable Development Theory**, which stresses the need for policies that balance economic growth, environmental protection, and social equity. This theory underscores the importance of aligning energy transitions with the Sustainable Development Goals (SDGs), ensuring that they promote long-term resilience and equity for all communities, particularly those in Zambia’s mineral resource areas.Table 3. Theoretical Framework for the Study

|  |  |
| --- | --- |
| **Theory** | **Key Focus** |
| **Rights-Based Approach** | Human rights integration, participation, and empowerment of stakeholders. |
| **Resource Curse Theory** | Economic paradox, inequality, and institutional weaknesses in resource areas. |
| **Sustainable Development** | Balancing environmental, social, and economic sustainability goals. |

### 3.8 ****The Role of Zambia in the Global Energy Transition****

### ****3.9 Importance of Critical Minerals****

Zambia is a key player in the global energy transition due to its rich reserves of **critical minerals**, particularly **copper** and **cobalt**, which are essential for clean energy technologies.

* **Copper**:
	+ Copper is a vital component in renewable energy systems, including electric grids, solar panels, wind turbines, and electric vehicle (EV) wiring.
	+ Zambia is one of the world’s largest copper producers, making it an integral supplier for the global energy transition.
* **Cobalt**:
	+ Cobalt is crucial for **lithium-ion batteries**, which power electric vehicles and other clean energy storage systems.
	+ Zambia, along with the Democratic Republic of Congo, is a major producer of cobalt, placing it strategically in the global supply chain for renewable technologies.
* **Other Minerals**:
	+ Minerals like nickel and manganese, though less prominent in Zambia, also hold potential for renewable energy infrastructure.

By supplying these critical minerals, Zambia supports the global shift towards low-carbon technologies, aligning with international climate goals and the demand for sustainable energy solutions.

### ****4. Mining Sector and Economic Development****

The mining sector is the cornerstone of Zambia’s economy, contributing significantly to **GDP**, employment, and foreign exchange earnings.

* **Contribution to GDP and Employment**:
	+ Mining accounts for approximately **10-14%** of Zambia’s GDP and over **70% of export revenues**, with copper alone contributing the majority of these earnings.
	+ The sector provides direct and indirect employment to thousands, supporting local economies in mineral-rich regions like the Copperbelt and North-Western provinces.
* **Socio-Environmental Costs**:
	+ Despite its economic significance, mining has imposed severe socio-environmental costs on local communities, including:
		- **Displacement** of populations due to mining operations.
		- **Environmental degradation** through deforestation, water pollution, and soil contamination.
		- **Health impacts** caused by air and water pollution, particularly affecting vulnerable groups.
	+ Communities often experience **inequitable benefit-sharing**, with limited access to the economic gains generated by resource extraction.

Balancing the economic benefits of mining with the socio-environmental well-being of affected communities remains a key challenge for Zambia’s sustainable development.

### ****5. Global Energy Demand and Supply Chain Dynamics****

Zambia occupies a strategic position in the **global energy supply chain**, given the growing demand for critical minerals driven by the clean energy transition.

* **Zambia’s Position in the Global Supply Chain**:
	+ With its vast reserves of copper and cobalt, Zambia is a major supplier of minerals required for renewable energy technologies, electric vehicles, and grid infrastructure.
	+ The country’s proximity to other mineral-rich regions, such as the **Democratic Republic of Congo (DRC)**, strengthens its role in regional and global mineral trade.
* **Implications for Trade and Investment**:
	+ The increasing demand for clean energy technologies presents opportunities for Zambia to attract **foreign investments** and strengthen trade partnerships.
	+ However, global supply chains often exert **pressure on production practices**, raising concerns about environmental degradation, labor rights violations, and human rights abuses.
* **Human Rights Considerations**:
	+ Zambia’s mineral production is crucial for global energy markets, but the extraction process often comes at a **human cost**:
		- Poor working conditions, child labor, and lack of fair compensation.
		- Limited community participation in decision-making processes and lack of Free, Prior, and Informed Consent (FPIC).
	+ Addressing these challenges is essential to ensuring that Zambia’s role in the energy transition aligns with principles of **human rights, social justice, and environmental sustainability**.

