



Effects of Bauxite Mining on Community Livelihood and Sustainability

Abdul Amid Aziz Jalloh^{1*} and David Kanume Kororma^{2*}

¹Research Fellow, School of Economics and Business Administration, Chongqing University, China

²University of Management and Technology (UNIMTECH), Sierra Leone

***Corresponding author:** Abdul Amid Aziz Jalloh and David Kanume Kororma, Research Fellow, School of Economics and Business Administration, Chongqing University, China & University of Management and Technology (UNIMTECH), Sierra Leone.

Received Date: October 11, 2021

Published Date: October 30, 2021

Abstract

Bauxite mining exploration has left many communities in deplorable conditions, ranging from low levels of livelihood sustenance to poor health facilities and poor road networks. This study assessed effects of bauxite mining on community livelihood and sustainability. This investigation was conducted in the provincial part of Guinea. The study reviewed pieces of literature published on bauxite mining and exploration; employed descriptive statistics and correlational methods, which facilitated the gathering, classification and presentation of data that led to analysis, description and conclusion of the study. Three hundred (300) questionnaires were distributed to community inhabitants, which enhanced the compilation of first-hand information. Data was analysed using descriptive statistics and results disclosed numerous problems, ranging from health to education and poor road networks. It was revealed that, bauxite exploration activities have damaged lands utilised for agricultural purposes. In addition, deposits of toxic substances have damaged soil nutrients, which caused degradation of the land tenure system and unproductiveness. This study identified issues bothering Sangaredi and other communities where bauxite-mining explorations are conducted. Results descriptively explained issues of exploration and established negative effects caused by bauxite mining in the community. However, such activity adversely affects the community at large. Because of the foregoing problems discovered as negative effects, it is necessary for government and mining corporations to pay considerable attention to Bidikoum community and address such problems. However, this study is noteworthy to researchers of mineral explorations, academicians and mining consultants and such information will serve as a reference manual for further investigation on the subject matter.

Keywords: Bauxite mining; Community livelihood; Sustainability

Introduction

Bauxite mining operations has affected many communities of operations that has rendered numerous villages and towns infertile since agricultural activities cannot be carried out effectively. Although affected by many exploration activities, communities are making frantic efforts to ensure that they improve the livelihood of their inhabitants. Mining industries in developing countries have contributed towards economic growth. However, bauxite-mining activity has damaged some communities' environment and has made some lands infertile because of methods used in the exploration process. Countless investigations have been conducted by different mining experts and consultancy agencies to unearth problems caused by mining activities. Even though numerous problems caused by mining operations are discovered, corporations contin-

ue to endanger communities through continuous exploration. As a result of the prevailing circumstances, this study determines to examine the effects of bauxite mining exploration conducted by Guinea Bauxite Company (GBC), which operates in the interiors of the country called Bidikoum. The company focuses on exploration of mineral resources with emphasis on bauxite mining. Citizens of Guinea and inhabitants of Bidikoum community, expressed concerns about the growth and sustainability of their community and such concerns have attracted many scholars and mining practitioners to examine the effects exploration has had on those communities. Similar researches carried out by mining specialist established contributions made by the company towards the country's economy. However, quantum effects exploration exercises are also

established, and it is upon this backdrop that this study emanated from to assess and discover the effects bauxite mining exercises has had on Bidikoum community livelihood and sustainability.

The concept of community sustainability is subject to economic development, which encompasses social and ecological elements that determine requirements of contemporary issues capable of influencing contributions of existing philosophies to address concerns of forthcoming generations [1-4]. Taking these into consideration, the various economic sectors remain to be seen materialized. The mining industry, like other sectors, is no exception to this practice. All that we have witnessed since the last decade of the twentieth century shows multiplication of large-scale mining projects that meet the growing global demand for minerals without considering impact relating to the multiple brutal transformations of the landscapes and the living environment of local communities [5-8]. In this perspective, reorientation is imperative for companies, whose activities are often accused of being responsible for serious degradations of the environment. Sustainable development becomes a matter of image, a strategic option, which must reconcile economic growth and appropriate development. Without entering the dialectic of precedence between economic growth and development, sustainable development needs to have a holistic vision of development based on the exploitation of mineral resources [9-13]. However, since bauxite mining is an activity whose very nature is fundamentally linked to the concept of risk, the identification, knowledge, prevention and management of these risks is of paramount importance. Any underestimation of these risks can have impacts on numerous sectors.

