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AN EXPLORATORY STUDY ON ENVIRONMENTAL MANAGEMENT GOOD PRACTICES IN THE MINING SECTOR IN SIERRA LEONE

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Abstract:
Environmental management plays a crucial role in improving public health and maintaining the health of ecosystems. Environmental management addresses the adverse impacts of human activities, including those caused by big companies, on the environment and aims to protect both human well-being and the natural world. It is important to note that the specific roles and responsibilities of national governments in environmental management may vary from country to country based on their legal and institutional frameworks. In addition, the government is often ascribed a pivotal role in protecting the environment through the implementation of environmental policies that protect the environment directly or solve environmental collective action problems. By applying checks and controls and actively managing environmental risks, the government seeks to protect human lives, safeguard property, and preserve the environment's health and integrity. A proactive approach to disaster management, coupled with sustainable environmental policies, can contribute to reducing the frequency and severity of environmental disasters in the long run. While governments play a central role in environmental protection, it is essential to recognize that the success of these efforts often depends on cooperation with private businesses, civil society organizations, scientists, and individuals. A comprehensive approach involving multiple stakeholders is crucial to achieving meaningful and lasting environmental conservation and sustainability. Legislatures have the authority to create laws, allocate resources, oversee government actions, and represent the interests of the public. When it comes to environmental matters, their involvement is instrumental in driving positive change and ensuring the implementation of policies that safeguard natural resources, promote sustainable development, and address pressing environmental challenges. It is worth noting that while the role of legislatures in advancing sustainable outcomes is crucial, successful environmental policymaking often involves collaboration among various stakeholders, including civil society organizations, industry representatives, scientists,

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and environmental experts. Policymaking processes encouraging inclusive participation can lead to more effective and balanced outcomes that resonate with the broader public and reflect a consensus on environmental protection and sustainability. Environmental management's ability to bridge various disciplines makes it a valuable approach to tackle complex environmental problems and promote sustainable solutions. The field plays a crucial role in ensuring the responsible use of natural resources and protecting the environment while considering economic and social factors for a balanced and sustainable future.

Keywords: Legislatures Environmental Management (EM), Environmental Management Accounting (EMA), Environmental Performance Indicators (EPIs), Environmental Management Good Practice (EMGP), Environment Protection Agency Sierra Leone (EPA-SL), Sierra Leone National Minerals Agency (SLNMA)

1. Introduction

Environmental management is the practice of organizing human activities to limit their impact on the natural environment. It involves protecting the land, flora and fauna, bodies of water, and the planet's atmosphere. Environmental management is a system that incorporates processes for summarizing, monitoring, reporting, developing, and executing environmental policies. The aim is to ensure the healthy state of the planet for future generations and to preserve all forms of life. Environmental management is related to the rational adjustment of humans with nature, involving judicious exploitation and utilization of natural resources without disturbing the ecosystem balance and equilibrium. Environmental managers work with a wide range of issues, including pollution prevention, waste materials management, global warming, loss of biodiversity, land degradation, and the management of water and land resources. Environmental management helps improve public health and the overall health of the ecosystem by minimizing the harm done due to the negligence of big companies and promoting environmental protection.

Governments play a pivotal role in protecting the environment through the implementation of environmental policies. Environmental policies are a set of guidelines, laws, regulations, and initiatives put in place by governments to address various environmental challenges and protect natural resources. These policies are essential for several reasons: Addressing environmental collective action problems: Many environmental issues, such as air and water pollution, climate change, deforestation, and habitat destruction, are collective action problems. These problems occur when individual actions, driven by self-interest, lead to adverse outcomes for society as a whole. Governments can step in to overcome these challenges by implementing policies that promote collective action and ensure that the common good is protected, and this can be instituted by:

a) **Setting priorities and goals**: Governments have the authority to establish environmental priorities and set long-term goals for sustainable development and environmental protection. Through policies, they can address pressing issues and work towards achieving environmental targets, such as reducing greenhouse gas emissions, conserving biodiversity, and promoting renewable energy.
b) **Regulating industries and businesses:** Environmental policies often involve regulations for industries and businesses to reduce their environmental impact. This can include setting emission standards, waste management requirements, and guidelines for sustainable practices. By imposing regulations, the government can hold polluters accountable and encourage more eco-friendly practices**.**
c) **Promoting conservation and sustainable resource management:** Governments can implement policies that support conservation efforts, protect natural habitats, and encourage sustainable use of natural resources. These policies may include designating protected areas, promoting sustainable agriculture and forestry, and incentivizing eco-friendly practices.
d) **Encouraging research and innovation:** Environmental policies can spur research and innovation in green technologies and sustainable practices. Governments can provide incentives, grants, and funding to support research and development in environmental fields, leading to the adoption of more sustainable solutions.
e) **International cooperation:** Environmental issues often transcend national borders, making international cooperation crucial. Governments play a key role in participating in global environmental agreements and treaties, such as the Paris Agreement on climate change, to collectively address global challenges and work towards a sustainable future. In addition, it's essential to acknowledge that academic literature and research continually contribute to our understanding of environmental policies and governance. Policies and their effectiveness may evolve based on new research, changing circumstances, and societal demands (Shorette, 2022).

Legislatures also play a critical role in enacting policies that advance sustainable outcomes (National Democratic Institute, 2021), as Legislatures have the authority to create laws, allocate resources, oversee government actions, and represent the interests of the public. When it comes to environmental matters, their involvement is instrumental in driving positive change and ensuring the implementation of policies that safeguard natural resources, promote sustainable development, and address pressing environmental challenges. Legislatures' engagement in environmental policymaking fosters democratic accountability and transparency, as these decisions are subject to public scrutiny and debate. By involving elected representatives in shaping environmental policies, societies can better ensure that their interests and concerns are taken into account. It is worth noting that while the role of legislatures in advancing sustainable outcomes is crucial, successful environmental policymaking often involves collaboration among various stakeholders, including civil society organizations, industry representatives, scientists, and environmental experts. Policymaking processes that

encourage inclusive participation can lead to more effective and balanced outcomes that resonate with the broader public and reflect a consensus on environmental protection and sustainability.

Environmental awareness can arise from various sources and influences, including scientific research, personal experiences, educational initiatives, cultural values, and grassroots movements, among others. People may become environmentally aware by witnessing the direct impacts of environmental degradation in their communities, learning about the interconnectedness of ecosystems and human well-being, or understanding the potential consequences of unsustainable practices. Political ideologies like environmentalism can provide a framework for addressing and advocating for environmental concerns. Environmentalism, as a political and social movement, emphasizes the importance of protecting the environment, promoting sustainable practices, and advocating for policy changes to address environmental challenges. Environmentalists often raise awareness about environmental issues, campaign for environmental conservation, and work to influence policy and decision-making processes. However, it is important to recognize that environmental awareness and concern can exist outside the realm of formal political ideologies. Many individuals, communities, organizations, and even businesses demonstrate environmental awareness and take action to protect and preserve the environment without necessarily subscribing to a specific political ideology.

Developing countries often face significant challenges when it comes to environmental issues. Factors such as limited resources, economic constraints, and a focus on industrial development can contribute to the reliance on non-renewable energy sources and the use of substandard plants and machinery. These practices can have detrimental effects on the environment, leading to pollution, habitat destruction, and other environmental hazards. Poor waste management, including inadequate drainage systems, can also contribute to environmental degradation. Improper disposal of waste materials can contaminate soil, water sources, and ecosystems, leading to pollution and health risks for local communities. Additionally, the lack of site preparation in various development projects can result in deforestation, land degradation, and the destruction of natural habitats. Addressing these environmental challenges requires a multifaceted approach that considers both economic development and environmental sustainability. Many developing countries are increasingly recognizing the importance of sustainable practices and are taking steps to transition to renewable energy sources, improve waste management systems, and implement environmental regulations to mitigate environmental hazards and degradation. International cooperation and support from developed countries can play a crucial role in assisting developing nations in their efforts to adopt sustainable practices and address environmental challenges. This can include providing technology transfers, financial assistance, and capacity-building initiatives to promote sustainable development and environmental protection.

In Sierra Leone, there has been significant expansion and diversification of the mining sector between January 2018 and March 2021. The increase in both large-scale and

small-scale mining companies, as well as the establishment of new industrial gold and mineral sand mines, indicates the growing interest in the country's mineral resources and the potential for economic development. Based on the data drawn from (SLNMA, 2021) [4] significant expansion and diversification of the mining sector have been reported in Large-Scale Mining Companies, Small-Scale Mining Companies, Industrial Gold Mines, and Mineral Sand Mines as follows: in January 2018 there were six large-scale mining companies (mining rutile, ilmenite, bauxite, and diamonds) operating in Sierra Leone. In March 2021 there are eleven large-scale mining companies (mining gold, diamonds, zircon bauxite, iron ore, and rutile) in Sierra Leone. The five new large-scale mining companies in operation are MEYA Mining Company, Wongor Investment Mining Company, Sierra Diamonds Mining Company, Kingho Mining Company, and Cheng Li Mining Company. In January 2018, seven small-scale mining companies were operating in Sierra Leone. In March 2021, thirteen small-scale mining companies are operating in Sierra Leone. In January 2018, there was only one industrial gold mine operating in Sierra Leone. In March 2021, there are nine industrial gold mines (6 small-scale and 3 large-scale) operating in Sierra Leone. In January 2018, there were two mineral sand (rutile, zircon, coltan, etc.) mines operating in Sierra Leone. In March 2021, six mineral sand mines are operating in Sierra Leone. The increase in mining activities, particularly in gold and mineral sand mining, reflects the exploration and development efforts undertaken by mining companies to tap into Sierra Leone's diverse mineral resources.