In conclusion, Zambia’s critical minerals position it as a significant player in the global energy transition. However, the country must balance its economic opportunities with the urgent need to address socio-environmental challenges and human rights concerns. Effective governance, equitable benefit-sharing, and sustainable mining practices will be key to ensuring that Zambia’s contributions to the energy transition are **inclusive, just, and sustainable**.

### ****6. Impact of the Just Energy Transition (JET) on Food Insecurity in Zambia's Communities****

### ****6.1 Displacement of Agricultural Communities****

* **Loss of Agricultural Land**:
	+ Large-scale mining operations associated with the extraction of critical minerals for the Just Energy Transition often result in the displacement of communities.
	+ This leads to the loss of **arable land**, which smallholder farmers rely on for subsistence farming and local food production.
	+ Displaced families are often resettled in areas with poor soil quality or inadequate access to water, significantly reducing agricultural productivity.
* **Reduced Food Production**:
	+ Communities that previously relied on agriculture for their livelihoods experience declines in **crop yields** due to land displacement.
	+ In areas like the **Copperbelt** and **North-Western Provinces**, food systems are disrupted, increasing dependence on food imports and market purchases.

### ****6.2 Environmental Degradation and Its Effect on Food Systems****

* **Soil and Water Contamination**:
	+ Mining activities result in the **contamination of soil and water resources** through heavy metals and other pollutants. This makes agricultural land unproductive and water unsafe for irrigation.
	+ Crops grown on contaminated land may be toxic or unsuitable for consumption, posing food safety risks.
* **Deforestation and Loss of Ecosystem Services**:
	+ Land clearing for mining leads to **deforestation**, which affects rainfall patterns, reduces soil fertility, and increases erosion.
	+ Loss of forest cover disrupts **ecosystem services** such as pollination, pest control, and soil moisture retention, further reducing agricultural output.
* **Impact on Livestock**:
	+ Pollution of grazing lands and water bodies negatively affects **livestock health**, leading to reduced milk and meat production, key food sources in many Zambian communities.

### ****6.3 Economic Inequities and Food Access****

* **Rising Food Prices**:
	+ Displacement and environmental degradation reduce local food production, causing **food shortages** and increased reliance on imported food. This leads to higher food prices, which are unaffordable for already impoverished communities.
* **Loss of Livelihoods**:
	+ Smallholder farmers and agricultural labourers lose their primary sources of income when agricultural land is converted for mining purposes.
	+ Without alternative employment opportunities, communities struggle to afford food, increasing **household food insecurity**.
* **Inequitable Benefit Distribution**:
	+ Although mineral extraction generates significant economic revenues, these benefits rarely trickle down to affected communities. Investments in agriculture or food security programs are minimal, leaving local populations without support to address food shortages [10].

### ****7. Climate Change Impacts Exacerbated by JET****

* **Changing Rainfall Patterns**:
	+ Mining and land degradation contribute to **climate change effects**, such as irregular rainfall and droughts, which disrupt farming seasons and reduce crop yields.
	+ Smallholder farmers lack the resources to adapt to climate variability, worsening food insecurity.
* **Dependence on Energy for Agriculture**:
	+ The focus on mineral extraction for the clean energy transition has diverted attention and resources away from investing in **energy access for agriculture**.
	+ Communities face challenges in accessing affordable energy for irrigation, food storage, and transport, further limiting food production and supply chain efficiency [11].

### ****8. Policy and Institutional Gaps in Addressing Food Insecurity****

* The focus on mineral extraction for JET has led to a lack of **integrated policies** that address the food security challenges faced by mining communities.
* Weak enforcement of environmental protection laws and inadequate compensation mechanisms for displaced communities have worsened food insecurity [12].
* Limited investment in **sustainable agriculture**, infrastructure, and climate-resilient farming practices further deepens the food crisis in mineral-rich regions.