Faced with this proven constraint of mining activity, environmental assessment measures and predict various dimensions in the mining process, which anticipate future solutions in mining activities. However, this objective is far from being achieved, since inadequacies are identified in management plans on environmental and social issues in many Africa mining countries [14-17]. The reasons for these failures are inherent in mining companies, and this is why mining is often associated with many cases of negative externalities, each of which party blames government intervention [18-20]. Mining companies criticize factors endangering their activities, which includes corruption of government officials, and unethical practices exhibited by governance in these countries rich in mineral resources [21,22]. Many government points fingers at mining companies that they take advantage of their political instability to arrogate leonine contracts. However, both sides (government and mining companies), should agree on the relationship between the efficiency of the mining activity and the type of governance put in place, to ensure regulation of mining activities [23-25].

The management of the main economic sectors of the country, particularly the mining sector is the subject of all criticism. Questions come from all categories such as unions, associations, non-governmental organisations (NGOs), leaders and political actors. In this widespread discontent, many causes are singled out, which

identify predatory mining companies, corrupt managers, looted resources etc. In this regard, it is difficult to distinguish causes from consequences and culprits from accomplices since the opportunity to promote sustainable development is constructively linked to exploitation of mineral resources [26-30]. Indeed, the choice to promote the development of a country from mining involves many factors such as sustainability, creation of added value role of different actors, multiple externalities, etc. Mining for development must obey certain fundamental principles governing mining operations including transparency and access to information. In this perspective, the role of a nation is to ensure adherence to certain standards and compliance to legislative principles regarding mining operations [31-34].

Mining is a lever for economic development and can be triggered for the general growth of the country. Despite the immense social and environmental impacts associated with it, the approach of development through exploitation of mineral resources is justified by arguments that this constitute the economic point of view, a natural capital whose extraction produces wealth, which can be consumed or reinvested in the production of other types of capital [35-37]. In addition, from a social point of view, multinational corporations promote training and education, to increase countries human capital. They offer huge training and employment opportunities for indigenous people. For all these reasons, mineral resources would therefore constitute an opportunity for countries development [38,39]. Generally speaking, for the proponents of this approach, the development of a country is possible from the exploitation of its mineral resources. Finally, between these two distinct approaches, there is a more centrist approach that can contribute towards a country's development process. For this approach, if economic development is possible through the development of mineral resources, this possibility is often accompanied by the establishment of an appropriate governance mechanism [40-44].

Preceding deliberations have expressed comprehensive overview on mining activities and their challenges in communities of operations. However, subsequent elements will discuss review of literature from different writers, provide appropriate method of data collection, analyse and discuss results obtain from primary sources and explain the contributions of this study to existing knowledge in bauxite mining and exploration activities.

Literature Review

Social and environmental effects of bauxite mining

Environmental impact assessment programmes for mining projects often underestimate the potential health risks of mining projects. Hazardous substances and wastes deposits in water and soil can have serious consequences on public health. Health is defined as the absence of ill-health and complete social, physical and mental well-being of a person [1,8,12]. The Hazardous substances includes all substances, which may be harmful to the population and / or the environment. Due to the quantum concentration of

physical, chemical or infectious characteristics, hazardous substances can lead to escalation of mortality and increases devastating illnesses [6,13]. It also constitutes potential and substantial risk to the populace or environmental degradation if improperly processed, stored, transported, disposed of or otherwise managed. Many health problems that are linked to mining activities include water contamination, which is polluted by surface and ground water, metals and elements, microbiological contamination by sewage and waste in campgrounds and residential areas of mining workers [2,3,7,12]. Air exposure also has high absorptions of mercury and cadmium, sulphur dioxide particles and heavy metals. However, the deposit of toxic elements from atmospheric emissions [4,10] also affects soil.

Mining activities can suddenly affect the standard of living and physical well-being including social and mental concerns of local communities. The improvised mining towns and camps often threaten food availability and security, thus increasing the risk of malnutrition [5,9]. Mining has indirect consequences on health, which includes the increased occurrence of chronic bronchitis, asthma, tuberculosis, and gastrointestinal diseases. During exploration, air emissions occur at every level of mining exercise, which affects development, construction and operational activities [15,19,24]. Large mining operations have the tendency to contribute meaningfully to air pollution, especially in the operational phase. Activities during bauxite extraction, processing, handling and transporting, depend on the equipment, generators, processes and materials which generate dangerous air pollutants such as matter, heavy metals, carbon monoxide, sulphur dioxide and nitrogen oxides [16,21].

