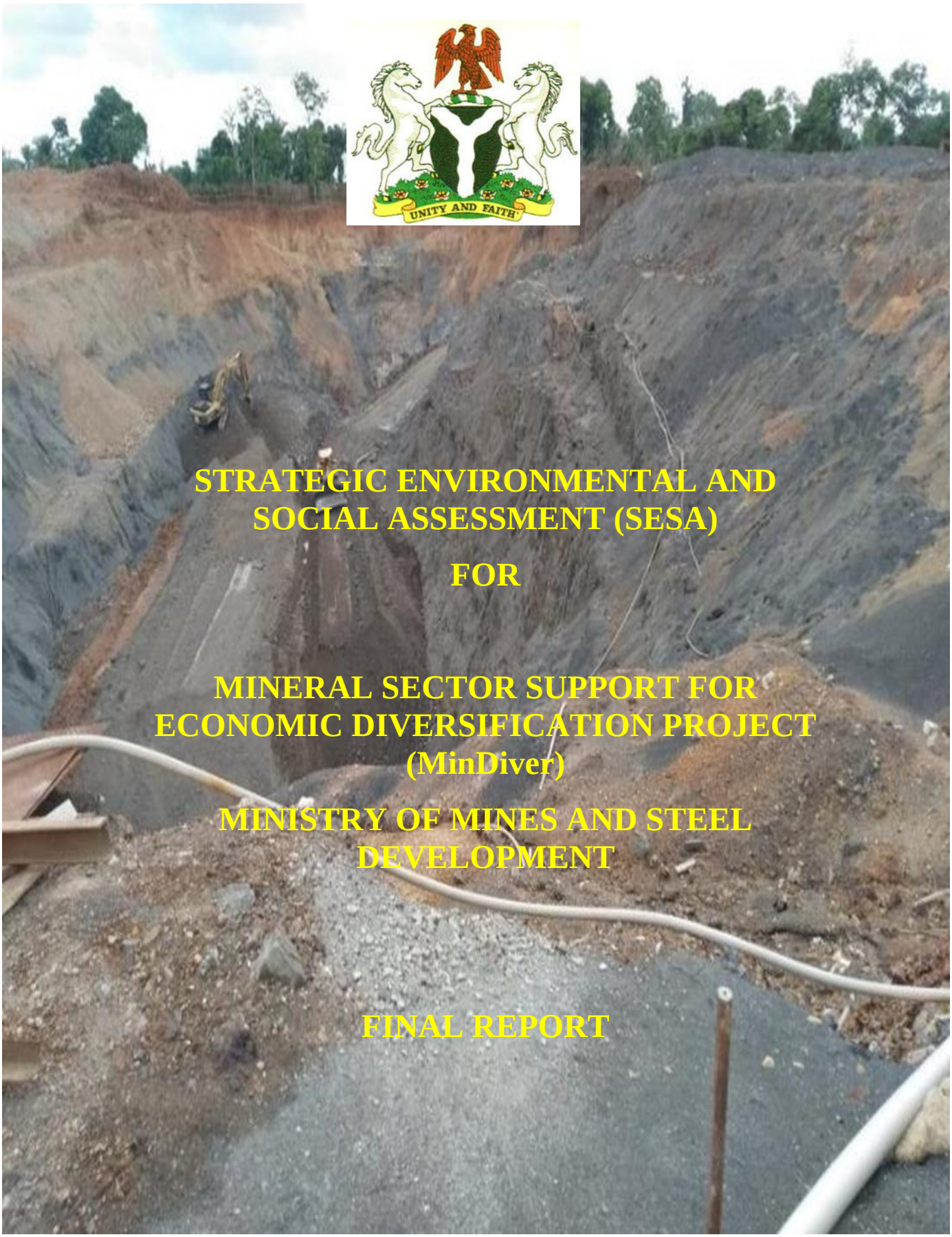


STRATEGIC ENVIRONMENTAL AND SOCIAL ASSESSMENT (SESA)

FOR

MINERAL SECTOR SUPPORT FOR ECONOMIC DIVERSIFICATION PROJECT (MinDiver)

MINISTRY OF MINES AND STEEL DEVELOPMENT

FINAL REPORT

TABLE OF FIGURES ..... **III**
LIST OF TABLES ..... **IV**
LIST OF ACRONYMS ..... **V**
EXECUTIVE SUMMARY ..... **VII**
CHAPTER ONE: INTRODUCTION **1**
1.1 Background 1
1.2 Justification for preparing Strategic Environmental and Social Assessment (SESA) 1
CHAPTER TWO: METHODOLOGY AND APPROACH TO THE STUDY **3**
CHAPTER THREE: BASELINE DATA **8**
3.1 Overview of Past, Present and Future Mining in Nigeria 8
3.1.1 History, Occurrences and Commodities *8*
3.1.2 Current Mining Activities *15*
3.1.3 Future Mineral Extraction *26*
3.2 Baseline Environmental Conditions in Nigeria 27
3.2.1 Physical Environment *27*
3.2.2 Biological Environment *38*
3.3 Socio-economic, Cultural and Mining Environment 43
3.3.1 Culture, Religion, Community and Gender Issues in Nigeria *43*
3.3.2.1 Gender Involvement and Other Socioeconomic Attributes of Mine Sites Visited *44*
3.3.3 Employment and Economic Activity *46*
3.3.4 Occupational Health *47*
3.3.5 Challenges of Artisanal and Small-Scale Mining in Nigeria *48*
CHAPTER FOUR: LEGAL, REGULATORY & INSTITUTIONAL FRAMEWORK **52**
4.1 Governance in Nigeria 52
4.2 Legal and Regulatory Frameworks Guiding Mining & Quarry Licensing & Monitoring 56
4.2.1 Federal Ministry of Environment regulations and Guidelines *56*
4.2.2 Nigeria Minerals and Mining Act, 2007 ..... *56*
4.2.2.1 Some Provisions of Minerals and Mining Act, 2007 ..... *56*
4.2.3 Nigeria Minerals and Mining Regulations, 2011 ..... *59*
4.2.4 National Minerals and Metals Policy, 2008 ..... *61*
4.2.5 Other Laws and Regulations Relating to Mining Sector and for Environmental Protection and Management in Nigeria *61*
4.3 Institutional Frameworks 66
4.3.1 Federal Ministry of Mines and Steel Development *66*
4.3.2 Federal Ministry of Environment *67*
4.3.3 The National Environmental Standards and Regulations Enforcement Agency (NESREA) *67*
4.3.4 State Level Ministries, Departments and Agencies *69*
4.4 Labour Commerce and Socioeconomic Regulation 69
4.4.1 Laws & Regulations *69*
4.5 The Mining & Quarrying Industry 69
4.5.1 Capacity of the Industry *69*