The expansion in the mining sector in Sierra Leone requires an understanding of the Environmental Management Good Practices in the Mining Industry; hence, the focus of this research is to understand the road map of the Government of Sierra Leone in the implementation of Environmental Management Good Practices in the mining sector.

2. Research Aim, Objectives, and Questions

2.1 Research Aim

The aim of this research is to understand the role of the Government of Sierra Leone in the implementation of Environmental Management Good Practices (EMGP) in Sierra Leone.

2.2 Objectives of the Study

To understand the effectiveness of the Government of Sierra Leone in the implementation of good environmental management practices.

2.3 Research Questions

The research questions are directed towards gaining an understanding of the role of the Government of Sierra Leone in the Implementation of environmental management good practices.

The following research questions are the focus of this research:

Research Question 1: Does the government have Statutory Instruments (SI) in place to regulate the mining industry?

Research Question 2: Is there a governance structure that improves the Mining Sector?

Research Question 3: Do the mineral resources of Sierra Leone have an effect on employment?

Research Question 4: Does the government have a monitoring mechanism to monitor the activities of the mining industry?

Research Question 5: What are the government mechanisms for Corporate Social Responsibility (CSP) in the communities in which the mining industry operates?

Research Question 6: Does the mining sector have an effect on Sierra Leone's GDP?

3. Research Methodology

The research design plays a crucial role in ensuring that the research problem is effectively addressed. For this research, the exploratory research design is adopted. Exploratory research, also known as case study research, is useful in obtaining information about the current status of a phenomenon and describing what exists to variables in a situation. This approach is suitable for challenging accepted assumptions about the way things are and can provoke further explanatory studies into the phenomenon. The justification for using this research design is that the study investigates details of a real-life situation using multiple sources of evidence, including literature review, observations, and documentary analysis. By using an exploratory research design, the study can explore the research problem in-depth, gather information from multiple sources, and generate a comprehensive understanding of the phenomenon under investigation. The data collected through literature review, observations, and documentary analysis will provide rich insights into the research problem and enable the researcher to develop a more profound understanding of the issue. Overall, the exploratory research design is an effective approach for addressing the research problem, providing a comprehensive understanding of the phenomenon, and generating insights that can inform future research in this area. The study used an exploratory end ex-facto design methodology, and data was collected using a secondary approach. In addition, quantitative and qualitative data were extracted through the desk survey method, and available records and related literature were reviewed.

The mixed methods model was used for this research. Data collection for the quantitative data and qualitative data was done through the mining companies' websites and the government websites. In addition, data were collected from the internet, articles, and textbooks. Data were analyzed using the concurrent triangulation approach to inform the discussion and interpretation of data. The concurrent triangulation approach is a widely recognized mixed methods model, characterized by the simultaneous

collection of quantitative and qualitative data (Crewell, 2009). The purpose is to compare and analyze the two databases to identify convergence, differences, or a combination of both. Various terms are used to describe this comparison, including confirmation, disconfirmation, cross-validation, or corroboration, depending on the authors (Greene, Caracelli, Graham, 1989).

This model aims to leverage the strengths of quantitative and qualitative methods while compensating for their weaknesses. The quantitative and qualitative data collection occurs concurrently within a single phase of the research study. Ideally, equal weight is given to both methods, but in practice, researchers may prioritize one over the other based on their specific research goals and context. The mixing of data in this approach typically takes place during the interpretation or discussion section of the study, and data can be merged, meaning one type of data is transformed into the other to facilitate easy comparison. Alternatively, the results of the two databases can be integrated or compared side by side in the discussion section. Published mixed methods studies often follow this approach, presenting quantitative statistical results first, followed by qualitative quotes that either support or disconfirm the quantitative findings (Crewell,2009). However, for this research, the qualitative and quantitative data will be discussed and interpreted interchangeably.

4. Literature Review

4.1 Introduction

Environmental Management Accounting (EMA) has been described as a support tool for managers to make informed decisions about their environmental impacts beyond its boundaries. It helps management to identify win-win solutions that improve economic and environmental performance (Burritt, Schaltegger, and Christ, 2021). The main objective of environmental accounting is to use the data garnered for management decision-making with respect to environmental standards and statutory compliant requirements of stakeholders (customers, government, local community, and the like), and the accounting provides the sustainable development of the activity, the contributions of high-level acknowledge of environmental taxes, capital expenditures, and exploitation generated by using certain pollution control equipment (Vasile & Man, 2012). Environmental accounting also enables organizations to evaluate the costs and benefits associated with environmental initiatives. This includes assessing environmental taxes, capital expenditures related to environmental management projects, and the returns on investments in pollution control equipment. By quantifying these factors, environmental accounting supports informed decision-making on resource allocation and investment strategies, contributing to sustainable development. Environmental awareness has strong ties to the political ideology of environmentalism (Cohen, 2001). Environmentalism is a broad philosophy and social movement that emphasizes the importance of protecting the natural environment and promoting sustainable practices to address environmental issues.

Over the last few decades, the expanding population and increasing industrial development have led to environmental degradation. Consequently, organizations face increasing pressures from a variety of stakeholders. Such pressure requires management to provide timely information about various aspects of their operations beyond those reflected in traditional financial and cost accounting methods (Khan, 2007). While environmentalism has played a significant role in promoting environmental awareness, it is not the sole source of such awareness. Environmental awareness can stem from a variety of influences, including personal experiences, education, cultural values, and scientific research. It is a multidimensional issue that involves a broad range of perspectives and motivations.

EMA is a crucial component of Environmental Management Systems (EMS). EMS refers to the formal systems and databases that integrate procedures and processes for managing an organization's environmental performance. EMS encompasses various aspects, including setting environmental objectives, establishing action plans, training personnel, monitoring environmental performance, summarizing data, and reporting information to both internal and external stakeholders. By incorporating EMA into EMS, organizations can gain better insights into their environmental impact and identify opportunities to optimize resource usage, reduce environmental risks, enhance operational efficiency, and strengthen their sustainability practices. This holistic approach helps organizations build a more sustainable and resilient business model while meeting the expectations of various stakeholders, including customers, investors, regulators, and communities

Environmental Performance Indicators (EPIs) are measurements that quantify the interaction between a business or organization and the environment (Olsthoorn *et al.*, 2001). They provide a structured and quantitative way to assess the effectiveness and efficiency of environmental actions and initiatives undertaken by the organization. The use of metrics in EPIs allows for the systematic evaluation of environmental performance over time, helping organizations track their progress toward sustainability goals and objectives metrics (Neely *et al.*, 1995). By using indicators, organizations can monitor specific aspects of their environmental impact and the outcomes of their sustainability strategies. EPIs act as surrogates or proxies for various organizational phenomena, meaning they serve as representative measures that provide insight into broader environmental performance without directly measuring every aspect (Ijiri, 1975). This allows organizations to gain valuable insights into their environmental performance without overwhelming complexity. Additionally, EPIs are often used to communicate the results of environmental efforts both within the organization and to external stakeholders. They help convey the organization's commitment to environmental responsibility and sustainability. By continuously measuring and analyzing EPIs, organizations can identify trends, areas of improvement, and potential risks related to their environmental impact. This knowledge can inform decision-making processes and resource allocation to support the organization's broader sustainability goals. Overall, EPIs play a vital role in guiding organizations toward improved environmental

performance, enhanced regulatory compliance, better stakeholder engagement, and the overall integration of sustainability principles into their operations and strategies.

Environmental Management Accounting (EMA) deals with the internal decision-making related to the environmental performance of the organization (Vinayagamoorthi *et al.*, 2012). Hence, different types of management accounting and control tools have been designed and implemented to improve the measurement and management of corporate environmental performance and information (Qian *et al.*, 2017). Research indicates that the fundamental role of accounting with a focus on management accounting is an invaluable tool in supporting environmental accounting (Ariffin, 2016; Contrafatto & Burns, 2013). Although the literature on the application of EMA has shown that it is likely to bring cost-saving opportunities, most organizations do have an environmental management accounting system in place. It is, therefore, advisable for organizations to use other environmental tools in compliance with the environmental legislation in consonance with their environmental aims and objectives (Gale, 2006). The increasing body of knowledge on academic and applied research provides a large number of contributions made to the progression of EMA in developed countries (Asiaei *et al*., 2021; Qian & Burritt, 2009; Deegan, 2003; Schaltegger & Burritt, 2000; Bailey & Soyka 1996; Epstein, 1996; Schaltegger, Muller & Hindrichsen, 1996; Tuppen, 1996). As evidenced in the literature the unabated attention is due to the environmental crisis that the activities of firms (e.g. in the mining and manufacturing) that has created significant financial consequences for various organizations that need to be managed (Asiaei *et al*., 2021; Schaltegger & Burritt, 2000). However, while EMA practices in developed countries have improved as a support mechanism to manage environmental issues, firms on the African continent are burdened with multiple challenges resulting from environmental degradation and have underutilized the environmental tools (Asiaei *et al*., 2021; Nyirenda, Ngwakwe & Ambe, 2014).

Compliance with environmental legislation ensures that organizations meet legal requirements and avoid potential penalties or liabilities. By employing appropriate environmental tools, organizations can address their environmental responsibilities and contribute to sustainable practices. It is important to note that environmental management encompasses a range of tools and approaches beyond accounting systems. Organizations may adopt practices such as environmental management systems (e.g., ISO 14001), life cycle assessment, environmental auditing, eco-design, and eco-labeling, among others. These tools provide additional avenues for managing environmental impacts, promoting sustainability, and achieving environmental objectives. Overall, while EMA offers valuable insights and supports decision-making, organizations should consider a holistic approach to environmental management that includes a combination of accounting tools and other environmental strategies to address their environmental aims and objectives effectively.