Bauxite mining and sustainable development

Sustainable development in mining identifies numerous methodologies, analyse the scope and limits in relation to the role mineral resources play in the development of a country. The contribution of mineral resource towards the growth of a country raises many questions and is the subject of a rich and varied literature that can be classified into two distinct approaches [14,20,23,25]. The first approach state that wealth in mineral resources is not necessarily synonymous with economic development. Several reviewed literatures support this approach and emphasised that, mining poses enormous risks to countries rich in mineral resources [17,18,27]. The effects are destabilization of the social values of local population, disruption of natural ecological balances and strengthening countries dependence on the export of minerals [36]. Thus, the establishment of mining companies often leads to the arrival of new people, loss of accorded privileges to natives. Losing control of a territory once acknowledged as inheritance could definitely nurture conflict. Industrial mining activity produces externalities for the host environment as such mining is associated with multiple negative externalities it generates [26,28,34]. The second approach notes that mining is a lever of economic development and can be triggered for the overall growth of the country's economy.

Despite immense social and environmental impacts associated with it, development through exploitation of mineral resources is justified by arguments that constitute an economic point of view, a natural capital, whose extraction produces wealth that can be consumed or reinvested in the production of other types of capital [30-32,37]. In addition, from a social point of view, transnational companies promote training and education, to increase countries human capital through enormous training and employment opportunities for indigenous people. In consideration to aforementioned reasons, mineral resources would therefore constitute an opportunity for countries that embark on mining operations to support this approach as it leads to the development of a country's mineral resources [8,29,33,35].

Bauxite exploration and livelihood

When mining activities are not properly managed, the consequences will be degradation of soil, water, biodiversity and deforestation, which has diverse undesirable effects on the livelihood of the local population. Bauxite mining exploration negligence in the control of contamination, consequently, affect other economic activities including agricultural and fishing exercises [1,12,13]. This situation principally affects communities where exploration operations are administered in villages, occupied by historically marginalized populations and victims of discrimination. Promoters of mining projects should guarantee adherence to fundamental rights of affected people and communities and ensures that such rights are not violated but respected [6,11,38]. These rights encompass control and utilisation of land, the right to safe drinking water and the right to livelihood. These rights can be enshrined in national laws and expressed through a range of international instruments [2,7]. All groups are equal under the law, and the interests of groups that are more vulnerable (low income and marginalized groups) must be identified and protected [3,39]. Mineral exploration can contaminate soils on large areas where agricultural activities of a mining project can be affected. Mining operations regularly modify the surrounding landscape by exposing soils that were previously intact [5,15,24]. Erosion expose soils, mined ores, slag heaps and fine materials in the waste heaps of rocks, which lead to substantial sediment loads in the exterior of waters and water drainage routes. In addition, hazardous materials and deposits of contaminated substances thrashed can lead to soil contamination [4,10,19].

Methods

Research design

Assessing the effects of bauxite mining requires suitable methods of data collection to ascertain development in the conduct of this study. The conduct of an investigation requires a unique research design, which shows a progressive path towards the achievement of research objectives. The absence of a constructive research design creates pursuits of diverse objectives, which does not institute a sense of direction that is followed to establish satisfactory and meaningful conclusion. However, this study employed descriptive

quantitative and correlational research methods, which is deemed suitable for the process since primary data obtained, addressed concerns of the subject matter in a scientific fashion and enables readers and researchers to see the meaningfulness of the study.

Study area

This study was conducted in the interiors of Guinea Conakry, specifically in the Bidikoum community where numerous mining activities commence operations. The sample frame of this study is the Bidikoum community and the sample units are the inhabitants of the said community. Such community have endured tremendous happenings in bauxite mining and exploration that has led to several constraints of inhabitants' livelihood. This area was selected as the study sample frame because the community host quantum of mining activities that has contributed towards the development of the country's economy and has created devastating consequences towards the growth and sustainability of the community.

Sampling of respondents

This study used simple random sampling, which select different categories of people that produced comprehensive information that led to objective analysis and discussion. This method enabled us to obtain a sample size of three hundred (300) participants, which served as representative sample for the research process. The sample size is segmented into the following categories: 150 of the participants are male whilst also 150 are female. However, such community houses a greater number of female residents.