4.5.2 Social and Community Contributions by the Industry 71
4.6 Training and Institutions 71
4.7 Analysis and Comment 71
4.7.1 Legislation and Regulatory Regime 71
4.7.2 Perception of Miners about Challenges they encounter Regarding the Legislations and Regulatory Regimes 73

CHAPTER FIVE: INTERNATIONAL COMPARISONS 77

5.1 International Standard 77
5.1.1 IFC Performance Standards 77
5.1.2: International Council of Mining and Metals' (ICMM) Sustainable Development Framework and Position Statements 78
5.1.3 Global Reporting Initiative (GRI) 78
5.1.4 Africa Mining Vision 79
5.2 Country Specific Examples 79
5.2.1 Ghana 79

CHAPTER SIX: ENVIRONMENTAL & SOCIAL IMPACTS OF MINING 83

6.1 Potential environmental and social effects of mining in Nigeria 77
6.2 Potential impacts of the MinDiver project 94

CHAPTER SEVEN: ASSESSMENT OF ALTERNATIVES 99

7.1 Alternative interventions under MinDiver project 99
7.2 Approaches and technologies 100

CHAPTER EIGHT: PUBLIC CONSULTATION 103

8.1 Overview 103
8.2 Stakeholder Analysis 103
8.3 Summary of Proceedings and Major concerns from Stakeholder Workshops 104
8.4 Highlight and Key Outcomes of Consultations 107
8.4.1 Women Involvement in Mining: 107
8.4.2 Child Labour and Regulation 107
8.4.3 Challenge of Obtaining Credit from Banks for Mining Business 108
8.4.4 Challenge of Adherence to Mining Laws by ASM Operators and Licensed Mining Companies: 108
8.4.5 Regulators Capacity and Challenges to Enforcement: 109
8.4.6 Host Communities Rights and Knowledge of Mining Laws and Risks 109
8.4.7 How Reforms/Legislation Can Be Used to Check Illegal Mining and Environmental Compliance: 109
8.4.8 Enforcement of Mining Laws: 110
8.4.9 Gender Based Violence (GBV) and Other Social Issues 110
8.5 Grievance Redress Mechanism 110

CHAPTER NINE: RECOMMENDATION FOR STRATEGIC ENVIRONMENTAL AND SOCIAL ISSUES FOR MINING SECTOR IN NIGERIA 112

9.1 Introduction 112
9.2 Strengthening Legal and Regulatory Regime and Environmental Governance 112

9.3 Removing Bottlenecks Regarding the Operation of Licensed and Artisanal Miners 114
9.4 Child Labour/Limiting Gender-Based Violence and Enhancing Women Participation in Mining in Nigeria 115
9.5 Enhancing the Knowledge of Legal and Regulatory Requirements of Operators in the Industry 116
9.6 Reducing the Effect of Mining on the Environment 116
9.7 Reducing the Effect of Mining Reforms on Livelihoods of Artisanal Miners 117
9.8 Implementation Plan 118

APPENDICES 126

Appendix 1: List of Identified Stakeholders 126
Appendix 2: Methodology for Socio-Economic Studies 128
Appendix 3: Methodology Used for the Study of Physical Parameters and Analysis of the Effect of Mining on Nigeria Environment 129
Appendix 4: Interview Schedule for Household Heads for Mindiver SESA 134
Lack of protective equipment 152
Appendix 5: Nigerian Solid Mineral Commodities and Typical Environmental Issues 153
Appendix 6: Socio-Economic Attributes of Miners at Asm Sites/Communities Visited and their Perception about Some Issues 162
Appendix 7: List of Mine Sites Visited 163
Appendix 8: Record of Stakeholder Workshop Minutes 165

TABLE OF FIGURES

Figure 3.1: Mining and quarrying percentage contribution to GDP (1981-2012) at 1990 basic 1990. Source: Plotted by the authors using Ministry of Mines and Steel Development (MMSD), 2017 data. 9
Figure 3.2: Mining and quarrying percentage contribution to GDP (2013-2018) at 2010 basic 2010 prices. 10
Figure 3.3: Map of Nigeria showing solid mineral locations 11
Figure 3.4: Abandoned mine sites and pits at Kuru mine site in Jos South LGA, Plateau State 14
Figure 3.5: Abandoned site at Okpara mine CPS Ogbete Enugu 14
Figure 3.6a: Abandoned mine site at Umuoghara in Izza North LGA 14
Figure 3.6b: Doctors treat lead-poisoned children in Zamfara 14
Figure 3.7: Map of Nigeria showing solid mineral location based on 2018 production 17
Figure 3.8: Limestone mining by artisanal miners in Abimfam community in Akamkpa LGA of Cross River State 26
Figure 3.9: Small scale Mining of Lead and Zinc Ore at Jidech Mining Company, Mkpumakpatapa, Izzi LGA Ebonyi State 27
Figure 3.10: Erosion caused by sand mining at Omene Opi in 31
Figure 3.11: Land degradation due to mining at Umuoghara in Izza North LGA, Ebonyi State 31
Figure 3.12: Map of Nigeria indicating the ecological zones. 39
Figure 3.13: Map of Nigeria showing vegetation zones and some important sites for biodiversity 42
Figure 3.14: Result of perception of miners and non-miners on women involvement in mining and discrimination against women 45
Figure 4.1: Structure of the Ministry of Mines and Steel Development 66
Figure 4.2 Organisational Structure of FMEnv 67
Figure 4.3: Result of the Opinion of the Miners on Regulation and Environmental Requirements They Considered High and Difficult to Comply with. 74
Figure 4.4: Result of Opinion of the Miners on Charges and Fees They Would Want Government to Amend 75

