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Assessing the Socio-Economic and Environmental Impact of Koidu Holdings on Local Communities in Tankoro Chiefdom, Kono District, Sierra Leone - Using the Rapid Impact Assessment Matrix Method

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ABSTRACT: The study used the RIAM technique to evaluate environmental sustainability using an environmental impact assessment through nine sessions of focus group discussions in the affected mining communities. The system's methodology involves assigning scores to impact component issues based on predetermined criteria, which are then transferred into arrangements that indicate the extent of positive or negative effects. The RIAM analysis reveals that kimberlite diamond mining has predominant negative environmental impacts across all three communities, A, B, and C. However, certain social and economic components reflected positive changes. Nevertheless, the positive impacts on those three communities are just about the same. From the total scores summary for the three communities, it is obvious that the kimberlite mining in the affected communities have negative effects than the positive effects. Based on these findings, recommendations were made for improvement.

KEYWORDS: RIAM, Mining, Environment, Socioeconomic, Communities,

1.0 INTRODUCTION

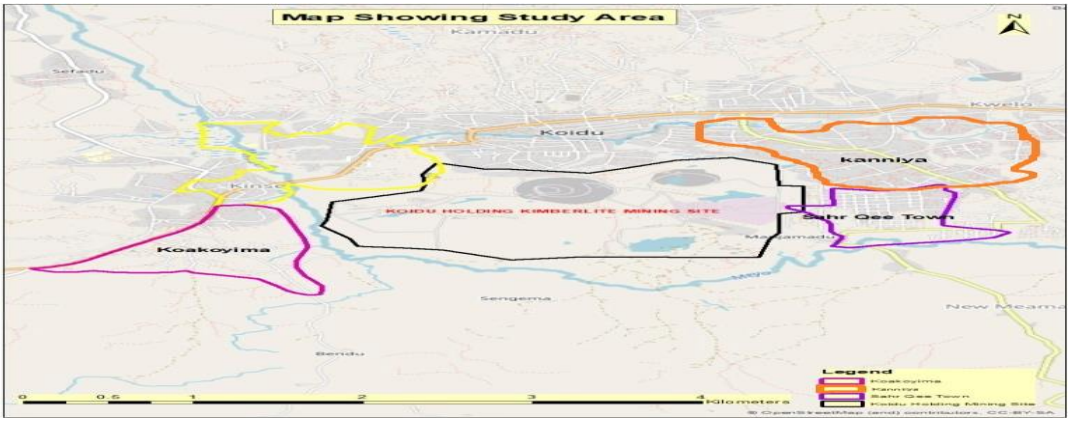
From considering pollution assessment to including a wider range of ecological evaluation, environmental impact assessment (EIA) has evolved to become a "holistic" EIA. The extractive industries are mostly to blame for land degradation, waste management, deforestation, and the spread of chemicals in rivers and streams, which lowers the quality of the water that humans drank. Human Rights Watch stated in 2014 that mining activities were the cause of the deteriorating environmental and social problems in mining communities, including concentrated land loss, negative effects on community displacement, as well as health and safety difficulties. Mineral extraction has long been connected to widespread deforestation, degraded soil, and environmental contamination in the local communities in Tankoro chiefdom. In addition to the pervasive environmental disruption, lost agricultural land, inadequate water accessibility, and deforestation (Awudi (2002); NACE 2009; NMJD 2010; Human Rights Watch 2014). This situation is what Vanclay (2017) refers to as 'mining-induced displacement', which involves the unplanned migration of impacted persons from their original housing and/or socioeconomic activities. Walser (2000 and Iimi 2007) mentioned the positive and negative impacts of mining in developing nations like Sierra Leone. When they earlier observed that mining has made a constructive impact on the economy of many countries and, can be measured in relation to employment and income generation. But also perceived that these socioeconomic benefits do not manifest at the community level directly. This research therefore takes a look at the Socio-Economic and Environmental Impact of Koidu Holdings on Local Communities in Tankoro Chiefdom, Kono District, Sierra Leone using The Rapid Impact Assessment Matrix Method. Specifically, it attempts to address the following objectives: (i) to identify the specific economic indicators that have changed in the local communities in Tankoro chiefdom since the inception of Koidu Holdings' mining activities (ii) to evaluate the most significant environmental impacts resulting from Koidu Holdings' mining activities in the selected communities; and (iii) to analyse the social impacts ensuing from the mining investments in the selected mining communities.

2.0 MATERIALS AND METHODS

Case Study

Koidu Holdings is a diamond mining company operating in Sierra Leone. It is wholly owned by BSG Resources Limited through its subsidiary BSGR Diamonds Limited. BSG Diamonds was renamed OCTÉA Ltd to reflect and honour the remarkable quality of the plentiful octahedral diamonds' typical of the diamond deposits in Sierra Leone. Koidu Holdings was the first commercial diamond mining company in 2003, to invest in the development of the resource sector in Sierra Leone, focused primarily on the kimberlite deposits at the local communities in Koidu City in Tankoro chiefdom Koidu. Koidu Holdings is still mining the kimberlite diamonds around Kanniya Resettlement, Koakoyima and Sahr Quee Town (Kolver 2012; Koidu Holdings 2019).

Figure 1: **Map displaying study area in Tankoro Chiefdom-**



Statistics Sierra Leone (2022)

Koidu Holdings Kimberlite diamond mining site (Mining Magazine 2022)

METHOD

The study used the RIAM method to evaluate environmental sustainability using an environmental impact assessment through nine sessions of focus group discussions in the affected mining communities. Primary informants, representing Traditional Elders and Youths, engaged in structured interviews, providing detailed responses that illuminated the realities of the situation. Assistance from community members in recruiting group participants was crucial in setting the context for the study and preventing misconceptions that could bias future interactions with researchers. Due to the politicized nature of the study communities, recording devices were not permitted, and note-taking was advised. Responses during the focus group discussions were deliberated and agreed upon among members, ensuring accuracy and mitigating extreme or incorrect viewpoints. This process also validated the responses' authenticity (Patton 2002). The study aimed to understand the expectations of the residents of Kanniya Resettlement, Koakoyima, and Sahr Quee Town for employment opportunities, community development, and compensation from the mining activities in Tankoro chiefdom.