Research instrument

Every research that focuses in obtaining first-hand information requires the collection of information either through observation, discussion or with the aid of a questionnaire. This study obtained first-hand information through administering questionnaires to target population. Four hundred (400) questionnaires were distributed, however, 300 were retrieved, filled with relevant information availed by respondents. Retrieved questionnaires were sorted out accordingly and raw data was imputed into SPSS for analysis and description of information submitted by respondents. This study developed a questionnaire using the Linkert scale system of obtaining information, which includes the following: 5=Strongly Agree, 4=Agree, 3=Neutral, 2=Disagree, 1=Strongly Disagree. Description of contents of literature review emanated from various researches conducted by numerous academic and scientific practitioners. The aforesaid is classified as follows: Social and Environmental Effects of Bauxite Mining was adopted from Fernandez-Lozano et al 2015, Gordon et al 2006 & Bebbington and Williams 2008. Bauxite Mining and Sustainable Development was obtained from Hore-Lacy [14], Scholz, et al. [20], Jaskoski [23] & Smil [25], whereas Bauxite Exploration and Livelihood was extracted from the discoveries of Bebbington and Williams [1], Gordon, et al. [12] & Heckenmüller

and Klepper [13].

Result and Discussions

(Table 1) Assessing the effects of bauxite mining on community livelihood and sustainability engulfs quantum of considerable issues that necessitate the growth of such community. As this study investigates the effects of bauxite mining on Bidikoum community, it engaged inhabitants of such community to ascertain constraints of being in a community where bauxite exploration is intensive. However, 300 inhabitants participated in the survey with a description of 150 male with 50% and 150 females with 50%. The age range of respondents is classified as 18-25, 26-35, 36-45 and 46+. Respondents' designations are outlined as businessperson, farmer, technician and unskilled. Respondents stated that there are unsatisfactory changes in nature and animals because of bauxite exploration exercises. They further expressed that; their cultivation system has reduced drastically because of afore expressed concerns. The intensity of mining operations has also affected community's social relationships, which has had serious effects on inhabitants' income generation. Respondents further stated that, several health problems encountered, emanated from unceasing bauxite exploration exercises, which pollutes the air and affect respiratory situations. In addition, respondents stated that power relations is also affected since surrounding communities could not converge frequently to discuss issues relating to community governance. Greater percentage of respondents expressed that, their living conditions are unsatisfactory since their activities are no longer effective because, agriculture, which is inhabitants' greatest concentration of livelihood and sustenance is affected by degradation and soil pollution. In addition, respondents emphatically stated that, decisions about the use of land is made by authorities in the community, which limits cultivation exercises. However, respondents registered unsatisfactory medical facilities that, accessing good medical facility is a great challenge and even though several concerns have been forwarded to the required authorities, there are no signs of improvement. As a result of the foregoing responses from participants in the community, it is established that operations of the said bauxite mining company negatively affect environmental activities and adversely affect the social engagements of inhabitants. Intense bauxite mining exercises have left the community with several problems that have deprived famers form cultivating their crops since community lands are polluted by toxic elements. In addition, constant exploration has led to air pollution, which caused many illnesses. In consideration of the above facts, it is clearly indicated that bauxite-mining activities have created negative social and environmental effects in the said community. This result is supported by studies conducted by different researchers such as: Brown [2], Carvalho [5] Jackson, et al. [16] & Jain, et al. [17] on environmental effects of mining exercises. However, this segment present unique element that are not evident in previous studies (Table 2).

Table 1: Descriptive Statistics on the distribution of respondent regarding social and environmental effects of bauxite mining.

	N	Range	Mini- mum	Maxi- mum	Mean		Std. De- viation	Vari- ance	Skewness		Kurtosis	
	Statis- tic	Statis- tic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statis- tic	Std. Error	Statistic	Std. Error
NARCUT	300	2	1	3	2.33	.043	.747	.557	-.629	.141	-.956	.281
CYC	300	2	1	3	2.47	.039	.671	.450	-.880	.141	-.384	.281
RSCTV	300	2	1	3	2.33	.043	.747	.557	-.629	.141	-.956	.281
SECT	300	2	1	3	2.23	.044	.762	.581	-.421	.141	-1.169	.281
PEETH	300	2	1	3	2.47	.039	.671	.450	-.880	.141	-.384	.281
PECRV	300	2	1	3	2.33	.040	.700	.491	-.566	.141	-.824	.281
CUL	300	1	1	2	1.5	.029	.501	.251	.000	.141	-2.013	.281
HAEA	300	2	1	3	2.37	.038	.659	.434	-.559	.141	-.680	.281
DAVL	300	2	1	3	2.33	.040	.700	.491	-.566	.141	-.824	.281
CFM	300	1	1	2	1.53	.029	.500	.250	-.134	.141	-1.995	.281
Valid N (list- wise)	300											

Table 2: Descriptive Statistics on the distribution of respondent concerning bauxite mining and sustainable development.