**9. Human Rights Challenges in Zambia’s Mineral Resource Areas**

### ****9.1 Socio-Economic Impacts****

* **Displacement of Communities and Loss of Livelihoods**:
	+ Mining operations often result in the displacement of communities living in mineral-rich areas, such as the **Copperbelt** and **North-Western provinces**.
	+ Displacement disrupts traditional livelihoods, particularly farming and small-scale trade, leaving affected populations with limited means of economic survival.
	+ Resettlement programs are often poorly implemented, lacking adequate compensation and alternative income-generating opportunities for displaced families [13].
* **Limited Benefit-Sharing and Inequitable Economic Gains**:
	+ Despite the mining sector’s significant contribution to **Zambia’s GDP** and export revenues, economic gains are not equitably distributed.
	+ Local communities in mining regions often receive little to no direct benefits from resource extraction. Infrastructure development, education, and health services remain inadequate.
	+ Foreign corporations dominate the sector, and taxation frameworks are often insufficient to ensure local benefit-sharing.

### ****9.2 Environmental Degradation****

* **Pollution, Deforestation, and Land Degradation**:
	+ Mining activities result in **air, soil, and water pollution**, particularly through the release of toxic substances such as heavy metals into nearby rivers and groundwater.
	+ Deforestation occurs due to land clearing for mining operations, reducing biodiversity and ecosystem stability.
	+ Land degradation, including soil erosion and loss of fertility, disrupts agricultural productivity, worsening food insecurity for local populations.
* **Health Impacts on Local Populations**:
	+ Exposure to pollutants causes severe health issues, including respiratory diseases, skin conditions, and increased cancer risks.
	+ Water contamination affects drinking water sources, increasing the incidence of waterborne diseases.
	+ Vulnerable groups, such as children and the elderly, are disproportionately impacted by environmental hazards caused by mining [3].

### ****9.3 Labor Rights Violations****

* **Poor Working Conditions in Mines**:
	+ Workers in Zambia’s mining sector often face hazardous working conditions, including exposure to unsafe environments, heavy machinery, and toxic chemicals.
	+ Low wages and long working hours exacerbate the exploitation of mine workers, particularly in small and artisanal mining operations.
* **Lack of Social Protection and Occupational Health Rights**:
	+ Many mine workers lack access to social protection measures, such as health insurance, compensation for workplace injuries, or retirement benefits.
	+ Occupational health and safety standards are often poorly enforced, increasing the risk of accidents and chronic health conditions.

### ****9.4 Gendered Impacts****

* **Marginalization of Women in Decision-Making and Resource Access**:
	+ Women in mining communities are often excluded from decision-making processes related to mining operations and benefit-sharing.
	+ Limited access to land, resources, and economic opportunities further marginalizes women, despite their critical roles in sustaining households and local economies [2].
* **Gender-Specific Health and Economic Vulnerabilities**:
	+ Women face increased health risks from environmental pollution, including pregnancy complications and higher exposure to toxic substances during daily activities.
	+ Economic vulnerabilities arise due to limited employment opportunities in the formal mining sector, pushing many women into low-paying and informal jobs.

### ****9.5 Access to Justice and Participation****

* **Barriers to Justice for Affected Communities**:
	+ Affected communities often face **legal and institutional barriers** when seeking justice for human rights abuses and environmental damage caused by mining activities.
	+ Limited access to legal representation, high litigation costs, and weak enforcement of regulations prevent communities from holding mining corporations accountable.
* **Lack of Meaningful Community Engagement in Mining Projects**:
	+ Mining decisions are often made without meaningful consultation with local populations, violating principles such as **Free, Prior, and Informed Consent (FPIC)**.
	+ Communities are excluded from resource governance processes, leading to a lack of trust, resentment, and social unrest.
	+ Inadequate engagement results in poorly designed compensation and mitigation measures that fail to address community concerns and needs.