The methodology involves assigning scores to impact component issues based on predetermined criteria, which are then transferred into arrangements that indicate the extent of positive or negative effects. The abstract and intangible effects could be measured on a specified scale and the cumulative impacts could be logically contrasted with the use of the RIAM tool. Using the

established criteria, a score is assigned to each environmental component after the impacts of project activities are compared to those of the components. This score indicates the expected impact of each component. The key assessment criteria are divided into two categories:

A. important criteria that, when taken alone, have the potential to alter the score; and

B. valuable criteria that, when taken together, have the potential to alter the score but are not important enough to do so.

Group A is made up of the total quotation system multiplied by the scores assigned to every criterion. The weight of each criterion directly intervenes thanks to the idea of multiplication. Additionally, **group B** is made up of the whole quotation system plus the marks assigned to every criterion. This makes sure that a mark would not have a significant impact on the final outcome when taken alone (Pastakia 1998).

A measure of the importance of the relevant condition **(A1)** is assessed based on the person's interest or the space boundaries that would be impacted. The following is the definition of the scale: **0** - Irrelevant/no importance; **1** - Important just to the local condition; **2** - Important to the areas immediately out of the local condition; **3** - Important to the regional/national interest; **4** - Important to the national/international interest. The magnitude **(A2)** is defined as the measure of the scale of benefit/damage of an impact or condition. The scale is defined in the following way: **+3** - Major positive benefit; **+2** - Significant improvement in the status quo; **+1** - Improvement in the status quo; 0 - No change/status quo; -**1** - Negative change to the status quo; **-2** - Significant negative effect or change **-3** - Major negative effect or change. Permanence **(B1**): **1-**No change/ not applicable; **2-**Temporary; **3-** Permanent; Reversibility **(B2):1**-No change/ not applicable; **2**- Reversible; **3**- Irreversible; Cumulative **(B3**): **1-** No change/ not applicable; **2**-Non-cumulative; **3**- Cumulative. The final assessment score **ES** is calculated as follows (Pastakia & Jensen 1998):

$$(a1) \text{ X } (a2) = aT \quad (1)$$

$$(b1) + (b2) + (b3) = bT \quad (2)$$

$$(aT) \text{ X } (bT) = ES \quad (3)$$

Where, the separate criteria scores (a1) and (a2) are significant to the condition (group A) and have the potential to independently alter the final score; (bl) to (b3) are the individual criteria scores that are of value to the situation (group B), but individually should not be capable of changing the score obtained;

aT is the result of multiplication of all (A) scores;

bT is the result of summation of all (B) scores; and

the condition's assessment score is ES.

According to the weights assigned to them, it is a method of quantifying the qualitative and abstract impacts. The ES scores are determined by the RIAM tool, which also fits each component within the proper range bands (Pastakia 1998).

3.0 RESULTS AND DISCUSSIONS

Local impact assessments were performed through focus group discussions involving selected participants from each community. These groups, comprising two Traditional Elders and four Youths, varied for each of the nine sessions, resulting in a total of 18 Traditional Elders and 36 Youths across all communities. They were selected for their deep knowledge of Koidu Holdings' mining operations. This selection process, aiming to capture a range of perspectives, was instrumental in gaining a balanced understanding of the community's views on mining impacts. The focus group discussions, each lasting about 90 minutes, were designed to elicit detailed insights into the communities' concerns, perceptions, and ideas. Topics discussed included employment priorities, community development initiatives, benefits from Surface Rent payments, management of Community and Agricultural Development Funds, environmental impacts of mining, and the specific nature of Koidu Holdings' operations. This method aligns with the principle of pertinency, selecting participants for their expertise in the subject matter (Burrows & Kendall 1997).

The sustainability of these communities was critically assessed, considering environmental, social, and economic factors. Using RIAM allowed for a comprehensive assessment of the impacts, both positive and negative, transforming qualitative analysis into a semi-quantitative format. This method followed Sundara Kumar et. al., (2013) in scoring impact components against predefined criteria and translating scores into ranges indicative of the impact's magnitude. The evaluation of each component was based on interviews and corroborated through focus group discussions, with RIAM analysis utilizing the gathered information. The assessment criteria, outlined in Table 1, provided a structured approach to score each component, considering factors like the importance of the condition (a1), magnitude of change/effect (a2), permanence (b1), reversibility (b2), and cumulative effects (b3).

Table 1. Assessment criteria

Criteria	Scale	Description
a1: Importance of condition	4	Important to national/international interest
	3	Important to regional/national interests
	2	Important to areas immediately outside the local condition
	1	Important only to the local condition
	0	No importance
a2: Magnitude of change/effect	+3	Major positive benefit
	+2	Significant improvement in status quo
	+1	Improvement in status quo
	0	No change/status quo
	-1	Negative change in status quo
	-2	Significant negative disbenefit or change
	-3	Major disbenefit or change
b1: Permanence	1	No change/not applicable
	2	Temporary
	3	Permanent
b2: Reversibility	1	No change/not applicable
	2	Reversible
	3	Irreversible
b3: Cumulative	1	No change/not applicable
	2	Non-cumulative/single
	3	Cumulative/synergistic

Source: Pastakia & Jensen, 1998

In the current study, focus group and initial interviews with respondents from the three communities have yielded a wealth of qualitative and quantitative information. The information has been included in the thorough analysis of all potential impacts on the three mining communities that were impacted. Three main categories were the focus of the impact assessment study, and numerous components were found and are listed in the tables below. The many impacts of mining were thoroughly examined, assessed using the previously mentioned standards, and each component was assigned a score. It is the process of quantifying the abstract and qualitative impacts in accordance with the weights assigned to them. After the local assessments, the researcher then used his knowledge derived largely from reviewing the relevant literature, to assign NATIONAL and INTERNATIONAL values:

Table 2. Range bands used for RIAM

Environmental Score (ES)	Range Bands	Range Value	Description of range band
+72 to +108	E	5	Major positive change/impact
+36 to +71	D	4	Significant positive change/impact
+19 to +35	C	3	Moderate positive change/impact
+10 to +18	B	2	Positive change/impact
+1 to +9	A	1	Slight positive change/impact
0	N	0	No change/status quo/ not applicable
-1 to- 9	-A	-1	Slight negative change/impact
-10 to -18	-B	-2	Negative change/impact
-35 to -19	-C	-3	Moderate negative change/impact
-71 to -36	-D	-4	Significant negative change/impact
-108 to -72	-E	-5	Major negative change/impact

Source: Adapted from Pastakia and Jensen, 1998

To ensure transparency and clarity, detailed RIAM score tables (Tables 3 to 5) and corresponding graphical representations (Figures 1 to 3) are presented, depicting the cumulative impact across the three communities. Kimberlite mining will generally have a negative impact on environmental components. However, positive impacts can also be found on the social and economic components.

Each component's impact was quantitatively assessed using the RIAM tool, which incorporates semi-quantitative data to generate a comprehensive environmental score. For instance, the proper numerical values have been allocated to components from environmental effect segments such as "farmland damage and deforestation," as detailed below. Given the significance of "farmland damage and deforestation" to both national and international interests. As a result, condition A1 is assigned a value of 4 on both segments. The environment will be significantly impacted negatively by farmland destruction and deforestation, which is why the magnitude of change/effect A2 is assigned a value of -2. For communities A and B, the input value for B1 is provided as 3, given that the effects are permanent. Furthermore, because B2 is irreversible, the input value is set to 3. Since mining operations have a cumulative negative impact on "farmland damage and deforestation," 3 is assigned as the input value for B3. Like the farmland damage and deforestation segments, each component is given a numerical value based on its importance, magnitude, permanence, reversibility, and cumulative effect. The ES scores are determined by the RIAM tool, which also fits all the components in the proper range bands, as shown below. The histograms, which represent the RIAM's results, provide a brief and straightforward synopsis of the overall impacts of mining in the three communities.

Table 3. Input values and RIAM scores for Environmental Impact (EI) Components

	Environmental Impact	**Community A: Kanniya Resettlement**						**Community B: Koakoyima**						**Community C: Sahr Quee Town**					
1	Components	A1	A2	B1	B2	B3	**ES RB**	A1	A2	B1	B2	B3	**ES RB**	A1	A2	B1	B2	B3	**ES RB**
2	Support livelihood	2	1	3	3	3	**18 +B**	2	1	3	3	3	**18 +B**	2	2	3	3	3	**36 +D**
3	Supply pipe borne water	1	-1	2	2	2	**-6 -A**	1	1	2	2	2	**6 +A**	1	2	2	2	2	**12 +B**
4	Wells/streams/ rain water	2	2	2	2	2	**24 +C**	2	0	2	2	2	**0 N**	1	1	2	2	2	**6 +A**
5	Water contamination	1	-3	3	3	3	**-27 -C**	1	-2	3	3	3	**-18 -B**	1	-2	3	3	3	**-18 -B**
6	Flooding	1	1	3	3	2	**8 +A**	1	1	2	2	2	**6 +A**	1	-1	3	2	2	**-7 -A**
7	Farmland damage	4	-2	3	3	3	**-72 -E**	4	-2	3	3	3	**-72 -E**	4	-3	3	3	3	**-108 -E**
8	Deforestation	4	-2	3	3	3	**-72 -E**	4	-3	3	3	3	**-63 -D**	4	-1	3	3	3	**-36 -D**
9	Visual landscape destruction	3	-2	3	3	3	**-54 -D**	3	-3	3	3	3	**-81 -E**	3	-3	3	3	3	**-81 -E**
10	Health problems	1	-2	2	2	3	**-14 -B**	1	-3	2	2	3	**-21 -C**	1	-2	2	2	3	**-14 -B**
11	Taking land of their forefathers for mining activities	1	-1	3	3	3	**-9 -A**	1	-1	3	3	3	**-9 -A**	1	-2	3	3	3	**-18 -B**
12	Relocate community	1	-2	3	3	3	**-18 -B**	1	-1	3	3	3	**-9 -A**	1	-3	3	3	3	**-27 -C**
13	Deprivation of employment opportunities	1	-2	2	2	3	**-14 -B**	1	-1	2	2	3	**-7 -A**	1	-3	2	2	3	**-21 -C**

Table 4. Input values and RIAM scores for Social Impact (SI) Components

	Social Impact	**Community A: Kanniya Resettlement**						**Community B: Koakoyima**						**Community C: Sahr Quee Town**					
	Components	A1	A2	B1	B2	B3	**ES RB**	A1	A2	B1	B2	B3	**ES RB**	A1	A2	B1	B2	B3	**ES RB**
1	Selling foodstuff, planting and animal husbandry	1	3	2	2	2	**18 +B**	1	1	2	2	2	**6 +A**	1	3	2	2	2	**18 +B**
2	Use water for drinking and washing	1	-2	3	3	3	**-18 -B**	1	-1	3	3	3	**-9 -A**	1	-1	3	3	3	**-9 -A**
3	Use wood for cooking	1	-3	3	3	2	**-24 -C**	1	-2	3	3	2	**-18 -B**	1	-2	3	3	2	**-18 -B**
4	Ride motorbikes	1	1	2	2	2	**6 +A**	1	1	2	2	2	**6 +A**	1	1	2	2	2	**6 +A**
5	Do petty trading/business/merchandise	1	1	2	2	2	**6 +A**	1	2	2	2	2	**12 +B**	1	3	2	2	2	**18 +B**
6	Work as contractors, building the resettlement homes	1	2	2	2	2	**12 +B**	1	2	2	2	2	**12 +B**	1	1	2	2	2	**6 +A**
7	Teaching in schools	1	3	3	3	3	**27 +C**	1	2	3	3	3	**18 +B**	1	3	3	3	3	**27 +C**
8	Work as civil/public servants in government ministries, departments, and Agencies; City council and district council	1	2	3	3	3	**18 +B**	1	1	3	3	3	**9 +A**	1	2	3	3	3	**18 +B**
9	Mining	1	1	2	2	2	**6 +A**	1	1	2	2	2	**6 +A**	1	1	2	2	2	**6 +A**
10	Running Tele Centre	1	1	2	2	2	**6 +A**	1	2	2	2	2	**12 +B**	1	1	2	2	2	**6+A**
11	Weaving	1	1	2	2	2	**6 +A**	1	1	2	2	2	**6 +A**	1	2	2	2	2	**12 +B**
12	Displacement of local community	1	-3	3	3	3	**-27 -C**	1	-2	3	3	3	**-18 -B**	1	-3	3	3	3	**-27 –C**
13	Destruction of their forest which disrupted	3	-3	3	3	3	**-81 -E**	3	-3	3	3	3	**-81 -E**	3	-2	3	3	3	**-54 -D**