4.2 Theoretical Review

Environmental awareness has strong ties to the political ideology of environmentalism (Cohen, 2001). Environmentalism is a broad philosophy and social movement that emphasizes the importance of protecting the natural environment and promoting sustainable practices to address environmental issues. Developing countries often face significant challenges when it comes to environmental issues. Factors such as limited resources, economic constraints, and a focus on industrial development can contribute to the reliance on non-renewable energy sources and the use of substandard plants and machinery. These practices can have detrimental effects on the environment, leading to pollution, habitat destruction, and other environmental hazards. Poor waste management, including inadequate drainage systems, can also contribute to environmental degradation. Improper disposal of waste materials can contaminate soil, water sources, and ecosystems, leading to pollution and health risks for local communities. Additionally, the lack of site preparation in various development projects can result in deforestation, land degradation, and the destruction of natural habitats. Addressing these environmental challenges requires a multifaceted approach that considers both economic development and environmental sustainability. Many developing countries are increasingly recognizing the importance of sustainable practices and are taking steps to transition to renewable energy sources, improve waste management systems, and implement environmental regulations to mitigate environmental hazards and degradation.

Burritt, Schaltegger, and Christ (2021) in their article considered Environmental Management Accounting as a valuable tool for managers to make informed decisions regarding their environmental impacts. EMA involves integrating environmental factors and costs into the organization's overall management accounting systems. It provides a framework that allows managers to assess and manage the environmental costs and benefits associated with their business operations. EMA helps management go beyond the boundaries of traditional accounting by considering the environmental impacts of the organization's activities, products, and services. It enables managers to identify the environmental costs and benefits that may not be captured through conventional accounting methods. By incorporating environmental information into decision-making processes, managers can gain a better understanding of the financial implications of their environmental performance. EMA allows managers to identify opportunities for improving both economic and environmental performance, leading to win-win solutions. By analyzing the environmental costs associated with different activities, managers can identify areas where cost savings can be achieved through improved resource efficiency, waste reduction, and energy conservation. This, in turn, can lead to improved profitability and competitiveness for the organization while simultaneously reducing its environmental footprint. Furthermore, EMA facilitates the measurement and monitoring of key environmental performance indicators, such as greenhouse gas emissions, water usage, and waste generation. By tracking and reporting on these indicators, managers can set environmental targets, monitor progress, and make informed decisions to drive

continuous improvement in the organization's environmental performance. In summary, Environmental Management Accounting (EMA) serves as a support tool for managers by providing them with the necessary information to assess and manage the environmental impacts of their operations. It helps identify win-win solutions that improve both economic and environmental performance, leading to sustainable and responsible business practices. International cooperation and support from developed countries can play a crucial role in assisting developing nations in their efforts to adopt sustainable practices and address environmental challenges. This can include providing technology transfers, financial assistance, and capacity-building initiatives to promote sustainable development and environmental protection.

Study of Nigerian and South African Firms The thesis by Uwalomwa (2011) highlights the growing importance of environmental issues in the context of economic growth and development. In recent decades, environmental concerns related to industrial activities have led to increased public scrutiny of corporations' non-financial performance and a greater demand for the disclosure of environmental information. The literature on corporate environmental disclosures has primarily focused on developed countries, with limited research conducted in the context of developing countries, particularly Nigeria. The lack of studies in developing economies has created a gap in understanding corporate environmental reporting practices in these regions. To address this gap, the research conducted a comparative study of corporate environmental reporting practices among listed firms in Nigeria and South Africa. The stakeholder theory was used as a basis for motivating corporate environmental disclosures. The study also examined the perceptions of lobby groups regarding the disclosure of environmental performance information and the corporate relationship with the host community. To gather data, questionnaires were distributed among members of selected states/provinces in Nigeria and South Africa. Content analysis techniques were employed to extract data from the annual reports and corporate websites of the selected companies. Multiple regression analysis was used to investigate the relationships between operating performance, financial leverage (proxied by debt-to-equity ratio), firm size, and the level of corporate environmental disclosure among the selected listed firms. The study concluded that despite the level of disclosure observed among firms, corporate environmental reporting practices in developing countries like Nigeria and South Africa remain ad-hoc, general, self-laudatory, and voluntary in nature. This implies that there is room for improvement in terms of the quality, standardization, and consistency of corporate environmental disclosures in these regions. Overall, the research underscores the significance of corporate environmental reporting practices and calls for more attention to be given to such disclosures, especially in developing economies. Enhancing environmental reporting practices can lead to improved corporate transparency and accountability, which are essential for sustainable economic development and environmental protection.

In the research An Assessment of the Relevance of Environmental Management Accounting for Sustainability in Zimbabwe’s Extractive Industries, Cuthbert Muza's

focused on assessing the relevance of Environmental Management Accounting (EMA) in Zimbabwe's mining sector and extractive industries. EMA has gained significance in companies with high environmental impacts, and this research aimed to understand whether EMA contributes to the sustainability of the mining sector and if EMA systems are more beneficial for sustainability compared to traditional accounting systems. The research used a qualitative research design with an interpretivist paradigm. Multiple methods of data collection were employed, including open-ended questionnaires, interviews, and document analysis, to gather both primary and secondary data. The snowball sampling method was used to reach 34 companies out of 89 potential companies in the mining sector, making it a case study with individual companies as the unit of analysis. The data were analyzed using qualitative data analysis software called 'Atlas.ti.' The research findings suggested that EMA does contribute positively to the mining sector, promoting sustainability. However, the use of EMA was found to be at an entry level with random applications, indicating that there is room for improvement and more systematic implementation. There were indications of Environmental Management Accounting practices being integrated into traditional accounting systems within the companies. The study also revealed that EMA improves the day-to-day operations of mining companies. In summary, the study highlights the potential benefits of EMA in promoting sustainability in Zimbabwe's mining sector and extractive industries, but it also underscores the challenges that need to be addressed to fully realize those benefits.

The article by Vasile and Man (2012) highlights the importance of proper identification and collection of both physical and financial data in environmental management accounting. They argue that by effectively gathering and analyzing data related to the environment, the decision-making process within an economic entity can be significantly improved. Environmental accounting plays a crucial role in providing additional information to management by identifying and quantifying various aspects related to environmental performance.

Some of the key measures that can be identified and quantified through environmental accounting include:

a) **Obligations associated with significant environmental impacts**: Environmental accounting helps in assessing the obligations and responsibilities that arise from the significant influences an economic entity exerts on the environment. This may involve evaluating the costs and liabilities associated with mitigating environmental impacts, such as pollution control measures or environmental remediation**.**
b) **Costs of complying with legal regulations:** Environmental management systems must adhere to various legal stipulations related to environmental protection. Environmental accounting helps in determining the costs incurred by the economic entity to comply with these regulations. This may include expenses for permits, compliance monitoring, and meeting environmental standards.
c) **Benefits or cost savings from implementing environmental management systems**: Environmental accounting allows for the identification and

quantification of the benefits or cost savings achieved through the implementation of environmental management systems. These systems may lead to improved resource efficiency, reduced waste generation, energy savings, and other positive environmental outcomes. By measuring and evaluating these benefits, management can assess the effectiveness of their environmental initiatives and make informed decisions. By integrating environmental data into the decision-making process, environmental management accounting enhances the understanding of the financial implications associated with environmental performance. This, in turn, enables the economic entity to prioritize and allocate resources effectively, identify areas for improvement, and develop strategies that balance environmental sustainability with economic considerations.

The initial approach in developing an environmental accounting system involves aligning environmental management with financial accounting. By identifying the significant environmental aspects and linking them to cost objects, managers can obtain the necessary data for decision-making. The selection of environmental issues should align with the objectives of the organization's environmental management system, which may differ from international standards like ISO14001. By quantifying the activities and resources associated with environmental management, the relationship between environmental management and costs becomes clearer. This allows for a better understanding of the costs and benefits associated with addressing environmental issues, as well as the assignment of financial responsibilities and objectives.

In a research by Fuzi *et al*. (2018), it was investigated the perception of top management regarding environmental management accounting practices. It found that management commitment was a key factor influencing the adoption and implementation of EMA practices. When top management was committed to environmental management, it positively influenced employees' perception of the importance of EMA and their willingness to participate in environmental initiatives. Gunarathne and Lee (2015): This study focused on the organizational antecedents of environmental management accounting and its implementation in Sri Lankan manufacturing firms. The findings highlighted that management commitment played a significant role in the adoption and effective implementation of EMA practices. When management demonstrated a strong commitment to environmental management, it positively influenced employees' engagement and participation in EMA activities. These studies by Fuzi *et al*. (2018) and Gunarathne and Lee (2015) emphasize the importance of management commitment in driving the successful implementation of EMA practices. When management demonstrates a genuine commitment to environmental sustainability, it sends a clear message to employees that environmental considerations are a priority for the organization. This commitment can inspire and motivate employees to actively participate in EMA activities, such as data collection, reporting, and decision-making processes. Overall, management commitment serves as a critical catalyst for the integration of environmental considerations into the organizational culture and practices.

It creates a supportive environment for EMA implementation and helps organizations achieve their environmental targets and goals.

4.2.1 The Role of Legislatures in the Implementation of Environmental Management

Legislatures have the authority to create laws, allocate resources, oversee government actions, and represent the interests of the public. When it comes to environmental matters, their involvement is instrumental in driving positive change and ensuring the implementation of policies that safeguard natural resources, promote sustainable development, and address pressing environmental challenges. Legislatures' engagement in environmental policymaking fosters democratic accountability and transparency, as these decisions are subject to public scrutiny and debate. By involving elected representatives in shaping environmental policies, societies can better ensure that their interests and concerns are taken into account (NDI 2021) . In addition, Legislatures play a critical role in enacting policies that advance sustainable outcomes and promote environmental protection.