Figure 8.1: Cross section of participants during stakeholder consultaions at different zones and minig locations in the country. 103

LIST OF TABLES

Table 3.1: Land Mark Events that happened in the Mining Sector 9
Table 3.2: Potential minerals in commercial quantities found in the States in Nigeria 12
Table 3.3: Mineral Production Figure in 2018 15
Table 3.4: Mineral Production Figure in 2018 according to States 18
Table 3.5: Summary of mine sites visited and the environmental and social issues encountered through the field visits in Southern and Northern Nigeria 20
Table 3.6: Summary of data availability on physical themes 27
Table 3.8: Categories of Biodiversity Sites in Nigeria 41
Table 3.9i: Distribution of Employed Persons in the Mining and Quarrying Sector By Economic Activity and Sex 46
Table 3.9ii: Mining Livelihoods 46
Table 3.10: Monthly Income and Expenses from Mining Activity as Given by Miners 47
Table 3.11: Challenges Miners Face as Regards Artisanal Mining Activity in Their Locality 49
Table 3.12: Strategies for overcoming the challenges faced by miners 51
Table 4.1: Assessment of Key MDAs and Partners in the Regulation and Enforcement of Environmental and Social Compliance in the Mining Sector in Nigeria. 53
Table 4.2 Summary of Environmental Obligations of Mineral Title Holders 60
Table 4.3: Summary of the Existing Regulations Applicable to Environmental Protection. 65
Table 4.4: Opinion of Miners with knowledge about Mining Laws and Regulations/Standards Regarding Challenges to Compliance to Mining Standards 73
Table 5.1: Summary of key environmental and social issues in the country pertinent to the objectives of the SESA 82
Table 6.1: Potential Environmental Impacts, Pollution Sources, Occupational Health Issues and Social, Economic and Cultural Impacts associated with Mining Activities 84
Table 6.2: Releases and Effects (Stocks and Flows) Associated with Mining Activities 87
Table 6.4: Potential Socio-economic Impacts from Mining 91
Table 6.5: Impacts Specific to Certain Minerals and Type of Mining 94
Table: 6.6: Environmental and Social Implications of the Project 95
Table 6.7: Perceptions and Consequences of Mining Activities in Sampled Communities 97
Table 7.1: Alternative interventions under the SMMR Project 99
Table 7.2 Alternative approaches and technologies 101
Table 8.1: Categorization of Stakeholders Influence and interest 104
Table 8.2: Summary of Proceedings and Major Concerns from Stakeholder Workshops 105
Table 9.1: Implementation Plan indicating the policy issues, action required, responsibilities, outcome targets and indicators 119

LIST OF ACRONYMS

AMV	Africa Mining Vision
ASM	Artisanal Smallscale Miners
ASMD	Artisanal Smallscale Mining Department
BOI	Bank of Industry
CBN	Central Bank of Nigeria
CBO	Community Based Organization
CDA	Community Development Agreement
CAMA	Company and Allied Matters Act
CF	Contaminated Factor
CITA	Company and Income Tax Act
COMEG	Council of Mining Engineers and Geoscientist
CSO	Civil Society Organization
EA	Environmental Audit
EFO	Externally Funded Output
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EITI	Extractive Industries Transparency Initiative
EL	Exploration License
EMS	Environmental Management System
EPRF	Environmental Protection and Rehabilitation Fund
EPRP	Environmental Protection and Rehabilitation Plan
ESIA	Environmental and Social Impact Assessment
ESHS	Environmental, Social, Health and Safety
ESMF	Environment and Social Management Framework
ESMP	Environment and Social Management Plan
ESS	Environmental and Social Standards
FAO	Food and Agriculture Organization
FCT	Federal Capital Territory
FDI	Foreign Direct Investment
FEPA	Federal Environmental Protection Agency
FGD	Focus Group Discussion
FMEnv	Federal Ministry of Environment
FMO	Federal Mining Officer
GBV	Gender Based Violence
GDP	Gross Domestic Product
GIS	Geographic Information System
GRI	Global Reporting Initiative
H&S	Health and Safety
HIV	Human Immune Virus
IBAs	Important Bird Areas
ICM	MInternational Council of Mining and Metal
IDA	International Development Agency
IFC	International Finance Corporation
IPCC	Intergovernment Panel on Climate Change
ISO	International Standard Organization

IUCN	International Union for the Conservation of Nature
LFN	Laws of the Federation of Nigeria
LGA	Local Government Authority
MCO	Mining Cadastre Office
MDA	Ministries Department and Agencies
MEC	Mines Environmental Compliance
MID	Mines Inspectorate Department
MINDIVER	Mineral Sector Support for Economic Diversification Project
MIREMCO	Mineral Resources and Environmental Management Committee
MMSD	Ministry of Mines and Steel Development
MOU	Memorandum of Understanding
NBS	National Bureau of Statistics
NEITI	Nigerian Extractive Industry Initiative
NESREA	National Environmental Standards and Regulations Enforcement Agency
NGO	Non-Governmental Organization
NIPC	Nigerian Investment Promotion Council
NOA	National Orientation Agency
NPC	Nigerian Population Commission
NRC	Nigerian Railway Corporation
NSDA	Nigerian Steel Development Authority
NUC	Nigerian University Commission
NWRI	National Water Resources Institute
OHS	Occupational Health and Safety
OP	Operational Policy
PAD	Project Appraisal Document
PDO	Project Development Objective
PIU	Project Implementation Unit
PPA	Project Preparation Advance
QL	Quarry Lease
RPF	Resettlement Policy Framework
SEA	Sexual Exploitation and Abuse
SESA	Strategic Environmental and Social Assessment
SMDF –	Sustainable Mineral Development Fund
SMEnv	State Ministry of Environment
SMMRP	Sustainable Management of Mineral Resources Project
SON	Standard Organization of Nigeria
SPV	Special Purpose Vehicle
SSML	Small Scale Mining Lease
STDs	Sexually Transmitted Diseases
TA	Transaction Advisory
UNESCO	United Nations Educational, Scientific and Cultural Organization
VAC	Violence Against Child
WBG	World Bank Group
WHO	World Health Organization
WQI	Water Quality Index