	traditional practices																		
14	No mosque or church to worship	1	-2	2	2	2	**-12 -B**	1	-2	2	2	2	**-12 -B**	1	-2	2	2	2	**-12 -B**
15	Health concerns in the community	3	-1	2	2	3	**-21 -C**	3	-1	2	2	3	**-21 -C**	3	-1	2	2	3	**-21 -C**

Table 5. Input values and RIAM scores for Economic Impact (ECI) Components

	Economic Impact	**Community A: Kanniya Resettlement**						**Community B: Koakoyima**						**Community C: Sahr Quee Town**					
	Components	A1	A2	B1	B2	B3	**ES RB**	A1	A2	B1	B2	B3	**ES RB**	A1	A2	B1	B2	B3	**ES RB**
1	Sales of goods and services	1	2	3	3	3	**18 +B**	1	1	3	3	3	**9 +A**	1	3	3	3	3	**27 +C**
2	Mining brings income to the community/CSR support: e.g. surface rent, community development funds etc.	3	3	3	3	3	**81 +E**	3	1	3	3	3	**27 +C**	3	3	2	3	3	**54 +D**
3	Construction of roads	2	3	3	3	3	**54 +D**	2	3	3	3	3	**54 +D**	2	3	3	3	3	**54 +D**
4	Support on education	3	3	3	3	3	**81 +E**	3	2	3	3	3	**54 +D**	3	2	3	3	3	**54 +D**
5	Building and refurbishment of schools	1	3	3	3	3	**27 +C**	1	2	3	3	3	**18 +B**	1	2	3	3	3	**18 +B**
6	Construction of Primary Health Units (PHUs)	4	3	3	3	3	**108 +E**	4	2	3	3	3	**72 +E**	4	3	3	3	3	**108 +E**
7	Building of Community Centres	1	3	3	3	2	**24 +C**	1	2	3	3	2	**16 +B**	1	**3**	3	3	2	**24 +C**
8	Create jobs for adults and youths	3	3	3	3	3	**81 +E**	3	2	3	3	3	**54 +D**	3	3	3	3	3	**81 +E**
9	Provision of wells/bore holes water	1	2	3	3	2	**16 +B**	1	2	3	3	3	**18 +B**	1	2	3	3	3	**18 +B**

10	Pipe borne water	1	0	2	2	2	**0 N**	1	-1	2	2	2	**-6 -A**	1	3	3	3	3	**27 +C**
11	Construction of resettlement homes	1	3	3	3	2	**24 +C**	1	0	1	2	2	**0 N**	1	2	3	3	2	**16 +B**
12	Construction of markets	1	**0**	2	2	2	**0 N**	1	**0**	2	2	2	**0 N**	1	3	3	3	3	**27 +C**
13	No effort to preserve the environment	3	-2	2	3	2	**-42 -D**	3	-2	2	3	2	**-42 -D**	3	-3	2	3	2	**-63 – D**

Table 6. Summary of scores for Community A: Kanniya Resettlement

Range	**-108 to -72**	**-71 to -36**	**-35 to -19**	**-18 to -10**	**-9 to -1**	**0**	**1 to 9**	**10 to 18**	**19 to 35**	**36 to 71**	**72 to 108**
Class	-E	-D	-C	-B	-A	N	A	B	C	D	E
EI	2	1	1	3	2	0	1	1	1	0	0
SI	1	0	3	2	0	0	5	3	1	0	0
ECI	0	1	0	0	0	2	0	2	3	1	4
Total	**3**	**2**	**4**	**5**	**2**	**2**	**6**	**6**	**5**	**1**	**4**

Table 7. Summary of scores for Community B: Koakoyima

Range	**-108 to -72**	**-71 to -36**	**-35 to -19**	**-18 to -10**	**-9 to -1**	**0**	**1 to 9**	**10 to 18**	**19 to 35**	**36 to 71**	**72 to 108**
Class	-E	-D	-C	-B	-A	N	A	B	C	D	E
EI	2	1	1	3	2	0	1	1	1	0	0
SI	1	0	3	2	0	0	5	3	1	0	0
ECI	0	1	0	0	0	2	0	2	3	1	4
Total	**3**	**2**	**4**	**5**	**2**	**2**	**6**	**6**	**5**	**1**	**4**

Table 8. Summary of scores for Community C: Sahr Quee Town

Communities A, B and C:

Range	**-108 to -72**	**-71 to -36**	**-35 to -19**	**-18 to -10**	**-9 to -1**	**0**	**1 to 9**	**10 to 18**	**19 to 35**	**36 to 71**	**72 to 108**
Class	-E	-D	-C	-B	-A	N	A	B	C	D	E
EI	2	1	2	3	1	0	1	1	0	1	1
SI	0	1	2	2	1	0	4	4	1	0	0
ECI	0	1	0	0	0	0	0	3	4	3	2
Total	**2**	**3**	**5**	**5**	**2**	**0**	**5**	**8**	**5**	**4**	**3**

