



## Evaluation of Environmental impacts of Okobo Coal Mining Project in Ankpa Local Government area of Kogi State, Nigeria.

<sup>1</sup>Msheliza Florence Nicholas, <sup>2</sup>Samaila, Ishaya K, <sup>3</sup>Magaji J.I, <sup>4</sup>Nwokocha O. Patrick

<sup>4</sup>Bioresources Development Centre Uburu, Ebonyi State, @ National Biotechnology Development Agency, Abuja, Nigeria.

Email: mshelizaflorance@gmail.com

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### Abstract

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Despite a proactive adoption of an Environmental Impact Assessment (EIA) document with detailed Environmental and Social Management Plan in place by the Okobo Coal Mining project, the community has continued to seek for help over deplorable environmental impact conditions created by the domicile Coal Mining activities. Thus, this study was conducted to evaluate the environmental impact of Okobo Coal Mining Project in Ankpa Local Government Area of Kogi State, Nigeria. The objectives of the study were to; assess the environmental impacts of Okobo Coal Mining Project, determine the level of implementation of environmental impacts mitigation measures and to identify the challenges confronting the implementation of Environmental Management Plan. Data were collected from both primary and secondary sources. Primary sources were questionnaire survey, face to face interview, observation and consultation with stakeholders while secondary sources were Okobo Coal Mining Project Environmental Impact Assessment (EIA) approved Report, Nigerian Mineral and Mining Acts and Regulations. Results showed all the predicted environmental impacts manifested in all the four surveyed communities. The most identified environmental impacts were; reduction in air quality which had approximately (94.07%) affirmation. decreased quality of run-off water with 88.14% followed by Acid Mine Drainage(AMD) 81.26%, 84.89% rated the implementation of the environmental mitigation measures low, 12.05% rated it moderate and 3.06% rated it high. Therefore, it was recommended amongst others that the Environmental Health and Safety Officer of the mining company should ensure that employees are provided with a respectable working environment, train their employees, ensure that proper protective equipment is provided to the employees. The mining company should install appropriate warning signs, implement waste management methods, water should be sprinkled on the untarred road at intervals to prevent dust, over loading of Coal should be avoided to prevent spillage, transportation of coal should be in covered vehicles to prevent fugitive dust emission, and should make sure that they conform to all government regulations.

**Keywords:** EIA, Implementation, Follow –up, Coal, Mining

### Introduction

Development and environment are no longer separate concepts due to the continued rise of interest in sustainable development of land and its valuable resources. To bring environment and development together, a new legislative and technical tool called Environmental Impact Assessment (EIA) was introduced at international and national levels (Baker and McLelland, 2003). This legislative and technical tool (EIA) has been applied for mining projects in Nigeria and the Okobo coal mine inclusive. Adoption of environmental impact assessments (EIAs) in Nigeria is to enable its government to plan development projects such as mining and other land use in an integrated manner, avoiding irreversible environmental damage. According to Erhun (2015), a stable and profitable mineral project requires consideration of not just the

economic viability of mineral deposit, but competent project appraisals is also essential as well as early incorporation of environmental and social impact analysis and the strengthening of the capacity of institutions to engage in such integrated assessment. However, Nwoko (2013) observed that prior to the enactment of the EIA Act 86 of 1992 in Nigeria, project appraisals were limited predominantly to feasibility studies and economic cost benefit analysis and that most of the appraisals did not take environmental costs, public opinion, social and environmental impacts of development into consideration. Mkpuma *et al.*, (2015) opined that mining can become more environmentally sustainable by developing and integrating practices that reduce the environmental impact of mining activities (mitigation measures). This include measures such as reducing water and energy consumption,

minimizing land disturbance and waste production, preventing soil, water, and air pollution at mine sites, and conducting successful mine closure and reclamation activities.

Environmental and Social Management Plan (E&SMP) is one of the tools available to achieve this goal. E&SMP a core component of EIA aimed at assessing, identifying and ranking the impacts the proposed mining activity will have on the environment and the lives of the community members where the operations are going to take place. Further, its goal is to identify the suitable measures to manage, avoid or mitigate the impact the mining activities will cause to the environment and mining community concerned. Therefore, it is submitted that E&SMP can assist in reducing harm and hazards of mining activities if well implemented. The E&SMP, once accepted by the relevant authorities, becomes an enforceable blueprint for managing impacts on the environment.