The role of legislatures in shaping environmental policies is vital for several reasons:

1) **Lawmaking and policy development:** Legislatures are responsible for creating laws and policies that govern various aspects of environmental protection, resource management, and sustainable development. Through the legislative process, lawmakers debate and pass bills that can have a significant impact on environmental issues.
2) **Representation and public interest:** Legislators represent the interests of their constituents, including concerns related to the environment. By advocating for and supporting environmental policies, legislators ensure that the public's voice is heard in shaping sustainable outcomes and protecting natural resources.
3) **Oversight and accountability:** Legislatures provide oversight of government agencies responsible for implementing environmental policies. Through committees and hearings, lawmakers can hold agencies accountable for their actions and ensure that environmental laws are effectively enforced.
4) **Budget allocation:** Legislatures control budgetary matters, including the allocation of funds for environmental programs and initiatives. By appropriating financial resources, lawmakers can support projects that promote sustainability and conservation.
5) **Amendment and updating of laws:** Environmental challenges are dynamic and ever-changing. Legislatures have the authority to amend and update existing laws to address emerging environmental issues and improve the effectiveness of environmental policies.
6) **International agreements and treaties:** In many cases, international environmental agreements and treaties require legislative approval or incorporation into domestic law. Legislatures play a crucial role in ratifying these

agreements, demonstrating a country's commitment to global environmental cooperation.

7) **Conflict resolution and consensus-building:** Environmental policy issues can be complex and can involve competing interests and viewpoints. Legislatures serve as platforms for debates and discussions, allowing stakeholders to find common ground and develop policies that balance various concerns**.**
8) **Long-term planning and vision:** Legislatures can contribute to setting long-term environmental goals and visions for the country. By adopting sustainable development agendas and environmental targets, lawmakers can guide the nation's efforts towards a greener and more sustainable future. It's worth noting that while the role of legislatures in advancing sustainable outcomes is crucial, successful environmental policymaking often involves collaboration among various stakeholders, including civil society organizations, industry representatives, scientists, and environmental experts. Policymaking processes that encourage inclusive participation can lead to more effective and balanced outcomes that resonate with the broader public and reflect a consensus on environmental protection and sustainability.

4.2.2 The Role of Government in the Mining Industry Environmental Protection in Sierra Leone

The government plays a role in environmental protection through regulation, management, and funding. The government regulates environmental protection through laws and regulations, manages environmental resources through agencies such as the National Park Services, the Forest Service, and the Fish and Wildlife Service, and provides funding for environmental protection initiatives through taxes, grants, and loans (Buzz Board) (NDI 2021). By engaging in these activities, the government takes a proactive stance in safeguarding the environment and addressing environmental challenges. This involvement is essential because many environmental issues require coordinated efforts and resources on a national or even global scale. Moreover, government agencies' regulatory powers can influence industries, businesses, and individuals to adopt more sustainable practices and reduce their environmental impact. Additionally, governments often participate in international environmental agreements and conventions to tackle global challenges collaboratively. Through these agreements, countries commit to joint actions and standards aimed at protecting the planet and mitigating issues like climate change, wildlife trafficking, and marine pollution. Furthermore, the government plays a significant role in managing and responding to environmental disasters, including floods, droughts, epidemics, wildfires, and other natural calamities. When such environmental disasters occur, they can have severe impacts on communities, economies, and ecosystems. Governments are responsible for mitigating these impacts, providing relief, and managing recovery efforts. While governments play a central role in environmental protection, it's essential to recognize that the success of these efforts often depends on cooperation with private businesses,

civil society organizations, scientists, and individuals. A comprehensive approach involving multiple stakeholders is crucial to achieving meaningful and lasting environmental conservation and sustainability.

The Government of Sierra Leone enacted the Mines and Mineral Act, 2009, the amendment of the EPA Act, 2008 in July 2010, and also made a proviso in the National Constitution of 1991 to protect and regulate the environment. The National Constitution of 1991[42] Chapter II: 7 (1) deals with the Economic objectives and Chapter II: 7 (1)a) affirms the country's commitment to "*harness all the natural resources of the nation to promote national prosperity and an efficient, dynamic and self-reliant economy*" and Chapter III: 18(3) states that" *Nothing contained in or done under the authority of any law shall be held to be inconsistent with or in contravention of this section to the extent that the law in question and makes provision*" Chapter III 18 (3)a) "*which is reasonably required in the interest of defence, public, safety, public order, public morality, public health or the conservation of the natural resources, such as mineral, marine, forest and other resources of Sierra Leone, except in so far as that provision or, as the case may be the thing done under the authority thereof is shown not to be reasonably justifiable in a democratic society*". Based on the foregoing provisions, the National Constitution of 1991 provides a clean bill of health for the Sierra Leone Mines and Mineral Act, 2009, and the Environment Protection Agency Act 2010 enactment.

The Sierra Leone Mines and Mineral Act, 2009[43]: An Act to consolidate and amend the law on mines and minerals to promote local and foreign investment in the mining sector by introducing new and improved provisions for exploration, mine development, and marketing of minerals and mineral secondary processing for the benefit of the people of Sierra Leone; to ensure that management of the mineral sector is transparent and accountable in accordance with international best practice; to promote improved employment practices in the mining sector; to improve the welfare of communities adversely affected by mining; to introduce measures to reduce the harmful effects of mining activities on the environment and to provide for other related matters.

The Environment Protection Agency (EPA) Act, 2008, as amended in 2010, provides the overarching legislative framework for the implementation of the constitutional provision on environmental protection and natural resource management (EPA Strategic Plan, 2017-2021). The Environment Protection Agency (EPA) Act, 2008, as amended in 2010, plays a crucial role in providing the legislative framework for environmental protection and natural resource management in Sierra Leone. The establishment of the Environment Protection Agency, Sierra Leone (EPA-SL), as the focal institution responsible for environmental protection and management demonstrates the government's commitment to addressing environmental issues comprehensively. The EPA-SL has been given a mandate that includes providing advisory, coordination, administrative, and enforcement services related to environmental protection. This broad mandate allows the agency to play a central role in ensuring that environmental considerations are integrated into various sectors and development activities. In addition, the amendment of the EPA Act, 2008, in July 2010, with oversight responsibility of the Agency placed under the Office of the President, reflects the Government of Sierra

Leone's continued commitment to sound environmental protection and management. This move is significant as it provides the Environment Protection Agency Sierra Leone (EPA-SL) with a stronger and more influential position within the government structure, enhancing its capacity to fulfill its broader mandate. By giving the Office of the President oversight responsibility of the EPA-SL, the government signals the importance it places on environmental issues and sustainable development at the highest level of decision-making. This can lead to increased attention to environmental concerns and better integration of environmental considerations into national policies, plans, and programs. The expanded mandate of the EPA-SL to oversee, coordinate, and monitor the implementation of all national environmental policies, plans, and programs aligns to achieve the Millennium Development Goals (MDGs) and, later, the Sustainable Development Goals (SDGs).

This suggests that environmental considerations are recognized as critical components of overall development strategies, and the EPA-SL plays a central role in ensuring that development activities are conducted in an environmentally sound and sustainable manner. Having oversight responsibility under the Office of the President can potentially enhance the EPA-SL's authority to enforce environmental regulations and policies across different sectors and ministries. This could lead to improved coordination and cooperation among various government bodies in addressing environmental challenges and fostering sustainable development. Furthermore, with its broader mandate, the EPA-SL is better positioned to promote public awareness and engagement on environmental issues, as well as facilitate public participation in decision-making processes that affect the environment. Engaging citizens and stakeholders in environmental matters can lead to more informed and inclusive decision-making and better outcomes for both the environment and the population.

In summary, the amendment of the EPA Act and the placement of the EPA-SL under the Office of the President signify the government's dedication to sound environmental protection and sustainable development. By granting the agency a more influential role and expanding its mandate, the government demonstrates its commitment to addressing environmental challenges holistically and ensuring the protection and sustainable management of the country's natural resources for the benefit of present and future generations.

Sierra Leone, along with countries like Bangladesh and Guinea Bissau, is identified as one of the most vulnerable nations to the adverse effects of climate change. There are several reasons why these countries are particularly susceptible**:**

1) **Geographic location:** Sierra Leone and the other vulnerable countries are situated in regions where the impact of climate change is more pronounced. Coastal and low-lying areas are at greater risk from sea-level rise and storm surges.
2) **Limited adaptive capacity**: These countries often have limited resources, infrastructure, and technological capabilities to adapt to the changing climate and cope with the consequences of extreme weather events.

3) **Dependence on natural resources:** Many vulnerable countries heavily depend on agriculture, fisheries, and forestry, making them highly sensitive to changes in weather patterns and natural resource availability.
4) **Poverty and social vulnerability:** High poverty rates and social inequalities in these countries exacerbate their vulnerability to climate change impacts, as marginalized communities are less equipped to respond to and recover from climate-related disasters.

Given these challenges, global efforts toward environmental protection and climate change mitigation are essential. Some key actions to address these issues include:

a) **Mitigating greenhouse gas emissions:** Implementing policies and practices to reduce emissions of greenhouse gases, such as transitioning to renewable energy sources, promoting energy efficiency, and adopting sustainable transportation options.
b) **Adaptation measures**: Supporting vulnerable countries like Sierra Leone in developing and implementing adaptation strategies that enhance resilience to climate change impacts. This may involve measures like building climate-resilient infrastructure, enhancing early warning systems, and implementing sustainable land and water management practices.
c) **International cooperation:** Encouraging collaboration between developed and developing nations to provide financial and technical assistance to support climate change adaptation and mitigation efforts in vulnerable countries.
d) **Reforestation and conservation:** Protecting and restoring forests and other natural ecosystems can play a crucial role in sequestering carbon dioxide and preserving biodiversity.
e) **Sustainable development:** Integrating climate change considerations into development planning can promote sustainable economic growth while minimizing environmental impacts**.**
f) **Public awareness and education:** Raising awareness about climate change and environmental protection can foster public support for policy changes and individual actions to reduce ecological footprints. The international community needs to work together to address climate change and protect the environment. By taking collective action and implementing sustainable practices.