### ****9.6 National Policies and Frameworks****

* **Analysis of Zambia’s Mining Laws and Energy Transition Policies**:
	+ Zambia has established various **legal and policy frameworks** to govern its mining sector, including the **Mines and Minerals Development Act** and environmental protection policies.
	+ The country’s mining regulations outline rules for licensing, revenue management, and environmental standards; however, they often lack explicit provisions to protect the **human rights** of local communities affected by resource extraction.
	+ Zambia’s energy transition policies, while aligning with global clean energy demands, have yet to comprehensively address the socio-economic and environmental consequences of mineral extraction on marginalized populations.
* **Gaps in Implementing Rights-Based Protections**:
	+ There is insufficient integration of **rights-based protections** (e.g., Free, Prior, and Informed Consent - FPIC) into national mining policies. This limits community participation and exacerbates displacement and socio-economic injustices.
	+ Weak enforcement mechanisms lead to **non-compliance** with labour rights, environmental regulations, and benefit-sharing agreements, leaving local communities vulnerable [11].
	+ Institutional inefficiencies and resource constraints hinder the monitoring and regulation of mining operations, contributing to human rights violations.

### ****9.7 Role of Government and Private Sector****

* **Accountability in Corporate Practices**:
	+ Private mining companies, particularly multinational corporations, often prioritize profit over social and environmental responsibility.
	+ Limited corporate accountability has led to poor labour conditions, environmental damage, and lack of meaningful compensation for affected communities.
	+ Weak regulatory oversight allows companies to operate with minimal adherence to human rights standards.
* **Role of Government Institutions**:
	+ Government institutions play a critical role in protecting human rights but face challenges such as limited funding, political influence, and inadequate enforcement capabilities.
	+ There is a need for stronger **regulatory frameworks** to hold mining companies accountable and ensure compliance with human rights and environmental protection laws [12],[13],[16].
	+ Government agencies must also promote **transparency** in revenue management to ensure communities benefit equitably from mineral resource extraction.

### ****9.8 Community Representation and Voice****

* **Strengthening Mechanisms for Meaningful Participation**:
	+ Communities in Zambia’s mineral resource areas often face **exclusion** from decision-making processes regarding mining operations. The lack of **Free, Prior, and Informed Consent (FPIC)** prevents them from actively participating in matters that affect their livelihoods and environment.
	+ Mechanisms to ensure community representation in resource governance remain weak, limiting their ability to voice concerns, negotiate fair compensation, and demand accountability.
* **Enhancing Benefit-Sharing**:
	+ There is a need to develop clear frameworks that promote **equitable benefit-sharing** from mining activities, including investments in local infrastructure, education, and health services.
	+ Strengthening platforms for dialogue between **communities, government, and private sector** stakeholders can help address grievances and build trust.

**10**. **Recommendations**

**10.1 Policy Recommendations**

* **Re-designing Policies to Protect Human Rights and Promote Sustainable Resource Governance**:
	+ Existing policies governing Zambia’s mineral sector need to be restructured to prioritize the protection of **human rights** and the well-being of communities in resource-rich areas.
	+ Policies should ensure equitable **benefit-sharing**, environmental sustainability, and social justice while promoting inclusive economic growth.
	+ Human rights considerations must be explicitly integrated into Zambia’s energy transition strategies to align with global best practices and international standards.
* **Integrating FPIC and Environmental Protection into Energy Transition Strategies**:
	+ The principle of **Free, Prior, and Informed Consent (FPIC)** should be embedded into all mining and energy-related projects to ensure that affected communities are fully informed and actively involved in decision-making processes.
	+ Environmental protection measures, including **impact assessments** and mitigation plans, must be mandatory components of resource governance frameworks to minimize damage to ecosystems and community health.
	+ Establishing legal mechanisms to enforce FPIC and hold stakeholders accountable will ensure that the transition process respects community rights and environmental sustainability [1],[3]-[7].