EXECUTIVE SUMMARY

ES 1.1: Background

The Strategic Environmental and Social Assessment (SESA) prepared by the Ministry of Mines and Steel Development (MMSD) aims to guide the overall implementation of Environmental and Social Assessment and Management of the activities of the Mineral Sector Support for Economic Diversification (MinDiver) Project. The project aims to leverage on Nigeria's vast natural resources to diversify the economy from the oil and gas sector in order to achieve sustainable economic growth and development. The specific objectives of the MinDiver Project are twofold: (1) to improve the attractiveness of Nigerian Mining sector, as a driver for economic diversification for long-term private sector investment in the exploration and production of minerals, and (2) to create a globally competitive sector capable of contributing to wealth creation, providing jobs and advancing the country's social and human security. In view of these objectives, SESA is conceptualized to primarily identify the priority actions that Government can take in order to foster the environmentally sustainable, socially equitable and inclusive development of Nigeria's mining sector.

ES 1.2: Structure of the Report

This SESA report is structured into eight (8) chapters as follows: Chapter One (1) is the Introduction and it sets out the project description and justification for preparing SESA. Chapter Two (2) discusses the methodology employed in carrying out the SESA. Chapter Three (3) presents the overview of past, present and future mining in Nigeria. Chapter Four (4) outlines the mining activities and mineral production statistics, summary of environmental and social conditions of the mine sites visited including biophysical condition, cultural, religion and gender issues, occupational health and challenges that miners encounter. Legal, regulatory and institutional framework including mandates, institutional capacity, coordination and issues of overlap and suggestion for improvements. Chapter Five (5) presents international standards on mining and experiences of some developing countries in managing their mining sector including their approach to institutional and governance weaknesses in the sector which Nigeria can learn from. Chapter Six (6) is a presentation on potential adverse environmental and social issues related to mining including climate change issues and mitigation measures. Chapter Seven (7) presents assessment of alternatives. Public consultation which elucidates stakeholder's social, environmental and economic interest and concerns with respect to mining were presented in Chapter Eight (8) while Chapter Nine (9) concludes with recommendations and action plan including schedules for implementation.

ES 1.3: Methodology

The methodology involved a range of activities. First, a scoping study was conducted entailing a review of critical documents related to the SESA and stakeholder analysis and include the 2005 SESA prepared for the Sustainable Management of Mineral Resources (SMMRP) Project, Environmental Study Report 2014 (Technical assistance project) for mining sector development in Nigeria through an externally funded output (EFO), the Project Appraisal Document (PAD), the Environment and Social Management Framework (ESMF), Resettlement Policy Framework (RPF) of the MinDiver Project, Nigeria Minerals and Mining Act 2007, Nigeria Minerals and Mining Regulations 2011 and SESA report of some countries including Sierra Leone, Mozambique, among others. A detailed stakeholder analysis was undertaken (see

section 8.2) to identify different stakeholders and mapped according to their degree of involvement in the sector. The field data collection involved extensive stakeholder consultation, survey and analysis of the social environment; physical and biological environment at selected mining sites. Six zonal stakeholder consultations were conducted in six geopolitical zones of Nigeria – Bauchi for North East, Kaduna for North West, Abuja for North Central, Abeokuta for South West, Calabar for South South and Enugu for South East zone. The survey involved using questionnaires to collect and collate data from miners and host communities in the field locations visited and also from the staff of Ministries Department and Agencies (MDAs) of Federal and State governments. A total of 34 mine sites were visited across twelve States and the Federal Capital Territory. There was analysis of environmental and social impacts, issues, description and analysis of the existing policies; regulations, institutional framework and assessment of capacity.

ES 1.4: Baseline Information

Nigeria is blessed with abundant solid mineral resources. The country has diverse mineral deposits across the 36 States of the Federation that can be mined in commercial quantities. At the time of the solid mineral boom (i.e. export of coal, tin and columbite in the 1960s and the 1970s), the mining sector contributed 4-5 percent to Gross Domestic Product (GDP). However, the decline in the performance of the sector led to the drop in its contribution from 5.6 percent in 1980 to 0.38 in 2012. Currently, the contribution of the sector to the GDP is among the lowest, although the sector is picking up as a result of the several reforms in the sector. The data on mining and quarrying output for 2018 shows that Nigeria produced a total of 55,810,964.53 tonnes of solid minerals (Mining Inspectorate, MMSD). Mining is mainly carried out by artisanal and small-scale miners (ASM) that rely on manual labour and simple tools; with few companies having heavy mining equipment. Sources show that granite and limestone are the most mined minerals in Nigeria as at 2018 by construction and cement manufacturing companies (Africa Check[1]).

ES 1.5: Main Findings from Reviews and Field Study and Policy Recommendations

ES 1.5.1: Findings

Nigeria has institutions, environmental laws and regulations which govern mining. Some of these include the Ministry of Mines and Steel Development (MMSD), Federal Ministry of Environment (FMEnv), States Ministries of Environment (SMEnv), National Environmental Standard and Regulations Enforcement Agency (NESREA), Mines Environmental Compliance Department (MEC), Mineral Resources and Environmental Management Committee (MIREMCO), Nigeria Minerals and Mining Act 2007, Nigeria Mineral Regulations 2011, Roadmap for the Growth and Development of the Nigerian Mining Industry, among others. It was discovered that MDAs at the Federal and State levels of government have limited funding, inadequate staff capacity and operational logistics to perform their mandates. This is further exacerbated by limited coordination and synergy among these institutions which is reflected in the overlapping functions among MDAs, FMEnv, NESREA, MEC, SMEnv and State Ministries of Solid Mineral/Natural Resources.