Environmental Impact

There is a considerable negative impact on the environment of communities A, B, and C due to the kimberlite diamond mining by Koidu Holdings. This is mainly due to the alteration of land use, water contamination, flooding, farmland damage, deforestation, visual landscape or topography destruction, and nuisance due to dust and debris, and noise. As a result, all components selected for study under the environmental section got negative scores. Deforestation, loss of natural habitats, biodiversity, disease, and soil pollution will completely destroy the ecological balance of the area. There is a significant negative impact on the sociological and cultural environment of the area due to kimberlite mining. It has also led to the loss of agricultural land, residential area, health and hygiene, and sanitation. The development of roads, support on education, building and refurbishment of schools, construction of Primary Health Units (PHUs) resettlement homes, markets and Community Centres together with employment and community development are the positive effects of mining activities in the affected communities. Nevertheless, mining has a

negative impact on the social and economic segment in the three local communities in Tankoro chiefdom. As a consequence of the loss of land value and agricultural potential, earthmoving equipment, rehabilitation and resettlement of displaced persons. The kimberlite mining has negative impacts on the social and cultural segment in terms of loss of health and hygiene, sanitation, scenic beauty, and decreased traffic. Because, most of the resettled persons were living at the centre of Koidu City, which has created high transportation costs for the inhabitants. The input values fed in to the RIAM tool and the corresponding Environmental score are given in the Tables 3 to 5. The summary of RIAM scores for Kanniya Resettlement, Koakoyima and Sahr Quee Town are given in Table 6, 7 and 8. Graphical results of the RIAM tool are shown in Figures. 2, 3 and 4 for communities A, B, and C respectively. The graphical output gives us a rapid glance at the overall impact of the environment. N stands for neutral and +ve and –ve alphabets on x-axis that shows positive and negative impact of the components. From the results of the RIAM analysis, it was observed that the environmental component obtained more negative scoring and has serious negative impacts on the environment.

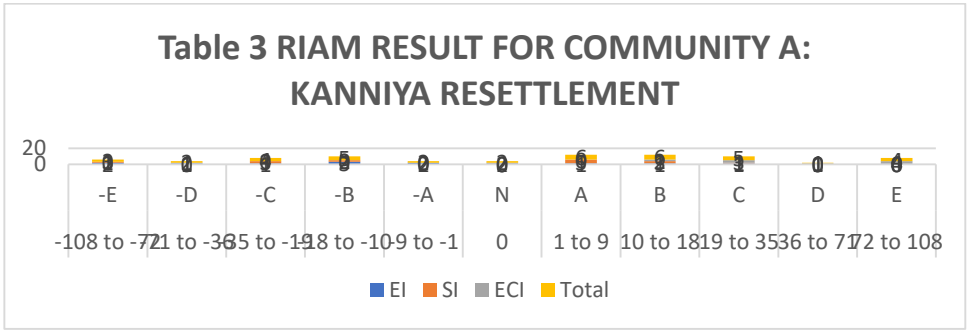


Figure 2 (Researcher's Study data 2022)

Figure 2 graph represents Community A, where we can see a significant number of components with slight positive change/impact in the economic sector (ECI), while the environmental impact (EI) shows a trend of moderate negative impacts.

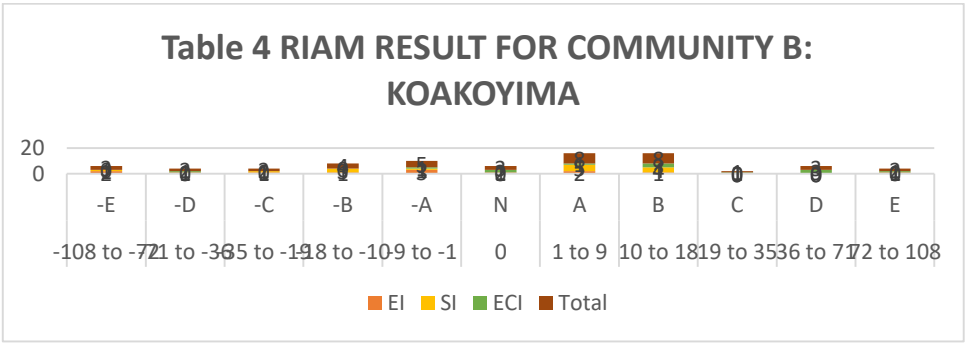


Figure 3 (Researcher's Study data 2022)

Figure 3 graph shows Community B, with a notable number of components in the slight and moderate positive change/impact for social (SI) and economic (ECI) aspects. The environmental impact (EI) also indicates a trend of moderate negative impacts.

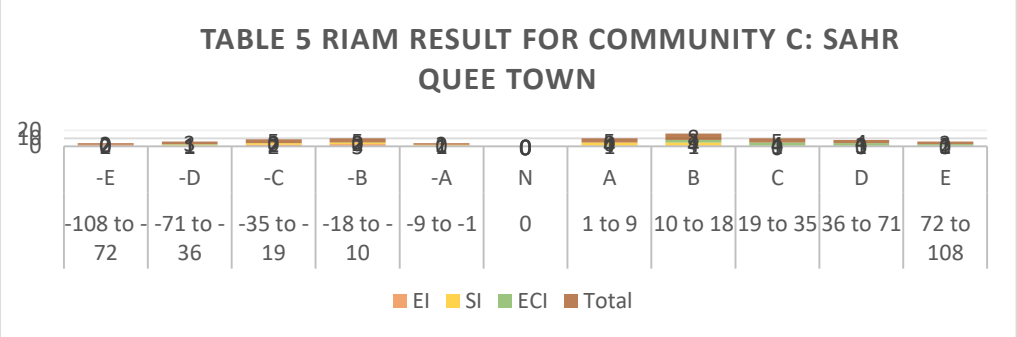


Figure 4 (Researcher's Study data 2022)

Figure 4 graph shows Community C, with a noteworthy number of components in the slight and moderate positive change/impact for social (SI) and economic (ECI) aspects. The environmental impact (EI) also indicates a trend of moderate negative impacts.