EIA has a wide range of benefit, it has been noted that EIA application is confronted with many challenges. For instance, Agbazue and Ehiemobi (2016) stated that “the Act and its practice are fraught with many challenges. EIA is often conducted long after the project proponents have become attached to a design concept. The other challenges include; performance and accountability failure of the responsible authority, proponents desire to simply fulfill “all righteousness”, professional incompetence of EIA practitioners, poor screening and scoping, ineffective coordination, poor public participation, and lack of post project monitoring and the implementation of mitigation measures.

Moreover, performance of Environmental & Social Management Plan (E&SMP) has become a common feature in environmental management debates among scholars,

practitioners, Non -Governmental Organizations (NGOs) and the government agencies in Nigeria. The discussions on the challenges of the EIA practice in Nigeria have covered a wide range of issues including an assessment of the compliance, responsibilities, efficiency and the performance of the EIA process (Agbazue and Ehiemobi, 2016). However, adequate attention has not been given to the Environmental Management Plan (EMP) in a specific project rather it is usually suggested that lack of implementation of mitigation measures, makes EIA ineffective (Mallo, 2007; Kolhoff *et al.*,2009; Marshall, 2011; Kabir, 2012; Canter, 2013). This study in a bid to bridge this gap intend to evaluate the environmental management plan of coal mining project at Okobo, Kogi State in order to find out why coal mining in Okobo, Kogi State has continued to cause detrimental environmental and socio-economic effects despite having an approved EIA report with detailed Environmental Management Plan. The objectives of the study are to assess the Environmental impact of Okobo Coal Mining Project; assess the implementation of environmental impacts mitigation measures and then evaluate the follow-up of environmental management plan (EMP).

### **Material and Methods**

Material used were; Approved Environmental Impact Assessment (EIA) Report of Okobo Coal Mining Project, Academic books and papers. National regulations, Nigerian Minerals and Mining Act, (NMMA) 2007, Nigerian Mineral & Mining Regulations, (NMMR) 2011, and Community Development Agreement (CDA Guidelines (2014)). Data collection were carried out through: review, questionnaire, interview and focus group discussion. This study reviewed the EMP of Okobo coal mine project and identified the predicted environmental impacts and mitigation

measures. After which questionnaire, interview and focus group discussion was conducted with stakeholders. A purposive sample technique was used to select four (4) communities (Okobo, Enjema, Okobo Ate, and OkoboOkpiko) for questionnaire administration. Although the mining project has six (6) host communities (Okobo, Enjema, Okobo Ate, Okobo Okpiko, Ejiga and Ofugolo) all in Ankpa Local Government Area in Kogi State. Four (4) communities were purposely selected based on their high vulnerability to the project than others. For representativeness, sampling considered the household spatiality. Thus, systematic sampling technique was used to select households to be sampled. As a result, three household intervals were used in household selection. Secondly panel sampling technique

was used to select stakeholder’s samples from the EIA process attendance list for focused group discussion.

Total samples of five hundred and twenty-three households were selected from the four (4) selected communities for the administration of questionnaire. The distributions of questionnaire across these ten communities were based on their population size obtained in the EIA (2011) report and projected to 2018 (Table1). Sample sizes were determined by Yamane (1973) a standard statistical formula:

$$S = \frac{N}{3+N (ME^2)} \quad (1)$$

where S = sample size  
 N = population  
 ME = margin of error allowed (0.05).

**Table 1: Sample Size for Questionnaire Administration**

Selected Communities	Population in EIA in 2011	Projected Population to 2018	Sample Size	Percentage of Sample Size
Okobo	800	996	81	8.13
Enjema,	5000	6225	199	3.19
Okobo Ate	900	1089	191	17.53
OkoboOkpiko	600	747	52	6.96
Total	7300	9057	523	35.81

Field observations were also undertaken to independently assess the various project affected communities and evidence of impacts mitigation. Focus Group Discussions (FGDs) were conducted to supplement the findings from the quantitative result. Consultations were held at various levels with stakeholders of the mining company, Stakeholders and representatives of host communities. Data collected were analyzed using frequency distribution, ANOVA and t-test.