4.2.3 Environment Protection Agency Sierra Leone

Before 1986, several Government Departments, Non-Governmental organizations (NGOs), and other Agencies carried out development activities without due consideration for sound environmental management (Strategic Plan, 2017-2021). The establishment of the Environment Protection Agency Sierra Leone (EPA-SL) in 2008 marks a significant step in the country's efforts to address environmental management and sustainability. Before 1986, development activities in Sierra Leone were carried out without proper consideration for environmental protection, leading to environmental degradation and various environmental challenges. The process of mainstreaming

environmental considerations began with the Ministry of Lands, Housing, and Country Planning, which later transferred the responsibility to the Ministries of Transport and Agriculture, Forestry, and Food Security in subsequent years. Recognizing the need for a more focused and dedicated institution to address environmental concerns, the Government of Sierra Leone established the Department of Environment in 2000 through the Environment Protection Act. Further progress was made in 2005 when the Environment Protection Department and the Forestry Division were separated from their respective ministries, leading to the establishment of the National Commission on the Environment and Forestry. However, the government saw the need for a more comprehensive and effective approach to environmental protection and management. In response to growing global environmental awareness and the pursuit of sustainable development, the Government of Sierra Leone enacted the Environment Protection Agency Act in 2008, leading to the establishment of the Environment Protection Agency Sierra Leone (EPA-SL). This new institution serves as a dedicated body responsible for the protection and management of the environment in the country. By consolidating the responsibilities and functions of environmental protection under one agency, the EPA-SL can act as a focal point for both national and international environmental issues. The EPA-SL's mandate includes overseeing environmental impact assessments, regulating and monitoring industrial activities, developing and implementing environmental policies and programs, and raising public awareness about environmental issues. The agency plays a critical role in promoting sustainable environmental management practices and ensuring that development activities in Sierra Leone are carried out in a manner that protects the environment and fosters long-term sustainability. The establishment of the EPA-SL demonstrates the government's commitment to addressing environmental challenges and contributing to global efforts in protecting the environment and achieving sustainable development goals. However, effective implementation and enforcement of environmental regulations and policies, as well as stakeholder engagement and public participation, are essential for the EPA-SL to achieve its objectives successfully.

4.2.3.1 Environment Protection Agency Core Functions

The main functions of the Agency as described in Section 12 of Part Three of the EPA Act of 2008 as amended in July 2010 (Functions of EPA-SL - EPA-SL) are mentioned as follows:

a) **Environmental impact licensing:** The Agency reviews and approves environmental impact assessments and environmental impact statements submitted following the EPA Act of 2008 or any other sector law;
b) **Enforcement and compliance:** The Agency ensures compliance with laid down environmental impact assessment procedures in the planning and execution of development projects, including compliance with respect to existing projects;

c) **Education and awareness raising on the environment:** The Agency is responsible for the creation of public awareness of the environment and its importance to the economic and social life of Sierra Leoneans;
d) **Environmental policy-making and legislation:** The Agency prescribes standards and guidelines relating to ambient air, water, and soil quality, the pollution of air, water, land, and other forms of environmental pollution including the discharge of wastes and the control of toxic substances.
e) **Mobilize, expedite, and monitor resources for environmental management:** The Agency develops plans and programs with environment management issues that can be funded from multiple funding sources.
f) **Strengthen private sector involvement in environmental management:** Liaise with the private sector, non-governmental agencies, and Community-Based Organizations on issues relating to the environment;
g) **Mobilize, expedite, and monitor resources for environmental management:** The Agency develops plans and programs with environment management issues that can be funded from multiple funding sources;
h) **Strengthen private sector involvement in environmental management:** Liaise with the private sector, non-governmental agencies, and Community-Based Organizations on issues relating to the environment;
i) **Climate changes and environmental protection:** Climate change and environmental protection are pressing global challenges, and their impacts are being felt across the world. Years of environmental degradation, overexploitation of natural resources, and the burning of fossil fuels have contributed to the intensification of climate change. The consequences of these actions are now evident through various manifestations, including rising temperatures, extreme weather events, melting glaciers, sea-level rise, and disruptions to ecosystems.

5. Result and Discussion

Research Question 1: Does the government have Statutory Instruments (SI) in place to regulate the mining industry?
The National Constitution of 1991 Chapter II: 7 (1) provides the leverage for government and regulatory institutions to enact laws and regulations respectively on natural resources as long as they do not contravening the National Constitution Chapter III: 18(3): Details of The National Constitution of 1991 Chapter II: 7 (1) and Chapter III: 18(3) is mentioned below:

The National Constitution of 1991 Chapter II: 7 (1) deals with the Economic objectives and Chapter II: 7 (1)a) affirms the country's commitment to *"harness all the natural resources of the nation to promote national prosperity and an efficient, dynamic and self-reliant economy".*

Chapter III: 18(3) states that *"nothing contained in or done under the authority of any law shall be held to be inconsistent with or in contravention of this section to the extent that the*

law in question and makes provision" Chapter III 18 (3)a) "*which is reasonably required in the interest of defence, public, safety, public order, public morality, public health or the conservation of the natural resources, such as mineral, marine, forest and other resources of Sierra Leone, except in so far as that provision or, as the case may be the thing done under the authority thereof is shown not to be reasonably justifiable in a democratic society.*"

The amendment of the EPA Act, 2008, in July 2010, with oversight responsibility of the Agency placed under the Office of the President, reflects the Government of Sierra Leone's continued commitment to sound environmental protection and management. This move is significant as it provides the Environment Protection Agency Sierra Leone (EPA-SL) with a stronger and more influential position within the government structure, enhancing its capacity to fulfill its broader mandate. By giving the Office of the President oversight responsibility of the EPA-SL, the government signals the importance it places on environmental issues and sustainable development at the highest level of decision-making. This can lead to increased attention to environmental concerns and better integration of environmental considerations into national policies, plans, and programs. In addition, having oversight responsibility under the Office of the President can potentially enhance the EPA-SL's authority to enforce environmental regulations and policies across different sectors and ministries. This could lead to improved coordination and cooperation among various government bodies in addressing environmental challenges and fostering sustainable development. Furthermore, the amendment of the EPA Act and the placement of the EPA-SL under the Office of the President signify the government's dedication to sound environmental protection and sustainable development. By granting the agency a more influential role and expanding its mandate, the government demonstrates its commitment to addressing environmental challenges holistically and ensuring the protection and sustainable management of the country's natural resources for the benefit of present and future generations. The introduction of the Sierra Leone Mineral Policy, Geo-data Management Policy, and Artisanal Mining Policy in May 2019 demonstrates the government's commitment to promoting sustainable and responsible development in the mining sector. Overall, the combination of policy reforms, institutional restructuring, and enhanced monitoring measures shows a comprehensive approach by the government and the NMA to promote sustainable and responsible mining practices, which can lead to positive socio-economic impacts for Sierra Leone and its people.

Research Question 2: Is there a governance structure that improves the Mining Sector?

In May 2019, the Government of Sierra Leone introduced three new policy documents: the Sierra Leone Mineral Policy; the Geo-data Management Policy; and the Artisanal Mining Policy (SLNMA Report, 2021). The introduction of the Sierra Leone Mineral Policy, Geo-data Management Policy, and Artisanal Mining Policy in May 2019 demonstrates the government's commitment to promoting sustainable and responsible development in the mining sector. These policy documents have specific objectives that align with national development goals and seek to attract private investments in

exploration and mining while ensuring that the benefits of mineral resources are maximized for all Sierra Leoneans. The review of the policy documents will keep the following benefits in view:

a) **Attracting private investments:** By providing a conducive environment for exploration and mining activities, the policies aim to encourage private sector involvement, which can lead to increased investment in the mineral sector and overall economic growth.
b) **Integration with the national economy:** Emphasizing the integration of the mineral sector with the rest of the economy ensures that mining activities contribute positively to the country's overall development.
c) **Transparent fiscal regime:** The establishment of a transparent fiscal regime aims to strike a balance between the benefits generated from mineral resources and the competitiveness of investments in the sector.
d) **Support for mineral beneficiation and marketing:** Encouraging mineral beneficiation and proper marketing strategies can lead to value addition and increased revenue generation from mineral resources.
e) **Sustainable exploitation of mineral resources:** The policies aim to guide investors towards sustainable practices, ensuring that mineral resources are utilized responsibly and in a manner that benefits the environment and local communities.
f) **Ensuring maximum benefits for Sierra Leoneans:** Ultimately, the policies are designed to ensure that the country's citizens obtain the maximum benefits from their mineral resource endowments, promoting equitable development and poverty reduction.

The ongoing comprehensive review of the Mines and Minerals Act of 2009 and the National Minerals Agency Act of 2012 indicates the government's commitment to strengthening the legal and governance framework of the extractives sector. This review is essential to ensure that the regulatory framework is up-to-date, comprehensive, and aligned with the country's current needs and development objectives. Additionally, the NMA's efforts to upgrade the Mining Cadastre Administration System (MCAS) and recruit Mines Compliance Officers and Draft Surveyors are significant steps toward enhancing transparency, administrative oversight, and compliance monitoring in the mining sector. These measures can help prevent illegal mining activities and ensure that mineral shipments are accurately accounted for, reducing the risk of smuggling and revenue loss.