DISCUSSIONS

The key points discussed are detailed in the discussions report below:

Focus Groups Discussions' Report

Employment priority for affected communities

The priority provided by Koidu Holdings to affected communities when hiring individuals for their mining company was the first issue discussed by the three communities. All the three sessions in Koakoyima and Sahr Quee Town Traditional elders said:

'Koidu Holdings prioritized hiring all people residing in Kono district rather than just those from the affected communities. If you have the required job experience, regardless whether you were born in Kono or moved there, you will be given preference for employment'. However, the impacted areas expected to be given priority when it comes to employment or job openings, as the case may be.

Since the Kanniya community is new and lacks amenities found in the other two communities, such as clean running water, operating markets, churches, mosques, and other social and economic activities that can benefit the youth as well as the residents, the mining company was expected to give Kanniya youths and adults preference when it came to employment opportunities; the Kanniya Resettlement Youth commented. For example, she stated:

'We have to travel to Sahr Quee Town or old Kanniya to get the items or services we needed, such as internet or mobile phone top-up. Most importantly, we are unable to locate a mosque or church in our new neighborhood when we wish to worship God. Except that we must go to old Kanniya or the heart of Sahr Quee Town to observe our prayers. To carry out all of these activities, transportation costs are required. Therefore, it is essential that the corporation give young people from Kanniya Resettlement priority when it comes to employment'.

From the Kanniya Resettlement, all participants from the three sessions expressed similar opinion. They further informed the FGD that 'the relocation had cost them their farmland and their means of subsistence. Koidu Holdings should therefore offer preference to members of their community when hiring new employees'. Losing their homes is just one aspect of the displacement that drives entire communities to relocate; other losses include losing their land and means of subsistence. Communities that have been uprooted are often relocated in locations with little resources and close to mines that are dirty and polluted. Local groups that have strong cultural and spiritual ties to the lands and forests of their ancestors and who may find it difficult to live when these ties are disrupted can be particularly devastated by involuntary displacement (MMSD 2001; Singh, Srinivas & Naik 2015; Ghose 2018).

Moreover, mining can generate much-needed income and jobs. It may also encourage the growth of a more skilled labour force and result to investments on infrastructure, health care, and education. In the absence of a solid legal and policy framework, these anticipated gains are challenging to actualize. While upholding strict environmental and social norms, such a framework must promote mining's positive effects on economic and social growth. Without one, mining operations may threaten to harm the environment and endanger employees, which could, among other things, result in non-inclusive growth and encourage corruption (Crawford 2015).

The initial focus was on Koidu Holdings' employment practices. Participants from Koakoyima and Sahr Quee Town noted that 'the company prioritizes residents of the Kono district, regardless of their origin within the district'. This practice has been a point of contention, particularly for the newly established Kanniya community, which lacks basic amenities. Residents expressed a need for employment prioritization, especially considering their displacement and loss of farmland and traditional livelihoods. This sentiment underscores the broader impacts of displacement, including cultural and economic upheaval.

Development projects supported by Koidu Holdings

The development initiatives that have been implemented in the impacted communities were the second subject covered at the FGD fora. The Youths from Sahr Quee Town mentioned some of the improvements which Koidu Holdings have made in both their community and the other two communities (Koakoyima and Kanniya), including 'the construction of new markets, a Primary Health Unit (PHU), the renovation of schools, and the provision of pipe-bone water for the Sahr Quee Town community. Also dug some water wells/boreholes at the Kanniya Resettlement. Moreover, there is a community center for the youths in Koakoyima'. These assertions were also echoed by the traditional elders and youths from Kanniya resettlement and Koakoyima. However, the Koakoyima Traditional Elders remarked that 'the only structure Koidu Holdings has ever constructed in their community is the

Community Centre. The company that is conducting some CSR efforts in Koakoyima is its rival, Meya Mining' they remarked. 'However, the company has provided scholarships to students at all academic levels and has supported schools with educational resources' they mentioned as well. In the summer of 2020, NMJD carried out a study on the positive social and economic effects of diamond mining on regional communities in Sierra Leone. According to their research, there was poor living conditions in mining regions, and there was a number of issues that locals associate with mining, such as gender-based violence, teenage pregnancies and girls dropping out of school, a lack of and high price for basic foods, environmental degradation, such as contaminated water basins and abandoned pits that serve as breeding grounds for disease-carrying mosquitoes, and deceitful landowners. Communities in the study areas that were impacted by diamond mining generally believe that mining offers few socioeconomic advantages. Focus groups revealed that the only real gains for the areas were some sporadic infrastructure upgrades and poorly paid jobs for young people (NMJD 2020).

Discussion of Koidu Holdings' development initiatives revealed mixed responses. Participants acknowledged the construction of markets, health units, schools, and water provision in Sahr Quee Town and Kanniya Resettlement. However, Koakoyima residents felt underserved, receiving limited development support mainly from a rival company, Meya Mining. This disparity points to uneven benefits distribution and raises questions about corporate social responsibility fulfillment.

Surface Rent Payments by Koidu Holdings

How much have the members of the affected community benefited from the payments of Surface rent? was the third topic covered in the FGD meetings.

The traditional elders of Sahr Quee Town claimed that 'the development of markets, PHUs, schools, as well as the provision of water supplies and community centers in the three communities, have indirectly benefited the impacted areas'.

'The Surface Rent monies were also used to create a new Local Government office for the sake of local governance', according to the traditional elders of the Koakoyima and Kanniya Resettlement communities. 'The Paramount Chief is currently in contact with EDSA to arrange a transformer for the delivery of electricity to the recently resettled communities, particularly Kanniya Resettlement', they further disclosed to the FGD. However, the Town Chiefs, Mamie Queen, and the Youth Leader are the three stakeholders who have been mentioned by the Youths in all the communities and the three Traditional Elders as direct recipients of the 50% surface rent. Communities believe that existing laws are not being applied properly and that the legal and policy framework is insufficient to handle development concerns. The key factor contributing to the persistence of poverty is mentioned as corruption in the collection, management, and allocation of mining earnings. Local officials who receive subnational payments are viewed with suspicion and accused of working together with large-scale mining companies to scam locals. Local stakeholders view the redistribution mechanism as a whole as being severely insufficient, poorly and selectively administered, not effectively institutionalized, inadequately accounted for, and heavily centralized by the government. Therefore, the system does not offer the room, chance, or empowerment necessary for exercising guaranteed rights and benefiting from them. This is evidenced in the local communities in Tankoro chiefdom where the 50% Surface Rent paid to the impacted communities directly benefited Town Chiefs, Mamie Queen, and the Youth Leader. (NMJD 2020).