	N	Range	Mini- mum	Maxi- mum	Mean		Std. De- viation	Vari- ance	Skewness		Kurtosis	
	Statis- tic	Statis- tic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statis- tic	Std. Error	Statis- tic	Std. Error
NAIAM	300	2	1	3	2.37	.038	.659	.434	-.559	.141	-.680	.281
CAAIG	300	2	1	3	2.33	.040	.700	.491	-.566	.141	-.824	.281
CAMSR	300	2	1	3	2.4	.038	.664	.441	-.661	.141	-.618	.281
LESIEM	300	2	1	3	2.27	.042	.728	.531	-.458	.141	-1.008	.281
HECMRP	300	1	1	2	1.53	.029	.500	.250	-.134	.141	-1.995	.281
SEND	300	2	1	3	2.37	.038	.659	.434	-.559	.141	-.680	.281
DFSDM	300	2	1	3	2.37	.038	.659	.434	-.559	.141	-.680	.281
DAESA	300	2	1	3	2.37	.038	.659	.434	-.559	.141	-.680	.281
SRHDR	300	1	1	2	1.53	.029	.500	.250	-.134	.141	-1.995	.281
CIPSDH	300	1	1	2	1.57	.029	.496	.246	-.270	.141	-1.940	.281
Valid N (listwise)	300											

Achieving Sustainable development in a community that is ravaged by continuous exploration exercises is an enormous challenge. Inhabitants in Bidikoum community are concern about the sustainability of their livelihood and the consequence of intensive bauxite exploration on future generational activities. Respondents noted that, bauxite-mining activities affects the living conditions of their animals and cultivation of rice, which support household income generation. Social interactions, which necessitate harmonious relationships amongst inhabitants in the community is been restrained by mining activities. Respondents mentioned that, local economic situation is greatly affected by bauxite mining operations because sources of income generation are interrupted by explorations. However, the continuous health related problems reported by inhabitants is caused by air pollution, which is triggered by mining explorations. Respondents registered significant concerns that,

economic development is a necessity for sustainable development and that; sustainable development demands a fair distribution of food and medical care. Achieving sustainable community development is challenging, however, it requires consciousness about livelihood issues. In this regard, respondents accentuated that, to achieve sustainable community development, inhabitants of Bidikoum community must have access to good education, which may serve as future source of sustainable growth. Another principal concern expressed by respondents is the issue of human rights. They noted that, sustainable development could never be achieved if people's rights are not respected and protected. They added that, improving health facilities in the Bidikoum community would contribute towards sustainable development. The aforementioned facts about sustainable community development have been extensively supported by quantum researches conducted on bauxite

mining and sustainability. Such studies laid emphasis on upholding human rights and organisations commitment on corporate social responsibility. The different research results emphasised continuous community sensitisation on several issues of development. This study has also discovered numerous constraints encountered by inhabitants of Bidikoum community. It however disclosed that, with the numerous problems outlined by respondents of the community, sustainable development cannot be achieved since key elements that enhances sustainability is neglected. In addition, re-

spondents' views have provided facts about this study's focus on sustainable livelihood. In consideration to facts obtained from survey, this result has considerable significance to investigations conducted by Gordon and Graedel [12], Rosemarin [17] & Scholz et al [20] in their quest to discover the dictates of sustainable development in mining operations. Nevertheless, results presented in this segment shows distinctive significance that previous investigations did not establish (Table 3).

Table 3: Descriptive Statistics on the distribution of respondent on bauxite exploration and livelihood.