Overall, the combination of policy reforms, institutional restructuring, and enhanced monitoring measures shows a comprehensive approach by the government and the NMA to promote sustainable and responsible mining practices, which can lead to positive socio-economic impacts for Sierra Leone and its people.

Research Question 3: Do the mineral resources of Sierra Leone affect employment?

The total number of Sierra Leoneans employed by mining companies in January 2018 was 8,552, and the total number of Sierra Leoneans employed by mining in March

2021 was 9,683. With Kingho Mining Company, Cheng Li Mining Company, Sierra Diamonds Limited, and Supreme Minerals Limited mining companies currently recruiting, this number is expected to increase significantly in the short term. Employment of Sierra Leoneans by large-scale mines and their contractors is expected to be around 13,500 employees by the end of 2021, up from 8,000 in December 2020. Employment of Sierra Leoneans by Small-scale mines and their contractors is expected to be around 2,000 employees (direct and indirect) by the end of 2021, up from 1,200 in 2020 (SLNMA Report, 2021).

The increase in employment numbers is attributed to several factors, including the expansion of existing mining operations and the recruitment efforts by companies like Kingho Mining Company, Cheng Li Mining Company, Sierra Diamonds Limited, and Supreme Minerals Limited. The growth in employment opportunities is a positive sign for the local workforce, as it reflects the potential for economic development and job creation in the mining sector. Additionally, the increase in employment in both large-scale and small-scale mines and their contractors suggests a diverse range of opportunities for Sierra Leoneans. It is worth noting that the mining sector's contribution to employment and the economy can have far-reaching effects on poverty reduction and overall socio-economic development in the country. However, it is essential to ensure that the expansion of mining activities is done responsibly, with proper consideration for environmental protection, health and safety standards, and community engagement to maximize the benefits for all stakeholders involved.

Research Question 4: Does the government have a monitoring mechanism to monitor the activities of the mining industry?

The NMA is strengthening its monitoring and compliance mechanisms and tools to enhance transparency and accountability in the mines and minerals sector. The National Minerals Agency (NMA) has taken a comprehensive and proactive approach to improving the governance and management of the mining sector in Sierra Leone. Strengthening monitoring and compliance mechanisms is crucial for promoting transparency and accountability, which are essential for the sustainable development of the minerals sector. The NMA's commitment to achieving strategic objectives such as value addition for employment, poverty reduction, community benefits, environmental rehabilitation, and revenue generation shows a focus on holistic and responsible development. By aligning its five-year strategic plan with Sierra Leone's Medium-term National Development Plan and the Minerals Policy, the NMA ensures that its efforts are in harmony with the country's broader development vision. Consolidating the achievements made so far demonstrates a commitment to building upon existing progress and continuous improvement. It also indicates that the NMA is tracking and evaluating its performance over time, which is vital for adaptive management and addressing any challenges that may arise. By integrating policies that promote sustainable growth and transformational development, the NMA is signaling its awareness of the need to balance economic gains with social and environmental

considerations. This approach is essential for ensuring that the benefits of the mining sector reach the broader population and contribute to long-term prosperity.

In addition, data collection and management are an invaluable mechanism that improves monitoring and evaluation. Hence in 2019, the GoSL successfully conducted a high-resolution, low-altitude airborne geophysical survey of the entire country to locate potential new minerals (SLNMA Report, 2021). The high-resolution, low-altitude airborne geophysical survey conducted by the Government of Sierra Leone (GoSL) in 2019 is a significant step in identifying potential new mineral resources across the entire country. This survey provides valuable geoscientific data that can attract private investment in the mining sector and accelerate the country's development, including employment creation, economic growth, and overall transformation. The geoscientific data collected from the survey can offer crucial insights into the mineral potential of different regions in Sierra Leone. This information is likely to be of great interest to mining companies and investors seeking opportunities for exploration and development. By having a comprehensive understanding of the country's mineral resources, investors can make informed decisions and invest in projects that align with Sierra Leone's strategic objectives. The NMA's in-house Directorate of Technology and Information Management (DTIM) plays a pivotal role in this endeavor. The development and deployment of the Enterprise Geoscientific Information Management System (eGIMS) are crucial for efficiently capturing, storing, managing, analyzing, and sharing mining-related geoscientific and social development data and information.

Having a centralized and robust information management system like eGIMS is advantageous in several ways:

a) **Data accessibility:** eGIMS ensures that valuable geoscientific and social development data is easily accessible to relevant stakeholders, including government officials, mining companies, researchers, and the public.
b) **Data integration:** By centralizing data from various sources, eGIMS enables the integration of diverse datasets, leading to comprehensive and multidimensional insights that can aid decision-making processes.
c) **Data analysis:** The system's analytical capabilities enable efficient processing and interpretation of data, facilitating the identification of patterns, trends, and potential opportunities.
d) **Transparency and accountability:** The deployment of eGIMS enhances transparency in the mining sector by providing a standardized platform for data sharing and reporting, which contributes to better governance and accountability.
e) **Planning and policy formulation:** Having access to accurate and up-to-date geoscientific information enables the formulation of well-informed policies and development plans for the mining sector and beyond.
f) **Sustainability:** Integrating social development data with geoscientific information allows for a more holistic approach to mining, ensuring that the sector's growth benefits local communities and promotes sustainable development.

Overall, the combination of the geophysical survey and the implementation of eGIMS underscores Sierra Leone's commitment to using advanced technologies and data-driven strategies to attract investment, promote responsible mining practices, and achieve its developmental goals. By leveraging this geoscientific data, Sierra Leone can make informed decisions that contribute to the sustainable and inclusive growth of its mining sector and the broader economy. Furthermore, the NMA Strategic Plan 2020-2025 appears to be a well-thought-out roadmap for the responsible and sustainable development of the mining sector in Sierra Leone. Implementation of such a plan, combined with strong monitoring and compliance mechanisms, can significantly contribute to the country's overall socio-economic development and environmental protection

Research Question 5: What are the government mechanisms for Corporate Social Responsibility (CSP) in the communities in which the mining industry operates?

Eight mining companies (i.e. Sierra Minerals Holdings Limited; Sierra Rutile Limited; Koidu Limited; Dayu Mining Company; Sierra Diamonds Limited; Kingho Mining Company; Wongor Investment and Mining Corporation; and MEYA Mining Company) have all signed Community Development Agreements (CDAs) with their host communities. Under the CDA, a fixed percentage of revenue from the mining operation will be used to implement development projects in the communities (SLNMA Report, 2021). The Community Development Agreements (CDAs) signed between the mining companies and their host communities are a positive step towards ensuring that the benefits of mining operations are shared with the local population. The fixed percentage of revenue allocated for development projects in the communities demonstrates the companies' commitment to social responsibility and community development. The contribution of over Le 20 billion since 2018 to implement development projects in the host communities indicates a significant investment in improving infrastructure and facilities that can positively impact the lives of the residents. Projects such as the multi-purpose building and market center in Lower Banta Chiefdom – Moyamba District, and the construction of schools in Kenema and Kono districts, can have far-reaching effects in terms of education, economic growth, and community empowerment. The payment of surface rents to landowners across the country also reflects the mining companies' acknowledgement of the rights of landowners and their willingness to compensate them for the use of their land. These payments can have a direct impact on the livelihoods of the landowners and can be vital in fostering a positive relationship between the mining companies and the communities they operate in. Overall, the mining companies' contributions and payments are crucial for fostering sustainable development, poverty reduction, and social progress in the regions where they operate. When handled responsibly and transparently, such agreements and financial commitments can lead to long-term benefits for both the mining companies and the host communities. However, it is also essential to ensure that the implementation of development projects and the

management of funds are done efficiently and with active participation from the local communities to maximize the positive impact on the ground.

Research Question 6: Does the mining sector have an effect on Sierra Leone's GDP?

According to data from Statistics Sierra Leone (SSL), the mineral exports for 2019 were USD 430 million, accounting for about 62% of total exports. In 2020, mineral exports were circa USD 313 million and accounted for 48% of total exports from Sierra Leone. Total revenue to the Government of Sierra Leone, from mining, was USD 56 Million (2018), USD 61 million (2019), and USD 44 Million (2020), the reduction mainly due to the COVID-19 Pandemic (SLNMA Report, 2021). The decline in mineral exports in 2020 compared to 2019 can be attributed to the global economic slowdown caused by the COVID-19 pandemic. The pandemic disrupted supply chains, reduced demand for minerals, and led to uncertainties in the global market, affecting the overall export performance of Sierra Leone. The reduction in government revenue from mining in 2020, compared to the previous years, can be largely attributed to the impact of the COVID-19 pandemic on mineral prices and demand, as well as disruptions in mining operations due to restrictions and lockdowns. Overall, the mining sector remains a significant contributor to Sierra Leone's economy, with mineral exports accounting for a substantial portion of the country's total exports. However, the pandemic-induced fluctuations in mineral exports and government revenue underscore the importance of diversifying the economy and strengthening resilience against external shocks. Additionally, the government's efforts to promote sustainable mining practices and enhance transparency and accountability in the sector can play a crucial role in maximizing the benefits of mineral resources for the country's development. Based on the quantitative data taken from Statistic Sierra Leone (Statas SL) report on the 2021 and 2022 Real Gross Domestic Product (RGDP), the impact of the mining sector on the GDP in Sierra Leone is future discussed as follows: Gross domestic product (GDP) at current prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for the depreciation of fabricated assets or for the depletion and degradation of natural resources. Data are in current US dollars. Dollar figures for GDP are converted from domestic currencies using single-year official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used (World Economic Outlook Database).