According to Sierra Leone Gem (2018), a publication of the National Minerals Agency (NMA), mining firms are required by law to pay landowners and authorized inhabitants for land use. No mining company will be granted a mining license if it does not provide proof that it has entered into an agreement with owners of the surface area for mining activities, in accordance with this condition. The agreement largely takes the form of a land lease, under which the company is required to pay annual surface rent to the landowners and other parties involved. On April 24, 2018, Koidu Limited made a surface rent payment of US$ 73,794 (seventy-three thousand, seven hundred ninety-four US dollars) to Tankoro Chiefdom, Kono District. However, if there is no corruption in the collection, management, and distribution of mining earnings, then communities can get compensation and huge money flows when a large mine is constructed, which can act as a key motivator for change and growth. These monetary flows have the power to alter the economic and social foundations of communities in locations that were previously outside the cash economy. The sorts of payments and how they are utilised are crucial factors in determining how mining might support community-level sustainable development. The distribution and impact of surface rent payments were questioned. While some infrastructure improvements were noted, concerns about the centralization and alleged mismanagement of funds were prevalent. This issue reflects broader challenges in ensuring equitable benefit-sharing and combating corruption, as highlighted in NMJD's 2020 report (MMSD 2001; NMJD 2020).

Furthermore, the mining royalty is an ad valorem tax, meaning that it levies taxes on the ore's worth at the time of sale or export. The mining royalty is, in theory, equal to the resource's utilization. In fact, the majority of nations have laws that declare any material found in the soil, subsurface, and even beneath territorial seas to be state property. As a result, the State only permits

mining companies to exploit their properties by giving them a mining right that is only good for a specific amount of time, over a specific region, and for a specific mineral. The mining royalty then functions legally as the opposite of a private resource being appropriated by the government. It is a significant and reasonably safe source of funding for the State because it influences production, regardless of the profitability of the mine (Bouterige et al 2019).

Management of community and agricultural development funds

The management of the community development funds in addition to the agricultural development funds was the fourth item brought up for discussions during the FGD. And the need to know the parties in charge of the funds. In response, the Sahr Quee Town traditional elder stated to the FGD that:

'The Paramount Chief, Senior District Officer, and Chiefdom Clerk are members of the committee that the NMA had previously established to oversee the community development funding. They too happened to be the account's signatories for the community development funds. There are now no agricultural funds available, because the funds have been substituted to crop compensation benefits'. The elders and youths of the three communities collaborated the elder of Sahr Quee Town's statement.

The Traditional Elders of Kanniya Resettlement also indicated to the FGD that 'Koidu Holdings had pledged to construct a market, a PHU, as well as build and relocate schools to the newly resettled community, in addition to the development funding'. In order to reevaluate the community's role in resource use and preservation, Agrawal & Gibson (1999) first looked at the theoretical foundations of the community before examining the aspects of the community that was important to advocates for the community's involvement in resource management.

Participants discussed the management structures for community development funds, indicating a lack of agricultural funds due to a shift towards crop compensation benefits. Concerns were raised about the transparency and inclusivity of fund management, reflecting a need for more participatory and accountable governance structures (Agrawal & Gibson 1999; Mines and Minerals Development Act of 2022).

Resettlement of displaced communities

It was further discussed by all members in all the sessions of the FGD that 'a committee called Village Resettlement Committee (VRC) was established to examine the relationship between the mining company and the affected mining communities' people with the aim of resolving existing problems in the resettlement areas'. Members of the VRC comprised of the resettlement stakeholders including the Paramount Chief (PC) who is the chairman of the VRC. In its mandate, the VRC should be consulted on mining activities together with the welfare of affected mining communities. The VRC meeting point was at the TNA building where the committee discusses matters relating to the welfare of the affected communities. However, because of the constant disagreements on issues surrounding double - standard behaviour of the VRC leadership and benefits yet to be derived from the company, the PC decided to move all meetings to his 'Court Barry' at his resident and superintend all meetings afterward, as a result of these disagreements'.

Nevertheless, the VRC at one time decided to meet the company management directly, instead of the chairman of VRC who was blocking recommendations made to the company, according to the FGD. When they met the company and told them that because of the PC connivance with the company which was preventing the communities to get the benefits they were expecting from Koidu Holdings (for instance, relocation package) was the reason for meeting them directly. And, admonished Koidu Holdings to convey their message to the PC. But the company declined to do so, they confirmed.

The discussion on resettlement highlighted the role of the Village Resettlement Committee (VRC) and ongoing conflicts within this body, suggesting governance challenges and dissatisfaction among community members regarding resettlement policies and their execution. The majority of mining-induced displacement occurs when impacted individuals are forced to leave their initial residence and/or engage in socioeconomic activities. It can also have a significant negative impact on the socioeconomic standing of those who have relocated, but this is an inevitable byproduct of increasing mineral exploitation (Kemp 2017; Wilson 2019).

Environmental Impact of Mining

The fifth topic discussed by the FGD was the environmental impact of mining in the affected communities. According to the Youths of Sahr Quee Town, 'there are no immediate effects (for the time being) on the impacted communities'. As it was revealed during the Focus Group talks that 'Koidu Holdings planted trees and gave locals tree seedlings to plant in their neighbourhoods in an attempt to protect the environment. However, there was no follow-up by the corporations to evaluate the type of trees that were planted. As a result, several of the newly planted trees were neglected, and some of them died'. The study looked for the mining company intervention measures based on the environmental circumstances in the study communities. This was done to make it possible for the researcher to analyze the mining company's readiness to handle the environmental issues related to the mining

activities as part of their required corporate social responsibility (Mabey et. al., 2020). However, compared to open-pit mining, underground mining frequently results in significant subsidence, which disturbs surface vegetation in a variety of ways. It is crucial and still lacking to conduct a sufficient quantitative evaluation of the long-term impacts of underground mining on the development of various plant communities (Mi et al 2020).