[1]Africa check is a non-profit fact checking independent organization set up in 2012 to promote accuracy in public debate and the media in Africa

In addition, the laws, regulations and guidelines for dealing with environmental issues in Nigeria are short of meeting international standards in terms of social inclusiveness. For example, the existing laws made no provisions for gender protection (gender-based violence, discrimination against women), protection of the rights of the vulnerable, labour influx-based issues, grievance redress mechanism, etc. Also, at the sector level, the existing laws and regulations for the Mineral Sector (Mineral Act, 2007 and the Nigeria Minerals and Mining Regulation 2011) are silent on the social issues mentioned including child labour protection, age limit for employment in mining, right of host communities and Occupational Health and Safety (OHS) guidelines. Overall, there is conflict between the Federal and State governments regarding the control of mineral resources which is as a result of the gaps in the Land Use Act, Nigeria Minerals and Mining Act 2007 and the Constitution of the Federal Republic of Nigeria 1999 (as amended). Although the 1999 Constitution as amended and the Mining Act of 2007 confers the ownership and control including legislating on issues regarding solid mineral to the Federal Government, the State governments believe that they have control over land following the right granted to the State Governor by the Land Use Act. The States and its citizens are of the opinion that they directly bears the brunt of degradation, social and health impacts caused by mining, and therefore, becomes necessary for the State Government to be involved in the governance and monitoring of mining activities in the State. This condition has resulted to multiplicity of taxes imposed on miners and thus has reduced investment in mining. Furthermore, issues of illegal mining and environmental consequences of open pit mining practiced in Nigeria significantly expose miners and inhabitants living around mining sites.

Recommendations: Key recommendations are presented below while the action plan for implementation of policy, institutional and governance recommendations are documented in Table 8.1 in the document.

ES1.6 Recommendation for Strategic Environmental and Social Issues for the Mining Sector in Nigeria

ES.1.6.1 Strengthening Legal and Regulatory Regime and Environmental Governance

Although the legal and institutional framework for mining in Nigeria is robust, there are areas that need to be fine-tuned and improved upon following concerns raised by stakeholders during the stakeholder workshop. The exclusion of State governments in mining administration in Nigeria although enshrined in the constitution of Federal Republic of Nigeria, 1999 (as amended) and the Mining Act, has some limitations as observed by stakeholders.

Recommendation I: Thus, to reduce the environmental foot print of mining in Nigeria, there is the need to provide some role for the state especially regarding the monitoring of compliance to environmental and social commitments of the miners. Presently, involvement of the state in monitoring is only felt during EIA preparation as coordinated by the Federal Ministry of Environment. This takes place only in the areas of site inspection and stakeholder review meetings. Therefore, we recommend that the mining regulations be updated to assign roles to the state and local governments especially regarding the development and implementation of community development agreements and monitoring of environmental compliance.

Recommendation II: To facilitate compliance with the EIA process and to encourage investment in the sector, MMSD in collaboration with the Federal Ministry of Environment, should enhance the coverage of social and health issue in EIA, ensure that communities where mineral exploitation will take place have access to the EIA report during disclosure and standardize EIA fee a consultant can charge a prospective client.

Recommendation III: The MMSD should propose some amendments in the Mining Act to include some of the issues already identified in this SESA and not captured in the Mining Act, for example, the prohibition of mining within forest reserves and other ecologically sensitive areas or critical ecosystems which are under the control and management of the state government, the inclusion of miners in MIREMCO, among others.

Recommendation IV: To facilitate miners compliance with environmental standards presented and analysed in chapter 4 of this SESA, government through MMSD should enhance the capacity of the Mine Environment and Compliance Department (MEC) especially through adequate staffing and provision of monitoring vehicles to ensure environmental compliance and monitoring.

Recommendation V: The MMSD should develop an action plan to recover all abandoned mine sites. Also, the ministry should ensure that the license of miners that fail to recover the sites where they mined is not renewed. Government should also, after due warning and with a specific time frame of non compliance, for example after one year, revoke the license of miners that failed to reclaim abandoned sites.

Recommendation VI: To facilitate the management and compliance with environmental requirements for mining title holders, a framework for coordination between MDAs involved in environmental issues and MMSD should be put in place beyond signing an MOU. This framework can be incorporated into the Mining Act. Also, to facilitate the institution of Environment Protection and Rehabilitation Fund, there is need to include time line of implementation and enforcement modalities in the Mining Act.

Recommendation VII: MMSD in coordination with FMEnv should mainstream climate change adaptation requirements or co -benefits in the sector operation. This is presently not emphasized in the Nigerian EIA guideline for mining. There is the need for proponents to develop climate change adaptation plan during the preparation of ESIA. Similarly, the mine operators/investors should obtain climate data annually to help in infrastructure design during planning, construction, and implementation phases of mining operations.

Recommendation VIII: The Nigerian EIA process under review is addressing the issue of inclusions of both social and health impact assessment and institutional responsibilities. There is need for MMSD to ensure that the review is reflected in the revised Mineral Act for the sector.

ES 1.6.2 Removing Bottlenecks Regarding the Operation of Licensed and Artisanal Miners

Recommendation I: The MMSD should as a matter of urgency embark on geological survey of mineral deposits and mines in Nigeria. Production of a large scale and high-resolution maps to

guide local and foreign investors in the mineral sector in Nigeria should be developed. This will also facilitate the issues of loans to investors by deposit money banks.

Recommendation II: Given the importance of forming cooperatives by artisanal miners to enable them access credit facilities from the Bank of Industry and Solid Mineral Development Fund; MinDiver should partner local government councils where mining is ongoing to mobilize, organize and register the miners into cooperatives.

Recommendation III: To facilitate the expansion of mining industry in Nigeria, the Central Bank working with commercial banks should provide a credit product specifically for miners

Recommendation IV: There is the need for the review of the Land Use Act so as to accommodate the different issues regarding land ownership in Nigeria.

Recommendation V: To eliminate the problem of multiplicity of taxes, MMSD should collaborate with State and local governments through MIREMCO to agree on specific environmental levies to collect. MMSD should also encourage the Federal Government to withhold derivation payments to any solid mineral producing state that refuses to cooperate in removing this scourge of multiplicity of taxes.