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
BOIDP	300	2	1	3	2.2	.046	.793	.629	-.373	.141	-1.317	.281
PIFP	300	2	1	3	2.27	.042	.728	.531	-.458	.141	-1.008	.281
DALIP	300	2	1	3	2.23	.044	.762	.581	-.421	.141	-1.169	.281
LAIRS	300	2	1	3	2.17	.045	.779	.608	-.300	.141	-1.296	.281
PEIFF	300	1	1	2	1.53	.029	.500	.250	-.134	.141	-1.995	.281
FEBCW	300	2	1	3	2.37	.038	.659	.434	-.559	.141	-.680	.281
HLG	300	2	1	3	2.13	.047	.807	.651	-.247	.141	-1.423	.281
DAMEFV	300	2	1	3	2.37	.038	.659	.434	-.559	.141	-.680	.281
MSILN	300	2	1	3	1.83	.050	.861	.741	.328	.141	-1.576	.281
CIILF	300	2	1	3	2.4	.041	.713	.508	-.758	.141	-.694	.281
Valid N (listwise)	300											

Maintaining sustainable livelihood is saturated by huge challenges since there are different elements that addresses such criticalities. In this regard, inhabitants of Bidikoum community demonstrated concerns about how bauxite-mining exercises affects their livelihood. A larger percentage of respondents mentioned that, the project provides income/cash benefit opportunities to inhabitants of the community. However, respondents emphasised that bauxite-mining corporations provide vital information about protecting the forests, which prevents deforestation and contribute towards community development. Concerning livelihood, respondents indicated that, mining institutions have helped to improve participation in decision making on livelihood issues. Respondents also attested that their skills in livelihood issues have improved over the past years because of effective tutoring programmes conducted by mining corporations. Respondents also indicated that protecting the forest ecosystem is a significant endeavor for them and their community. Nevertheless, the unavailability of numerous sources of income led to deforestation, which also affects community development. In this regard, respondents mentioned that, they are willing to stop deforestation if provided with necessities that sustain their family livelihood. Regarding happiness about living conditions and other community issues, some respondents mentioned that their living conditions are unsatisfactory whereas others stated that their conditions have been pleasant over the past years. Accessing

business centres to purchase items for domestic and other use is a big challenge, since the road network is very poor and distances between communities and market centres is long. Concerning the sufficiency of income to address basic family needs, major percentage emphatically stated that, their families do not have sufficient income to maintain basic family needs. Regarding coping mechanisms with insufficient income, greater percentage of respondents demonstrated that they cope with the insufficient income they have, since there is no alternative source to address other commitments. Regarding infrastructural support, respondents mentioned that they benefit from infrastructural supports provided by mining corporations in Bidikoum community. Facts presented in this segment shows companies commitment on their social responsibility and disclosed negative aspects of bauxite exploration on community livelihood. With the foregoing facts, it is evident that, livelihood situation in the community is deplorable and requires government and corporation's effort to address unpleasant situations of human living. The preceding facts emphasised concerns about livelihood, which studies such as Jain, et al. [21], Loureiro, et al. [26] & Vaccari [31], supported. Nevertheless, the result in this section established specific elements about livelihood, which previous studies did not address. As a result, facts derived from this section shows distinct significance (Table 4).

Table 4: Correlations on the relationship between sustainable development and community livelihood.

	1	2	3	4	5	6	7	8	9	10
SACR	1.000									
LESIEM	.884	1.000								
SEDN	.963	.911	1.000							
DAESA	.963	.911	1.000	1.000						
SHRD	.866	.802	.827	.827	1.000					
SIPCHD	.832	.783	.795	.795	.935	1.000				
BOIDP	.863	.950	.884	.884	.827	.816	1.000			
PIFP	.884	1.000	.911	.911	.802	.783	.950	1.000		
DALIP	.872	.972	.895	.895	.814	.799	.974	.972	1.000	
FEIFP	.866	.802	.827	.827	1.000	.935	.827	.802	.814	1.000

Correlations between sustainable development and community livelihood shows significant relationship between the two components. However, respondents noted that, because of changes in the land tenure system caused by bauxite mining operations, social relationships will definitely experience changes as well. Consequently, this will affect local economic situation since harmonious relationship is deprived by intense exploration exercises. Respondents believe that economic development is necessary, since income generation facilitate the improvement of inhabitants living conditions. However, respondents accentuated that, achieving sustainable development encompasses the provision of quality education for Bidikoum community inhabitants as it creates awareness about community development and livelihood issues. Respondents noted that, corporation's commitment on their corporate social responsibility would help to improve inhabitants' health status through the provision of good medical facilities. In addition to upholding human rights, respondents emphatically stated that sustainable development would definitely be enhanced if people's rights are respected. It is also noted that, if community people are provided with adequate information about deforestation and cash benefit opportunities; they will be deceased from hewing trees that protect the surface of the land, as their livelihood will no longer be on deforestation, since protecting the forest is significant for them and their families. Respondents mentioned that improving their understanding about livelihood issues would minimize their sufferings and dependence on others. Having critically examined the relationship between sustainable development and livelihood, it is believed that both work corporately to improve Bidikoum community.