Nominal GDP refers to the Gross Domestic Product (GDP) calculated at current market prices. It represents the total monetary value of all goods and services produced within a country's borders during a specific period, using the prices that are prevalent in that period. On the other hand, the Current Market Price refers to the prices of goods and services that are currently prevailing in the market at the time of measurement. When calculating the nominal GDP, economists use these current market prices for each good and service. An increase in nominal GDP value compared to a previous period usually

indicates economic growth. This increase can occur due to various factors, such as an increase in production, higher consumer spending, government expenditure, or inflation (i.e., a general rise in the overall price level). It is important to note that nominal GDP can be influenced by changes in both the quantity of goods and services produced (real output) and changes in their respective prices. There has been a significant increase in the Gross Domestic Product at current prices in Sierra Leone between the period 2018 to 2021 as indicated in Figure 1 below which indicates economic growth.

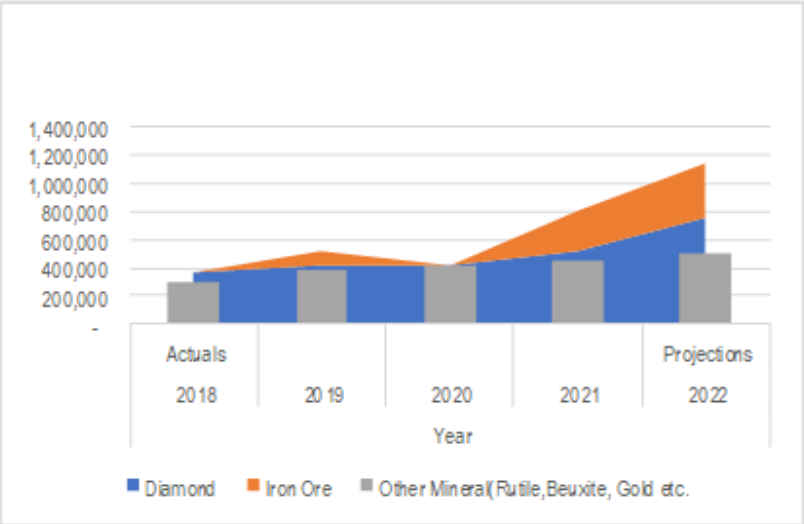

Figure 1: Groos Domestic Product Current Prices (in millions Leones)

It's important to note that while GDP is a crucial measure, however, has its limitations, such as not accounting for non-market activities, income distribution, and environmental impacts. As a result, GDP is often used in conjunction with other indicators to provide a more comprehensive view of an economy's well-being and progress.

The nominal GDP may not always give an accurate representation of the actual economic growth or decline because it does not account for changes in the overall price level. This is where "real GDP" comes into play. Real GDP adjusts for inflation or deflation by using constant base-year prices for goods and services, thus providing a more accurate measure of economic output. Economists often use real GDP to make meaningful comparisons of economic performance across different years, as it isolates the impact of price changes and focuses solely on changes in production and output. Real Gross Domestic Product (GDP) is a measure of the total economic output of a country, adjusted for changes in price levels. It reflects the value of all goods and services produced by an economy in a given year but is expressed in base-year prices. This inflation-adjusted measure allows for a more accurate comparison of economic performance over time by removing the impact of price changes. However, in Figure 2 below the figures for the mining sector were extracted to indicate whether the mining sector indicators have shown a positive or negative effect on the economy. The Real Gross Domestic Product

Growth Rates between 2018 and 2021 declined and some of the key reasons could be the closure of some mining companies and the effect of COVID-19.

Figure 2: Real Gross Domestic Product Growth Rates

By using real GDP, economists and policymakers can better understand whether the economy has grown or contracted in real terms, separate from the impact of changing prices. It allows for meaningful comparisons of economic performance across different time periods and provides insights into the overall economic health and trends of a country. Figure 2 above indicates that the impact of the mining industry on the economy started contracting in 2019 and became worse in 2020 which is the result of COVID-19; the economy started picking up in 2021 and would get better based on the projections for 2022. By tracking the real GDP growth rate over time, economists, policymakers, and investors can gain valuable information about the state of an economy and make informed decisions about monetary and fiscal policies, investments, and business strategies. It is a key metric for understanding the cyclical patterns and long-term trends of economic activity in a country. Overall, it is worth noting that Nominal GDP uses current market prices and can be affected by changes in both production and prices whilst the Real GDP uses constant base-year prices and provides a more accurate measure of changes in production and output by removing the influence of price changes. Both nominal and real GDP serve essential purposes in economic analysis, with each offering unique insights into the state and growth of an economy. In addition, nominal GDP (GDP at current prices) represents the total monetary value of all goods and services produced in a specific time period, using the prices prevailing during that period, and it can be expressed in the local currency (or any other currency) per capita to measure economic performance on a per-person basis. Furthermore, GDP at current prices is a measure of the total economic output of a country, including the value added by producers, product taxes, and minus subsidies. It is expressed in local currency, converted from domestic currencies using official exchange rates (or alternative conversion factors if needed), and does not account for depreciation or the depletion and degradation of natural resources.

The GDP deflator is used to measure the price level changes in an economy and also measures the inflation or deflation of the entire output of an economy, rather than just the price changes of goods and services. It captures the price changes of all domestically produced final goods and services, whether they are consumed by households, businesses, government, or invested in by the private sector. The CPI measures the price inflation or deflation of a specific basket of goods and services that represents the typical consumption pattern of households. It is primarily used to understand changes in the cost of living for consumers. On the other hand, the GDP deflator takes into account a broader range of goods and services, including those used for investment, government spending, and exports, providing a more comprehensive measure of overall price level changes in the economy. It's important to note that while the GDP deflator measures the price level changes, and is also indirectly affected by changes in the output of an economy. When real GDP increases or decreases due to changes in production, it can influence the overall GDP deflator. For example, if real GDP grows faster than nominal GDP (inflation is lower), it may indicate increased productivity or efficiency gains in the economy.

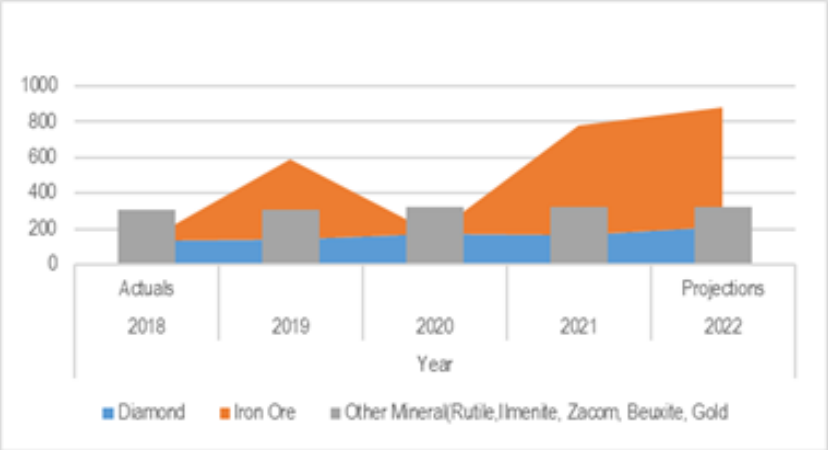

Figure 3: Gross Domestic Product Deflators

The GDP price deflator helps economists compare the levels of real economic activity from one year to another. Figure 3 above indicates the price level changes for diamonds, iron ore, and other minerals. Diamonds and other minerals as shown an increase in prices from 2019 through 2021and the trend will continue in 2022 based on the projections for 2022. However, in the case of iron ore, nothing was achieved in 2018 but was better in 2019 and nothing was achieved in 2020 but significantly improved in 2021 compared to 2019 and this will be in 2022 based on the projected figure. The overall impact of the mining industry on real economic activity is positive. It is worth noting that, the GDP deflator is a valuable tool for policymakers, economists, and analysts to assess price level changes in an economy and to make adjustments for inflation when comparing economic output over time.

The percentages represent the shares of different sectors (i.e., industries) in the total value of goods and services produced in a country or region during a specific year.

These percentages are often calculated based on the value-added approach, where the value added by each sector to the production process is measured.

The percentages of GDP contributions can vary significantly from one country to another and may change over time as economies evolve and develop. Developed economies typically have a higher share of GDP contributed by the services sector, reflecting a shift towards more service-oriented economies. In contrast, developing economies may have a more significant share of GDP contributed by agriculture and industry.

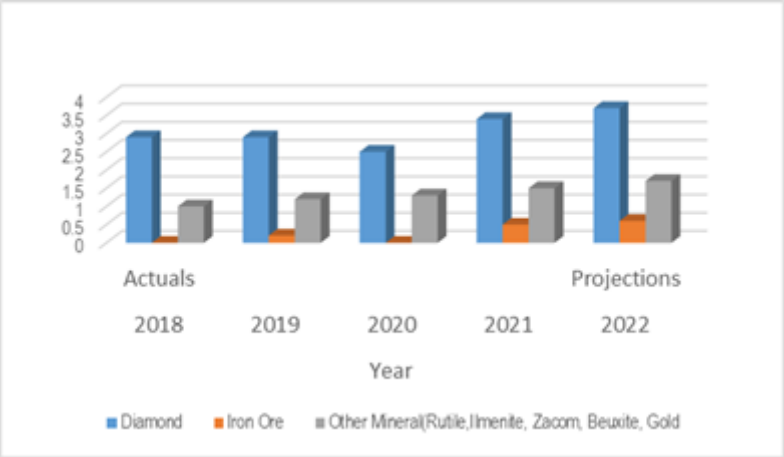

Figure 4: Percentages of Contribution to Gross Domestic Product

Figure 4 above indicates the percentage contribution for diamonds was constant in 2018 and 2019 but declined in 2020 but increased in 2021 and the projected figure for 2022 indicates the increase will continue. On the other hand, other minerals as shown an increase in percentage contribution to GDP from 2019 through 2021and the trend will continue in 2022 based on the projections for 2022. However, in the case of iron ore, nothing was achieved in 2018 but was better in 2019 and nothing was achieved in 2020 but significantly improved in 2021 compared to 2019 and this will be in 2022 based on the projected figure. The overall effect is that the percentage of the mining sectors contributes positively to the GDP.