Recommendation VI: Government should formalize illegal miners. This can be done through inviting them to register voluntarily and support them with some incentives.

ES 1.6.3 Child Labour/Limiting Gender Based Violence and Enhancing Women Participation in Mining in Nigeria

Recommendation I: As part of amending the Mineral and Mining Act 2007 and improving the mining regulation, government should incorporate age limit regarding employment in the mining sector. The Mining Act should expressly state the age considered illegal for mining employment or adopt in explicit term the stand of the Nigerian Labor Act, CAP L1 LFN, 2004.
Also, as an immediate measure, government should institute a policy to stop the operation of a mine site where children work as labourers.

Recommendation 2: MinDiver Project should provide women miners with enabling capacity training, skills and information that will help for sustainable competitive mining, and for accessing fund from government or partnership fund owners. MMSD should use the platform of the proposed Solid Mineral Development Fund to prioritize financial grant to women in mining. In addition, the MMSD should, in collaboration with relevant ministries and NGOs, mount a sensitization program at mine sites to discourage discrimination against women.

Recommendation 3: MinDiver will incorporate in the TOR of the specific instruments such ESIA/ESMP the need to carryout mapping of GBV response facilities and services providers in any sub-project/investment location. This will be for the purpose of preparing a GBV action plan for specific investments. The action plan will also include measures that will discourage GBV/SEA occurrences and how victims could be rehabilitated. The GBV management plan will be mainstreamed in any contract for implementation under MinDiver and MMSD in general.

ES.1.6.4 Enhancing the Knowledge of Legal and Regulatory Requirements of Operators in the Mining Industry

Recommendation I: The MMSD should develop and implement a sensitization plan to effectively sensitize the different stakeholders in the sector on the mining act and the regulations especially on the environmental requirements. Miners and mining communities should be sensitized on community development agreement in order to ensure that the community is well protected.

Recommendation 2: There should be adequate training for ASM and local communities on the impact of ASM on the miners, the environment and social lives of the community. MMSD should collaborate with National Orientation Agency to mount a sensitization program round the mining sites and mining communities in Nigeria.

ES 1.6.6 Reducing the Effect of Mining on the Environment

Recommendation I: The MMSD through the MEC department should ensure that mine waste water from licensed and ASM operators is treated before discharge into the surface water at mining sites in line with the EIA regulation.Although, this solution may not provide complete panacea to the effect of water pollution and environment, due to the largely unregulated nature of the sector. However, it will be a good starting point and will go a long way in pollution abatement in the short and medium term.

Recommendation II: As part of compliance, MMSD through MEC department should ensure mining facilities and ASM should provide alternative source of water to discourage the use of run off mines for domestic purposes to prevent exposure to heavy metals contamination (Lead, Mercury and chromium) as witnessed in Ebonyi, Edo, and Plateau. Contaminated soils should undergo remediation to reduce or eliminate the contamination levels of these heavy metals.

Recommendation 111: It is strongly recommended that further in-depth study on cumulative impact of ASM on the environment and the community be investigated during preparation of any mining investment site specific instrument such as ESIA/ESMP.

ES 1.6.7 Reducing the Effect of Mining Reforms on Livelihoods of Artisanal Miners

Recommendation I: The MMSD in collaboration with the Central Bank of Nigeria (CBN) and Bank of Industry (BOI) should build the capacity of artisanal miners in different trade areas and provide them with credit facilities to enable them venture into different livelihood options and thus move away from the mining sector, and for those still in the mining sector, carry out mining activities in a sustainable manner.

ES 1.6.8 Occupational Health and Safety

Recommendation I: MinDiver should develop a robust OHS standard and train the staff of Mines Environmental Compliance (MEC) department on OHS operations including monitoring and enforcement of OHS compliance.

Recommendation II: Government should discourage the prevalence of under age workers in mines environment. Also, as an immediate measure, government should institute a policy to penalise or stop operations of a mine site where children work as labourers.

CHAPTER ONE: INTRODUCTION

1.1 Background

The Nigeria minerals sector performed poorly over the last four decades with little contribution to the Gross Domestic Product (GDP) of the country. Despite the vast mineral resources available in the country, the mining and quarrying sector (excluding oil and gas) contributed only 0.15 percent to the country's GDP in 2015 (at 2010 constant basic prices) (NBS, 2016)[2]. In order to effectively address this poor performance and to help in achieving government economic diversification agenda, the Ministry of Mines and Steel Development (MMSD) developed a roadmap for the growth and development of the Nigeria mining industry with the objectives to strengthen and reform the sector, attract new investors and collaborate with a wide network of partners and stakeholders to rejuvenate the sector and build a prosperous economy propelled by inflows from the solid minerals sector.

To implement the roadmap, the Ministry sought the assistant of the World Bank through the Mineral Sector Support for Economic Diversification (MinDiver) Project to develop the mining sector. The project development objective is "to enhance the mining sector's contribution to the economy by strengthening key government institutions, improving information infrastructure and knowledge, and fostering domestic investment in the sector" (MinDiver PAD 2017)[3].

The MinDiver Project consists of the following components:

- Component 1: Establishing a Strong Foundation for Mining Sector Development
- Component 2: Facilitating Downstream Sector Development and Enhancing Competitiveness
- Component 3: Project Management and Coordination

1.2 Justification for preparing Strategic Environmental and Social Assessment (SESA)

This SESA which is an update to Sustainable Management of Mineral Resources Project (SMMRP) SESA (Coppin, 2005) focused on activities for the proposed improvement of the Nigerian Mining sector for economic diversification which requires strategic policy direction on environmental and social inclusiveness and effectiveness in realizing the overall project development and sustainability. In addition, a SESA was required to ensure the existence of strong institutions, legislations, policies and synergies to proactively address the existing and potential environmental and social challenges associated with the mining sector in Nigeria thereby attracting private sector investment. Mining activities can pose critical risks and adverse impacts to human safety and the environment which may involve the following:

- Increased Abandoned mine pits and associated land degradation such as gully erosion;
- High public safety risk as a result of incidents from falling into abandoned mines, shallow ponds, and poisonous wastes;
- Surface and ground water contamination from mine wastes;
- Air pollution as a result of evaporation of mercury into the atmosphere during Gold mining, dust and other air pollutants;
- Destruction of natural habitat;

[2]NBS (2016) Nigeria Gross Domestic Product Report Quarter One 2016. Abuja, NBS.