Conclusion

This study carefully investigated the effects of bauxite mining exploration on community livelihood and sustainability. Engaging in such endeavor is quite challenging, particularly gathering primary information from a community that is highly stress about living conditions. However, this study critically reviewed secondary information published on bauxite mining exploration and livelihood issues. We consulted books, magazines, journal articles and other relevant references that contributed to the development of pieces of literature, which identified gaps addressed in this study. This study

employed descriptive quantitative survey and correlational methods that facilitated the gathering, classification and presentation of data that led to analysis, description and conclusion of the subject studied. However, 300 questionnaires were distributed to inhabitants of Sangaredi community, which facilitated the gathering of first-hand information that enhanced the completion of this study. Primary data obtained from survey was analysed using descriptive statistics and correlational methods aided by SPSS. Analysed facts disclosed that, operations of bauxite mining companies have damaged communities in several forms. Agricultural activities are restrained because of degradation and deposits of toxic elements on the surface of the land. In addition, processed data disclosed that social relationships are constrained, health conditions are deplorable and accessibility to quality education is a big challenge. Other concerns expressed by the community are accessibility to shopping centres is constrained by poor road network and violation of human rights is evident. In addition, since inhabitants cannot engage fully in their income generation activities, their living conditions are frustrating as there are no alternative sources of income for their livelihood. This makes families to cope with insufficient income for their livelihood, which consequently affect their health status and development agendas. In consideration of the above facts, it is evident that Bidikoum community is constrained because of aforementioned discovered facts about their standard of living. This study discovered numerous facts about bauxite mining activities in Sangaredi community and established issues of concern that both government and corporations could discuss and find solution. However, this investigation will serve as noteworthy information to bauxite mining companies in Bidikoum and other communities in Guinea. Since limited sample size of 300 respondents and a sample frame of one community facilitated the achievement of results of this study, however, future endeavors could consider an expansion through increasing the sample size and frame or probably deal with specific issues dealt with in this study.

Acknowledgement

None.

Conflict of Interest

No conflict of interest.