### ****10.2 Technological and Institutional Advancements****

* **Innovations for Minimizing Environmental Harm**:
	+ Adoption of **green mining technologies** can reduce the environmental impact of resource extraction by minimizing pollution, energy use, and waste generation. Technologies such as water recycling systems, emission control tools, and efficient mining practices should be prioritized.
	+ Investment in **sustainable extraction technologies** will ensure that mineral resources, such as copper and cobalt, are produced in an environmentally responsible manner while meeting global energy demands.
* **Strengthening Institutions to Monitor and Enforce Rights-Based Frameworks**:
	+ Institutions responsible for regulating the mining sector need to be strengthened to effectively monitor compliance with human rights and environmental standards [6],[19],[27].
	+ Developing capacity within government agencies to conduct **regular audits, inspections**, and community consultations will improve accountability.
	+ Creating **independent oversight bodies** can ensure transparency in mining operations, protect local communities, and enforce adherence to human-rights-based frameworks [14],[26].

### ****10.3 Inclusive Development Strategies****

* **Empowering Local Communities through Capacity Building and Economic Inclusion**:
	+ Capacity-building programs should equip local communities with skills to participate actively in mining-related decision-making and economic activities.
	+ Initiatives promoting **economic inclusion**, such as small-scale mining support, community-led enterprises, and access to markets, can enhance local livelihoods and ensure communities benefit from resource extraction [5],[23].
* **Promoting Gender Equity and Addressing Social Vulnerabilities**:
	+ Gender-sensitive policies should address the marginalization of women in mining communities by promoting their participation in decision-making processes, access to resources, and economic opportunities.
	+ Programs that address **gender-specific vulnerabilities**, such as health risks and limited employment opportunities, are essential for achieving inclusive development [15]-[18].
	+ Social support mechanisms, such as education, healthcare, and financial inclusion programs, should prioritize vulnerable groups, including women, youth, and marginalized populations.

### ****10.4 Multi-Stakeholder Approaches****

* **Collaboration Between Government, Private Sector, Civil Society, and Local Communities**:
	+ Achieving a human-rights-centered Just Energy Transition requires **collaboration** among all key stakeholders [19]-[22].
		- The **government** must take a leading role in designing and enforcing policies that protect human rights, promote equity, and ensure environmental sustainability.
		- The **private sector** should adopt transparent and accountable practices, integrating environmental, social, and governance (ESG) principles into their operations.
		- **Civil society organizations (CSOs)** can play a crucial role in advocating for community rights, monitoring corporate practices, and providing platforms for community engagement.
		- **Local communities** must be empowered to participate meaningfully in decision-making processes and benefit-sharing mechanisms [4],[26],[27].
	+ Platforms for **dialogue and partnerships** between these stakeholders can help identify shared goals, resolve conflicts, and implement effective energy transition strategies.

**11. Implication and Relevance of the Study**

This study highlights the critical need for a human-rights-centred Just Energy Transition (JET) in Zambia’s mineral resource areas, ensuring that the shift to renewable energy is equitable and sustainable. The research underscores that while Zambia plays a pivotal role in the global clean energy transition due to its vast reserves of critical minerals such as copper and cobalt, the socio-economic and environmental burdens of resource extraction disproportionately impact local communities [1]-[6]. These challenges include land displacement, labour rights violations, environmental degradation, and inadequate benefit-sharing. The findings imply that without comprehensive policy reforms, Zambia’s energy transition risks perpetuating historical inequalities, where multinational corporations and elites benefit at the expense of marginalized populations. Strengthening environmental governance, enforcing Free, Prior, and Informed Consent (FPIC), and holding mining corporations accountable are essential steps toward ensuring fair resource distribution[4]-[9]. Additionally, the study highlights the importance of multi-stakeholder collaboration among government, civil society, and the private sector to create an inclusive energy transition framework.