[3]World Bank (2017) Project Appraisal Document on a Proposed Credit US$150 million to the Federal Republic of Nigeria for a Mineral Sector Support for Economic Diversification Project (MINDIVER). Washington, The World Bank.

- Alteration of water tables;
- Pollution impact (e.g.: drainage from mining sites, oil spills, soil contamination, etc.);
- Occupational health impacts (e.g.: handling of chemicals, dust inhalation, exposure to cyanide, mercury, unsanitary living conditions etc.);
- GBV/SEA and VAC risk are often associated with women and children due to poor mining practices and ill behavior of mining operators;
- Increased vulnerability situations (effect on livelihood) among women, children and minority groups as a result of land take for mining;
- Health impacts, for example, lead poisoning etc;
- Social conflicts between new individuals at a mine and among indigenes of a community; and
- Armed banditry and crime.

Thus, SESA identified gaps and overlaps in current institutional arrangements, policies and regulations that are responsible for failures to adequately mitigate negative Environmental, Social, Health, Safety and Security (ESHSS) issues and impacts, and enhance positive ESHSS issues and impacts, associated with the mining sector. Although, SESA was prepared for the mining sector in 2005 prior to the development Nigeria Minerals Mining Act 2007 and Minerals and Mining Regulation of 2011, there was need to update the SESA given new developments in the sector and other emerging issues such as gender based violence, occupational/community health and safety etc.; and to ensure that any potential adverse social and environmental impacts are mitigated in accordance with World Bank policies and the National and State laws on environmental protection. The SESA also considered the detailed activities to be undertaken in the MinDiver Project as indicated above. The 2005 SESA was updated to include:

1) An update of baseline data and information concerning the mining sector in Nigeria.
2) Legislative review and update, outlining all current relevant laws, regional policies, and institutional and regulatory adjustments required to integrate social and environmental considerations into mineral sector development. This would strengthen the roles of the relevant Ministry or Departments to ensure effective implementation.
3) Environmental and social priorities and key inter-sectoral environmental and social linkages associated to mining activities in the country is addressed to improve environmental and social sustainability of mining in Nigeria.
4) International comparisons, case studies, examples and best practices on how other developing countries have addressed similar institutional and governance weaknesses for promoting environmentally and socially responsible mining development perculiar to Nigeria.
5) The formulation of mining related policy recommendations to address institutional and governance weaknesses by considering perceptions and concerns of main stakeholders especially, vulnerable groups and the development of SESA action plan.
6) The recommendation of systems that will enable future adjustments of mining related policies in response to experience, new information or changes in stakeholder preferences.

CHAPTER TWO: METHODOLOGY AND APPROACH TO THE STUDY

In order to achieve the objectives detailed in the terms of reference (TOR), the following tasks were undertaken:

(i) Scoping study and review of documents related to SESA as well as stakeholder identification and analysis;
(ii) Field work including data collection and bio-physical sampling;
(iii) Identification of environmental and social impacts and issues;
(iv) Description of the regulatory and institutional framework and assessment of capacity;
(v) Formulation of feasible recommendations; and
(vi) Consultation workshops and disclosure.

Task 1: Scoping Study, Review of Documents Related to SESA and Stakeholder Analysis

This involved extensive review of related documents and substantial stakeholder inputs thereby, identifying and describing key impact areas, regulatory and institutional issues of mining sub-sector that need to be addressed. These involved carrying out the following tasks:

1. Review of the 2005 SESA for the SMMRP, Environmental Study Report 2014 - Technical assistance project for mining sector development in Nigeria through an externally funded output (EFO), the Project Appraisal Document (PAD), the Environment and Social Management Framework (ESMF 2016) and Resettlement Policy Framework (RPF 2016) of the MinDiver Project. Other documents include the Nigeria Minerals and Mining Act 2007, Nigeria Minerals and Mining Regulations 2011 and the Roadmap for the Growth and Development of the Nigerian Mining Industry.

2. Review of guidelines on Environmental Protection and Rehabilitation Plan (EPRP 2016), MIREMCO Handbook, CDA and Artisanal and Small-scale Mining (ASM) Handbook 2018.

3. Review of the environmental and social impact management experience in the sector; the legal, regulatory and institutional framework within which the sector operates; an overview of the environmental and social characteristics of the areas that are most likely to be affected by sector activities, and extensive review of several literature material, publications and reports relating to SESA and also SESA of mining sector of different countries including that of Mozambique, Sierra Leone, etc.

4. Finalization of Stakeholder Identification and analysis**:** As part of the scoping study, key stakeholders have been identified in the mining sector. Highlight of stakeholder analysis is presented in Section 7.2 while full list of stakeholders is in Appendix 1.

Task 2: Field Work including data collection and bio-physical sampling

Selection of States and sites for Field survey: In the selection of mining sites in States the following were considered.

1) The States and sites that were studied during the preparation of 2005 SESA;
2) MinDiver Project intervention areas;

3) The six Mining Cadastre Offices (MCO) located in the six geopolitical zones (Enugu, Jos, Kaduna, Benin, Maiduguri and Ibadan) and Abuja; and
4) The consideration that Nigeria's mineral deposits are spread across most of its 36 states and Abuja with a Federal Mines Officer (FMO) in each of the States of the Federation.

Field visits in States covered in the 2005 SESA include Plateau, Niger and FCT Abuja (North-Central), Gombe and Bauchi (North-East), Kaduna (North-West) and Enugu and Ebonyi (South-East). Based on this, field visits were conducted in these states. Following the consultation with MinDiver PIU during the pre-SESA meeting, the states covered in the South West are Ogun and Ondo, and in the South-South; Cross River and Edo. The additional state that was covered in the North West was Kano State. Thus, a total of 13 States were visited including the FCT Abuja. 14 mine sites covered during the preparation of 2005 SESA was visited in addition to other mine sites that were identified across the States. A list of mining sites visited in the selected States is presented in Appendix 7. The activities carried out under field work are as follows: Stakeholder Consultation which included the development of survey instruments and survey and analysis of the social environment, physical and biological environment at selected mining sites.