Nevertheless, the Youths of Kanniya Resettlement and Koakoyima stated that 'Koidu Holding mining company had not made much of an effort to lessen the environmental impacts'. Whereas, the traditional elders of Sahr Quee Town claimed that 'the mining company was making some efforts to lessen the unfavourable environmental effects as a result of mining'. A Traditional Elders of Kanniya Resettlement also responded that: 'The Koidu Holdings company has dug some boreholes, particularly in the Kanniya resettlement community, which serve as a supply of drinkable water, to help reduce the severity of the water crisis. The mining company has also implemented other measures, such as routine watering of important roads inside the communities to reduce air pollution caused by increased dust release'. This meant Koidu Holdings must make additional efforts to reduce the damaging effects of mining on the environment in the local communities, and enhance the social services that normally come from the three mining communities, particularly Kanniya Resettlement. According to Rutenge (2016), large-scale mining projects, which are typically owned by multinational corporations, have sparked conflicts in the majority of the regions in which they operate. Many demonstrations over land conflicts, environmental damage, and subpar social services usually start in mining areas. Violence is frequently used to address these issues. However, in response to community unhappiness, communities where mining is taking place and mining companies usually work together to promote social services, either directly or indirectly. Nevertheless, communities impacted by mining are routinely excluded from the mining earnings and benefit-sharing (Rutenge 2016); Mabey et. al., 2020).

Environmental concerns were prominent, with varied reports on Koidu Holdings' efforts to mitigate impacts. While some tree planting initiatives were noted, a lack of follow-up and comprehensive environmental management was evident. This situation reflects a need for more robust environmental stewardship and community engagement in monitoring and mitigation efforts.

Type of Mining Performed by Koidu Holdings:

Based on the comments from the respondents in the impacted areas, the researcher decided to bring up a sixth issue at the FGD settings to confirm the type of mining Koidu Holdings is executing in the local communities in Tankoro chiefdom. Consistent with all FGD participants in the three communities, Koidu Holdings at present engage in underground mining. And, underground mining can leave large hollows behind by excessive diamond mining, which has had severe repercussions and implications for the environment. These openings, which have the power to literally swallow small towns, form a deep, cone-shaped breach in the ground. Many of these diamond mines produce pollution that contaminates the neighbouring soil or bodies of water in addition to leaving large holes in the earth's surface caused by the mining. Further effects are related to vibration, acoustic pressure, and noise while mining equipment and explosives are in use. This situation will undoubtedly disrupt more activities like agriculture and plantations as well as disrupting people's lives (Heart is Diamond 2017; Sukri et. al., 2020).

The concentration turned to the specifics of Koidu Holdings' mining operations. Participants noted the environmental consequences of underground mining, emphasizing the need for stricter environmental controls and mitigation strategies to address the negative impacts on local ecosystems and community livelihoods.

The discussions revealed that the communities' dissatisfaction stemmed from unmet expectations regarding employment, community development, and compensation, as well as exclusion from mining benefits.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

In general, the RIAM analysis reveals that kimberlite diamond mining has predominant negative environmental impacts across all three communities, A, B, and C. However, certain social and economic components reflected positive changes. Nevertheless, the positive impacts on those three communities are just about the same. From the total scores summary for the three communities, it is obvious that the kimberlite mining in the affected communities have negative effects than the positive effects. Based on these findings, there is need to develop recommendations for improvement.

4.2 Recommendations for Improvement

The discovery together with mining of diamonds in Kono district in the 1930s is acknowledged as the beginning of formal mineral exploitation in Sierra Leone. Large-scale mining operations started after the enactment of the Minerals Act of 1927. The discovery of alluvial diamond deposits in the early 1930s generated a paradigm shift in mining in Sierra Leone with the beginning of artisanal and small-scale mining (ASM).

The objectives of the focus group discussions were to get information about the problems, perceptions, and ideas of diverse community groups on the positive and negative impacts of mining in the three communities. The discussions revealed that the communities' dissatisfaction stemmed from unmet expectations regarding employment, community development, and compensation, as well as exclusion from mining benefits. On the whole, kimberlite diamond mining has major negative environmental impacts across all three communities. However, certain social and economic benefits reflected positive changes. Nevertheless, the positive impacts on those three communities are just nominal.

Therefore, it is necessary to put forward the following recommendations based on the FGD outcome:

- That mining should be done legally and correctly without hurting the communities that will be impacted, by setting up a robust monitoring and regulatory machinery that will ensure Koidu Holding lawfully conducts itself.
- The NMA should reestablish an inclusive stakeholders committee for the even - distribution of the 50% surface rent to the direct beneficiaries; instead of being paid directly to the Town Chiefs, Mamie Queen, and the Youth Leader of Tankoro chiefdom.
- So as to promote transparency and accountability, the NMA should not only limit the development funds' committee membership to the Paramount Chief, Senior District Officer, and Chiefdom Clerk, who are also signatories to the development funds' account. But to expand the committee to include selected members of the affected communities to oversee the community development funds as well.
- Members of the Village Resettlement Committee (VRC) should comprise of the resettlement stakeholders together with the Paramount Chief (PC) as observer not as chairman of the VRC for more transparency and accountability. And, the VRC should collectively discuss matters relating to the welfare of the affected communities and collectively voiced their verdicts directly to Koidu Holdings management going forward,
- to lower the damaging environmental effects of mining in these communities, NMA, EPA and other stakeholder organizations must enhance their monitoring efforts and implement legal obligations.
- To conclude, with the aim of promote sustainable development in the affected communities, these suggestions could be considered to improve environmentally responsible mining practices and reduce harmful environmental impacts.

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