Supply-side policies are economic strategies aimed at increasing the potential output (supply) of an economy. These policies often focus on creating a conducive environment for businesses to invest, innovate, and produce goods and services efficiently. GDP growth from the supply side focuses on understanding how different factors of production contribute to the overall economic growth of a country. This analysis is based on the supply-side theory, which emphasizes that increasing the supply of goods and services in an economy leads to economic expansion and improved economic performance. Figure 5 below indicates the impact of the mining industry on the economy as the economic expansion declined in 2020 as the two performing minerals diamond and other minerals declined in supply however, the mining sector supply side contributed positively in 2021 to economic expansion and improved economic performance. The supply-side analysis is a valuable tool for policymakers and

economists as it helps identify the drivers of economic growth and assists in formulating policies that support sustainable development. By understanding how labour, capital, and technology contribute to GDP growth, countries can make informed decisions to improve their economic performance and enhance the standard of living for their citizens (OECD, 2021).

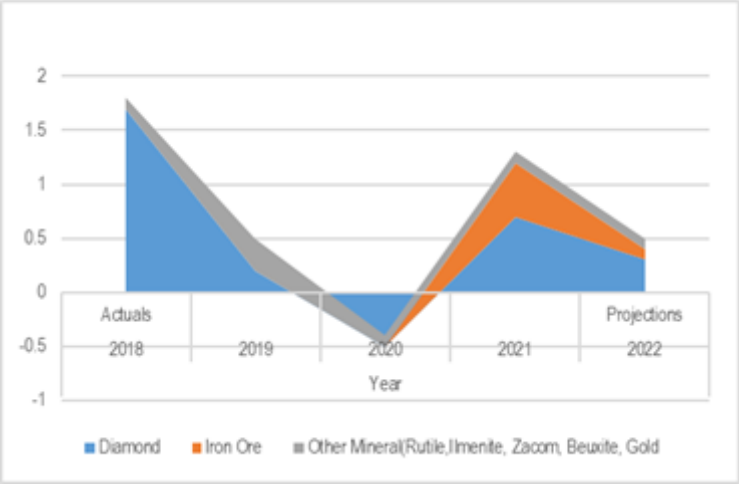

Figure 5: Contribution to Gross Domestic Product Growth

In summary, Sierra Leone experienced a strong recovery in its economy in 2019, with a growth rate of 5.3%, which was an improvement from the 3.5% growth in 2018. This growth was mainly attributed to the industrial sector, particularly the mining and quarrying activities. However, like many other countries, Sierra Leone faced challenges due to the COVID-19 pandemic in 2020. The impact was especially noticeable in specific sectors, such as mining, transport, trade, and tourism, which were hit hard by restrictions and reduced economic activity. Despite the difficulties faced in 2020, there was a positive trend towards the end of 2021 and throughout 2022. The government's decision to relax restrictions and the resumption of international flights for tourism activities likely played a significant role in this economic recovery. Additionally, the reopening of more mining and manufacturing sectors also contributed to the growth. As a result of these recoveries, the GDP growth rate for 2021 reached 4.0%, which is a positive indicator of the country's economic progress. Looking ahead, it's expected that the economic outlook will continue to improve, albeit at a slightly slower pace. With the resumption of tourism activities and further expansion in the mining and manufacturing sectors, Sierra Leone's economy is projected to grow at a rate of 3.8% in 2022. Overall, the country's economic performance in recent years shows resilience and potential for further growth, but it's essential to remain mindful of potential challenges and continue implementing effective policies to sustain the positive momentum. In addition, the mining sector is fundamental to economic growth and improved economic performance, and the effective role of government is critical in ensuring the monitoring, performance, enacting the needful laws and regulations that protect the environment and "*harness all the natural resources of the nation to promote national prosperity and an efficient, dynamic and self-reliant economy*"

6. Conclusion, Limitations, and Recommendations to Future Researchers

6.1 Conclusion

Sierra Leone is richly endowed with natural resources rangelands, freshwater, wetlands, biodiversity, wildlife, fisheries, and mineral resources. Despite having abundant resources, the exploitation and utilization of these resources have not translated into improved living standards for the majority of the population, who continue to live in abject poverty. Several factors contribute to this situation:

1) **Poverty and dependence on natural resources:** The majority of the population in Sierra Leone relies on natural resources for their livelihoods. However, the lack of alternative economic opportunities and basic services perpetuates the cycle of poverty and forces people to depend heavily on the exploitation of natural resources, often using unsustainable practices.
2) **Population growth:** The increasing population puts additional pressure on the available natural resources. As the population grows, there is a higher demand for food, water, and fuel, leading to more intensive use of land and resources.
3) **Land use changes and deforestation:** The demand for land for economic development, agriculture, and settlement leads to significant land-use changes and deforestation. Forest cover is being lost at an alarming rate, which has adverse effects on biodiversity, carbon sequestration, and ecosystem services.
4) **Unsustainable practices:** Activities like charcoal production, fuelwood collection, slash-and-burn agriculture, and illegal mining are examples of unsustainable practices that contribute to land degradation, loss of vegetation, soil erosion, and contamination of water sources. These practices not only harm the environment but also threaten the livelihoods of communities that depend on these resources.

Addressing these challenges requires a comprehensive approach that considers environmental conservation, sustainable resource management, and poverty alleviation. Some potential strategies include:

1) **Sustainable resource management:** Implementing policies and practices that promote sustainable agriculture, fishing, and mining can help protect natural resources while providing livelihood opportunities for the population. This could involve supporting eco-friendly and efficient farming methods, encouraging responsible fishing practices, and regulating mining activities to minimize environmental impacts.
2) **Forest conservation and reforestation:** Initiatives to protect existing forests and restore degraded areas through reforestation and afforestation efforts can help mitigate deforestation and its associated negative impacts.
3) **Diversification of the economy:** Encouraging economic diversification and investment in sectors beyond natural resource extraction can reduce the population's dependency on resource exploitation. This may involve promoting industries like tourism, manufacturing, and services, which can create more diverse job opportunities.

4) **Education and awareness:** Raising awareness about the importance of environmental conservation and sustainable resource management is crucial. Education programs can empower local communities to adopt more environmentally friendly practices and be active participants in protecting their natural resources.
5) **Governance and regulation:** Strengthening governance and regulatory frameworks to monitor and control natural resource extraction is essential to curb illegal and unsustainable activities. Transparent and accountable governance can help ensure that resource revenues benefit the broader population and contribute to poverty reduction.
6) **International cooperation and aid:** Sierra Leone may benefit from international cooperation and aid to support sustainable development projects, environmental protection, and poverty alleviation efforts.

Addressing the complex relationship between natural resource exploitation, poverty, and population growth requires a multi-faceted approach with the involvement of various stakeholders, including the government, local communities, non-governmental organizations, and international partners. By adopting sustainable practices and promoting equitable resource management, it may be possible to improve living conditions for the citizens of Sierra Leone while safeguarding their valuable natural heritage.

6.2 Limitations

The amendment of the EPA Act in 2010 was primarily focused on administrative issues and did not address certain emerging environmental challenges, such as climate change, and gender and natural resource management issues. The EPA-SL must be equipped with the necessary tools and provisions to effectively tackle these challenges and promote sustainable environmental management. Addressing climate change is a pressing global issue, and countries like Sierra Leone, which are vulnerable to its impacts, need to have adequate legal frameworks in place to mitigate its effects and adapt to changing conditions. By incorporating climate change considerations into the EPA Act, the agency can be more proactive in implementing climate adaptation and mitigation measures. Moreover, including provisions related to fees for violations and litigation can strengthen the enforcement of environmental regulations and act as a deterrent against environmental offenses. Adequate penalties and enforcement mechanisms are essential to ensure compliance with environmental laws and protect the environment effectively. Additionally, addressing gender and natural resource management issues is crucial for promoting inclusivity and sustainability in environmental initiatives. Recognizing and incorporating gender perspectives into environmental policies and programs can lead to more equitable and effective outcomes and better reflect the diverse needs and experiences of different segments of the population. A further amendment to the EPA Act to address these emerging environmental challenges can empower the EPA-SL to be more proactive, responsive, and effective in its role as the focal institution for

environmental protection and management in Sierra Leone. By mainstreaming environment, gender, and climate change considerations into the legal framework, the agency can better safeguard the environment and promote sustainable development for the well-being of the country and its citizens.

7. Recommendation to Government Regulatory Bodies and Future Researchers

The increase in mining activities, particularly in gold and mineral sand mining, reflects the exploration and development efforts undertaken by mining companies to tap into Sierra Leone's diverse mineral resources. This expansion can bring several economic benefits, including job creation, increased export revenue, and potential investments in local infrastructure and communities. As the mining sector continues to grow and diversify, it becomes crucial for the government and relevant regulatory bodies to ensure responsible and sustainable mining practices. This involves promoting environmental protection, social engagement with local communities, and transparent governance to maximize the benefits of the mining sector for the country's long-term development. Future research on Environmental Management and Corporate Social Responsibility is recommended.

Conflict of Interest Statement

This research is free from any conflict of interest, and there are no anticipated ethical issues.

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