The relevance of this research extends beyond Zambia, offering insights applicable to other resource-rich developing nations facing similar governance and equity challenges in the energy transition. By aligning with Sustainable Development Goals (SDGs) such as clean energy (SDG 7), decent work (SDG 8), and reduced inequalities (SDG 10) [21]-[27], the study provides a model for integrating social justice into mineral resource management. Furthermore, it emphasizes the need for gender-sensitive approaches, ensuring that women and vulnerable groups are actively involved in decision-making processes [24]. In conclusion, the study’s implications reinforce that Zambia’s energy transition must not only meet global demands for clean energy but also prioritize the rights, livelihoods, and well-being of local communities. By adopting a rights-based approach, Zambia can transform its mineral wealth into a vehicle for sustainable development, fostering economic inclusivity and environmental resilience.

**12. Conclusion and Recommendations**

Zambia's mineral wealth positions it as a key player in the global Just Energy Transition (JET), yet its resource-rich communities continue to bear the socio-economic and environmental costs of extraction. This study underscores the urgent need for a human-rights-centered approach to the JET, ensuring that affected communities benefit equitably from mineral-driven development. Despite Zambia’s economic dependence on mining, persistent issues such as displacement, labour rights violations, environmental degradation, and weak policy enforcement hinder a just transition. To address these challenges, Zambia must integrate **Free, Prior, and Informed Consent (FPIC)** into national policies, strengthen environmental governance, and hold mining corporations accountable for social and ecological impacts. Enhancing community participation, particularly for marginalized groups, is essential for ensuring that decision-making processes are inclusive and equitable. Furthermore, fostering **multi-stakeholder collaboration**—involving government, private sector, and civil society—will be crucial in designing sustainable and inclusive energy policies. A truly just transition must balance economic growth with **social justice and environmental sustainability.** By implementing policies that uphold human rights and promote equitable resource governance, Zambia can transform its mineral wealth into a catalyst for sustainable development, ensuring that no community is left behind in the shift to clean energy.

### ****12.1 Final Recommendations****

* **Prioritize Inclusive and Equitable Policies**: Policies must be re-designed to explicitly protect **human rights**, ensuring equitable benefit-sharing, compensation for displaced communities, and inclusion of marginalized groups in decision-making processes.
* **Strengthen Institutional Frameworks**: Government institutions responsible for resource governance must be empowered to **monitor, regulate**, and enforce rights-based approaches, with a focus on transparency and accountability.
* **Promote Sustainable Technologies**: Investments in **green mining technologies** can help minimize environmental harm while ensuring Zambia remains competitive in the global supply chain.
* **Empower Local Communities**: Capacity-building initiatives, economic inclusion programs, and gender-sensitive policies are critical for uplifting communities and ensuring they benefit from Zambia’s mineral wealth.
* **Foster Multi-Stakeholder Collaboration**: Effective partnerships between **government, private sector, civil society**, and local communities are essential for achieving shared goals and ensuring an inclusive energy transition.

### ****12.2 Future Research Directions****

* **Human Rights Impact Assessments**: In-depth studies on the long-term human rights implications of mineral extraction and energy transitions in specific Zambian regions.
* **Gender and Vulnerability Analysis**: Research on the **gendered impacts** of resource extraction and strategies to address the unique challenges faced by women and marginalized groups.
* **Economic Viability of Sustainable Technologies**: Investigation into the feasibility of adopting **environmentally friendly mining technologies** and their socio-economic benefits for Zambia.
* **Comparative Studies on JET Implementation**: Cross-country analyses of successful Just Energy Transition frameworks to identify lessons and best practices applicable to Zambia’s context.
* **Community Participation Mechanisms**: Research on effective models for **Free, Prior, and Informed Consent (FPIC)** implementation and strengthening **community representation** in resource governance.

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