**Results and Discussion**

Environmental impacts associated with coal mining activities were predicted and listed in the Okobo Coal Mining approved EIA Report. This study assessed the environment based on respondents’ affirmation of impacts by using the EMP as a check list. It was found that all the predicted environmental impacts of Okobo Coal Mining Project (which include increase in road traffic volume and risk of accident/injury, increase in noise nuisance, pressure on existing infrastructure, increase waste generation, soil

degradation and soil/ groundwater contamination, reduction in air quality, acid mine drainage and decreased quality of run-off water manifested in all the 4 surveyed host communities given the recognition of impacts by respondents. The results in table 3.1 present the environmental impacts of Okobo Coal Mining operation by respondents. It shows among other things that up to three-quarter (75%) of respondents recognized all the impacts except for increase waste generation that had little below (69.98%). The most recognized environmental impact of the Coal Mining Project in the study area are: -

**Reduction in air quality:** - This was approximately ninety-five percent (94.07 %). This may be due to impacts from air pollution resulting from activities such as crushing and grinding, during excavation, loading, beneficiation, haulage activities and emissions by stationary internal combustion engines, diesel vehicles conveying the coal on the untarred road and coal fired plant. It has been observed that the mining operators have no laid down adequate measures to prevent harmful emissions of dust into the ambient air which has health risk and hazards to plants, animals and humans and also greatly contribute to global warming and climate change.

**Decreased quality of run-off water (88.14%);** This may be due to excavation activities within the 5- meter deep open pit affecting the ground water. The Surface Mining activities consume large volumes of water and extraction activities have possibly disrupted the water bed in the community. The contaminated residue water from the activities find their way back to the communities' streams). Mining and its related operations not only consume a huge amount of water, but often have great impacts on the immediate hydrological system as well as influence water quality

and quantity within the mining area. The majority of the residence within the mining area in Okobo Ate and Enjema indicated that mining activities had limited the access of communities to safe and adequate water, thus causing water scarcity. Furthermore, diverse and adverse open-cast mine was observed to have significant effects on the mining area ground regime. There were complaints of wells drying up in some communities as a result of the distortion in the water table due to massive opening of the pit. It was observed that a borehole was provided by the mining company and one rehabilitated at Enjema as part of the obligations negotiated and set out in the community Development Agreement (CDA) between mining operators and the mining communities.

**Acid Mine Drainage AMD (81.26%).** This occurs when water combines with oxygen and pyrites in the ore body of used mines to release a toxic mixture of heavy metal. Coal mining generate waste rocks that are major potential sources of AMD. AMD usually contains toxic heavy metals and is a critical environmental pollution problem in mines and result in an increase in acidity and an increase in concentrations of dissolved metals in the water, causing the pH of surface and underground water to be very low. AMD from abandoned mines can contaminate ground and surface water if not properly managed and can also adversely affect the health of the members of the communities that rely on this water for drinking, domestic or agricultural purposes. Earlier studies (Mallo, 2011; USEPA, 2011; Princewillet *al*, 2014), have shown that mining is detrimental to natural environment. Mallo (2011) noted that Acid Mine Drainage (AMD) is one of the most significant environmental challenges facing the mining industry worldwide. USEPA (2011) stated that the major impact of a large and deep open cast mine is on the ground water regime of the

region. Princewill *et al.*, (2014) found that “water pollution was the most severe environmental impact of mining in Akwuke”. In all the four communities surveyed, over (62.06%) recognized the environmental impacts.

ninety percent (90%) of respondents agreed on environmental impacts except in Okobo Okpiko where above sixty percent

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**Table 1: Environmental Impacts of Okobo Coal Mining Operation**

Impacts	Increase in road traffic volume		Increase in noise		Pressure on existing infrastructure,		Increase waste generation		Soil and Groundwater Contamination		Decreased quality of run-off		Reduction in air quality		Acid Mine Drainage	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Okobo	81	0	75	6	81	0	74	7	81	0	76	5	80	1	81	0
Enjema	68	131	138	61	124	75	99	100	112	87	157	42	177	22	113	86
Okobo Ate	189	2	154	37	161	30	154	37	176	15	178	13	186	5	184	7
OkoboOkpiko	52	0	48	4	50	2	39	13	45	7	50	2	49	3	47	5
Total	390	133	415	108	416	107	366	157	414	109	461	62	492	31	425	98
Percent (%)	75	25.43	79.35	20.65	79.54	20.46	69.98	30.02	79.16	20.84	88.14	11.85	94.07	5.93	81.2	18.74