References

- Bebbington A, M Williams (2008) Water and mining conflicts in Peru. *Mt Res Dev* 28: 190-195.
- Brown LR (2011) *World on the edge: how to prevent environmental and economic collapse*. W.W. Norton & Company, New York, London. 240 pp.
- Bury J T (2002) Livelihoods, mining and peasant protests in the Peruvian Andes. *J Lat Am Geogr* 1(1): 1-19.
- Carvalho FP (1995) 210Pb and 210Po in sediments and suspended matter in the Tagus estuary, Portugal. Local enhancement of natural levels by wastes from phosphate ore processing industry. *Sci Total Environ* 159: 201-214.
- Carvalho FP (2011) Environmental radioactive impact associated to uranium production. *Am J Environ Sci* 7: 547-553.
- Chang SE, J Stone, K Demes, M Piscitelli (2014) Consequences of oil spills: a review and framework for informing planning. *Ecol Soc* 19(2): 26.
- Cordell D, JO Drangert, S White (2009) The story of phosphorus: global food security and food for thought. *Glob Environ Change* 19: 292-305.
- Fernandez-Lozano J, G Gutierrez-Alonso, MA Fernandez-Moran (2015) Using airborne LiDAR sensing technology and aerial orthoimages to unravel roman water supply systems and gold works in NW Spain (Eria valley, León). *J Archaeol Sci* 53: 356-373.
- Flor P (2014) Mining and economic development in Peru. *ReVista, Harvard Review of Latin America*, Harvard University, Rockefeller Centre.
- Freese B (2004) *Coal: a Human History*. Penguin Books, London. 137 pp.
- Gilbert N (2009) The Disappearing Nutrient. *Nature* 461(7265): 716-718.
- Gordon RB, M Bertram, TE Graedel (2006) Metal stocks and sustainability. *Proc Natl Acad Sci* 103(5): 1209-1214.
- Heckenmüller M, D Narita, G Klepper (2014) Global availability of phosphorus and its implications for global food supply: an economic overview. Kiel Working Paper No. 1897. Kiel Institute for Working Economy, Kiel, Germany.
- Hore-Lacy I (2016) *Uranium for nuclear power: Ressources, mining and transformation to fuel*. Elsevier, Woodhead Publishing, Amsterdam.
- Hudson-Edwards KA, HE Jamieson, BG Lottermoser (2011) Mine wastes: past, present, future. *Elements* 7(6): 375-380.
- Jackson RB, A Vengosh, JW Carey, RJ Davies, TH Darrah, et al. (2014) The environmental costs and benefits of fracking. *Annu. Rev Environ Resour* 39: 327-362.
- Rosemarin A (2010) Peak phosphorus, the next inconvenient truth? - 2nd International Lecture Series on sustainable sanitation. World Bank, Manila.
- Ross ML (2015) What have we learned about the resource curse? *Annu. Rev Polit Sci* 18: 239-259.
- Schnug E, LJ De Kok (2016) *Phosphorus in agriculture: 100% zero*. Springer, New York.
- Scholz RW, AE Ulrich, M Eilittä, A Roy (2013) Sustainable use of phosphorus: a finite resource. *Sci Total Environ* 461-462: 799-803.
- Jain R, ZC Cui, JK Domen (2016) *Environmental impact of mining and mineral processing*. Elsevier, Butterworth-Heinemann Publ, 322 pp.
- Schüler D, M Buchert, R Liu, S Dittrich, C Merz (2011) Study on rare earths and their recycling. Final Report for the Greens/EFA Group in the European Parliament. Institute for Applied Ecology, Darmstadt, Germany.
- Jaskoski M (2014) Environmental licensing and conflict in Peru's mining sector: a path-dependent analysis. *World Dev* 64: 873-883.
- Lima IB, WL Filho (2015) *Rare Earths Industry: technological, Economic and Environmental Implications*. Elsevier, Amsterdam.
- Smil V (2004) World history and energy. In: *Encyclopedia of Energy*, C. Cleveland, Elsevier, Amsterdam 6: 549-561.
- Loureiro ML, JB Loomis, MX Vázquez (2009) Economic valuation of environmental damages due to the prestige oil spill in Spain. *Environ Resour Econ* 44: 537-553.
- Merkel BJ, A Arab (2015) *Uranium-past and future challenges*. Springer, New York.
- Michaelides EES (2012) *Alternative energy sources*. Springer, New York.
- Miranda M, QA Blanco-Urbe, L Hernández, GJ Ochoa, E Yerena (1998) All that glitters is not gold: balancing conservation and development in Venezuela's frontier forests. World Resources Institute, Forest Frontiers Initiative.
- Triscritti F (2013) Mining, development and corporate-community conflicts in Peru. *Commun Dev J* 3: 437-450.
- Vaccari DA (2009) Phosphorus famine: the threat to our food supply. *Scientific American Magazine*.
- Van Vuuren DP, AF Bouwman, AHW Beusen (2010) Phosphorus demand for the 1970-2100 period: a scenario analysis of resource depletion. *Glob Environ Change* 20: 428-439.
- Wells PG (2017) The iconic torrey canyon oil spill of 1967 - Marking its legacy. *Mar Pollut Bull* 115(1-2): 1-2.
- Yan G, HM Cho, I Lee, G Kim (2012) Significant emissions of 210Po by coal burning into the urban atmosphere of Seoul, Korea. *Atmosph Environ* 54: 80-85.
- Basov V (2015) True giants of mining: World's top 10 iron ore mines.
- Mudroch A, U Stottmeister, C Kennedy, H Klapper, (2002) *Remediation of abandoned surface coal mining sites*. Series: Environmental Engineering. Springer, New York, 175 pp.
- Nordstrom DK (2011) Mine waters: acidic to Circumneutral. *Elements* 7: 393-398.
- Ponce A, C Mc Clintock (2014) The explosive Combination of inefficient local bureaucracies and mining production: evidence from localized societal protests in Peru *Lat Am Polit Soc* 56: 118-140.
- Reardon AC (2011) *Metallurgy for the nonmetallurgist*, 2nd edn. ASM International, Materials Park, OH, USA.
- UNSCEAR (2017) Sources, effects and risks of ionizing radiation, United Nations scientific committee on the effects of atomic radiation.
- UNSCEAR (2016) Report to the General Assembly, with Scientific Annexes. United Nations, New York.
- USGS (2008) *The Global Flows of Metals and Minerals in DG Rogich, GR Matos, eds. U.S. Geological Survey Open-File Report 2008-1355*, 11 pp.
- World Bank (2007) *Cost of pollution in China*. The World Bank, Washington, DC.
- World Bank (2009) *Mining together: large-scale mining meets artisanal mining - a guide for action*. World Bank, Washington, DC.