**Analysis of Variance (ANOVA) for Rating of the Implementation of Mitigation Measures for Environmental Impacts**

SOURCE OF VARIATION	SUM OF SQUARES	DEGREE OF FREEDOM	MEAN SS	F RATIO
BETWEEN GROUP	146.6	3	48.87	4.87
WITHIN GROUP	221.6	15	14.77	
TOTAL	2232.61	18	333.54	

Calculated F= 4.87 F-table at 0.05  $F_{3, 15}=2.11$

Calculated F 4.87 > table F 2.11

**Inference**

Since the calculated F value of 4.87 is greater than the table F value of 2.11, Ho that “there is no significant difference among the rating (low, moderate and high) of the implementation of mitigation measures for environmental impacts of Okobo coal mining at 95% confidence level is rejected. Therefore, this implies that “there is a significant difference among the rating of the implementation of mitigation measures for environmental impacts of Okobo coal mining at 95% confidence level. Thus, the rating was significantly lower than moderate and high since low had the highest mean. So, the implementations of environmental mitigation measures were low. The following were discovered during the research: -

- i. When a mining company fails to comply with its environmental obligations, consequences are not meted adequately. i.e. fines, shut in. and/or imprisonment, publishing a list of regulatory infractions/non-compliance events/fines and penalties are not applied by the relevant authority. If such relevant section of the law is applied there will be an increase in uptake and implementation of the set regulations for the benefit of mining communities, their employees and humanity.
- ii. There is inadequate enforcement mechanism due to lack of financial/technical resources to enforce compliance to enhance their ESIA management capabilities.
- iii. Environmental audits for mining sites are also not conducted accordingly to ensure that sites observe all the mitigation

measures for any/all adverse environmental impact.

iv. The existing law mandate the need for Environmental Impact Assessment (EIA), the biggest concerns remains the low level of compliance with such laws and policies by license holders. Inadequate level of compliance is exacerbated by the cost of EIA, which is too expensive for the mineral title holders, so they prefer to do Environmental Audit instead of EIA.

v. Lack of participation of the mining host communities in planning, implementation, management and monitoring of activities of all phases of mining and post mining operations of Okobo Coal Mining Project.

**Conclusion**

The implementation of environmental management plan of Okobo coal mining project is not satisfactory as residents were not impressed with the company’s activities. Data from the survey showed that the environmental impacts mitigation measures were poorly implemented \ Thus, the poor implementation of the Environmental Management Plan (EMP) of Okobo coal mining project accounts for the significant manifestation of negative impacts that lead the communities to seek for help.

**Recommendations** The following should be done by the mining company:-The untarred road that passes through the host communities (Enjema, Okobo Ate and Okobo) should be tarred, water should be sprinkled at intervals, over loading of Coal should be avoided to prevent spillage, transportation of coal should be in covered



vehicles to prevent fugitive dust emission, regular checking and maintenance of vehicles should be conducted once in every two months and pollution under control certificate be obtained, masks should be provided to the workers the mine, plantation should be taken up along the approach roads and vicinity of mine lease. The plantation arrests dust, The Environmental Health and Safety Officer of the mining company should ensure that employees are provided with a respectable working environment, train their employees, ensure that proper protective equipment is provided to the employees. The mining company should install appropriate warning signs, implement waste management methods, and conform to all other government regulations. Agencies responsible for regulatory enforcement and compliance should provide the technical and financial resources to be able to fulfil their mandate and when they failed strong punishment for non-compliance should be meted to them. Environmental audits for mining sites should be conducted accordingly by regulatory agencies to ensure that sites observed all the mitigation measures for any/all adverse environmental impact. The Nigerian Mineral and Mining Act (2007) should be reviewed to fill in the gaps needed. The mining sector to strengthen synergy with other regulators particularly in the area of monitoring and enforcement to avoid regulatory overlap of functions. EIA procedure does not target the specifics of environmental management, Small Scale Mining does not require EIA, instead Environmental Permit for Small Scale Mining operation should be done by them to reduce the cost of EIA. The mining Mineral Title Holders should be educated on the provisions of the law in the Nigerian Mineral and mining Act, 2007 on EIA and CDAs, pollution control measures and to create awareness on technical knowledge on how to reduce risk/hazards in mining operations. The mining host communities should also be given sensitization by the regulatory authority on the relevant sections of the

law with respect to environmental regulation and compliance. Attention should also be focused on climate smart minerals to transit to renewable energy to avert climate catastrophe

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