Stakeholder Consultation

Extensive stakeholder consultations were conducted in order to realize the objective of the SESA. Stakeholder consultations included key informant interviews, zonal workshops, household interview, and interview of miners at mining sites, focus group discussions (FGD) and questionnaire interviews for each State Ministry of Mines/Mineral Resources or Environment as the case may be.

Key Informant Interviews: Key informants were interviewed which included government officers, community leaders, heads of community based organizations (CBOs), non-governmental organizations (NGOs) and heads/representatives of some mining companies, for example, Mr Obi, Manager Jidech Mining Company, Mkpumakpatapa, Izzi LGA; Chidi Aneke, of Gezapam Nigeria Limited Ivo LGA Ebonyi State; Engr. Isa Karikati Stephen, Quarry Manager, Perfect Stone Quarries Limited Durumi village – Galuwyi district, Mpape in Bwari Area Council; Mr Dauda Davou, Public Relations Officer, Hongyun Mining Industrial Limited, Durumi village – Galuwyi district, Mpape in Bwari Area Council; and Engr. Manager Ebiang Achu Enterprises Mfamosing, Akamkpa LGA, Cross River. The key informants were identified during stakeholder analysis.

Zonal Workshop: Zonal workshops were organized across the six geopolitical zones of Nigeria. Representatives from seven categories of stakeholders namely communities, government, civil society groups, miners, academia, development agencies and the private sector were involved in the zonal workshops. Some of the government organizations that participated in the workshops are staff of MMSD, Ministry of Environment, NESREA, Ministry of Water Recourses, among others (see attendance list in Appendix 8).

Household/Miners Interview: Households, miners and host communities, located within the ASM mining sites were interviewed. This enabled information gathering on socioeconomic attributes of the miners and host communities, perceptions about environmental and social issues

experienced in mining communities and its effect, perception on mitigation options that can be employed to limit the effects of mining on the environment, among others.

Focus Group Discussion (FGD): Focus group discussions were organized in selected mining sites and communities. Two focus interviews were organized in all mining communities visited, one general FGD and a FGD specifically for women. Each of the FGDs mentioned involved ASM and non-miners in the community. The objective was to determine perceptions about environmental and social issues in the mining sector and how it affects them, suggestions on how the problems could be ameliorated and perceptions on government's role in the mining sector, among others.

Questionnaire interview for each State Ministry of Mines/Mineral Resources or Environment: To obtain further information on the mining sector in each State, questionnaires were distributed to States of the Federation that have a Ministry of Solid Minerals and FCT Abuja. Data collected with the questionnaire included baseline data regarding mines and their related environmental, social and health impacts; linkages between ministries; studies of previous environmental, social and economic problems/impacts, pollution sources; evidence of successful resettlement schemes; and health issues. These questionnaires were solicited from four States, namely, Niger, Cross River, Plateau, and Kaduna.

Design of instrument of data collection adequate for data gathering in the case of each of the stakeholder groups:

Instruments of data collection were prepared and designed for targeted stakeholder groups. Depending on the nature and type of information or data, the following multiple survey instruments were used:

- Household Survey instrument – for gathering household related information such as age, marital status, education, income, livelihood, involvement of household in mining value chain, etc.
- Checklist – for gathering environmental and social baseline data that may be determined by spot check, observation or interview.
- Focus Group Discussion (FGD) – required for gathering information specific to groups that may not be known through general household survey; and used as platforms to mainstream inclusiveness of all stakeholder groups including minorities and the vulnerable in the SESA process.
- Key in-depth interview – useful in obtaining detailed information relevant to the SESA from experienced custodians and authorities.

The detailed approach for field study covering the socio-economic aspects including sampling of respondents, sample size, among others is presented in Appendix 2.

Survey and Analysis of Physical and Biological Environment

Surveys of the physical and biological environment of mining sites were carried out. This involved the study of physical parameters namely; air quality, soil and water quality, and noise; and biological parameters, namely, flora and fauna of the mining sites and their status. In line with this, surface and ground water samples and soil samples were collected and analyzed. Also, air quality and noise level measurements in the locations were carried out. This helped to facilitate the analysis of environmental and social impacts of mining operations on the physical

and biological environment of the locations and also on human and biodiversity; thus strategies were recommended to ensure improvements in the mining sector. The methodology for survey and analysis of physical and biological environment is captured in Appendix 3, while the technical report covering detailed approach for field study including methodology, sample collection and analysis, results and implication of findings is presented as an addendum to the SESA as a technical annex.

Task 3: Analysis of Environmental and Social Impacts and Issues and Recommendations for effective Environmental and Social Management and Achievement of the Project Objectives

The environmental and social impacts and issues and the proposed mitigation measures was analysed to provide clarity on:

- The potential environmental and social risks and issues associated with operations in the mining sector including large scale, small scale and Artisanal mining;
- The type, amount, extent, source and adequacy of available environmental and social baseline data, which is or could be relevant to existing and potential mining operations;
- The social and environmental risks and impacts which could be generated or induced by mining development as it affects the MinDiver project, including gender impact assessment and climate change impacts;
- The appropriate recommendation for potential mitigation measures and monitoring requirements that will help to reduce each potential environmental, social and health risks and impact.

Task 4: Description and Analysis of the Existing Policies, Regulations, Institutional Framework and Assessment of Capacity

The existing institutional and regulatory policies relevant to mining sector in Nigeria in terms of its adequacy, weaknesses and gap filling requirements were reviewed. Specifically, the following activities were carried out:

- Review of the World Bank Safeguard Policies (www.worldbank.org/safeguards), World Bank Group Environmental, Health and Safety guidelines (www.ifc.org), Mining Sector Strategic Environmental and Social Assessment (SESA) for Infrastructure (March 2010); *Policy SEA: Conceptual Model and Operational Guidance for Applying SEA in Sector Reform* (World Bank 2010), *Good Practice Guidance for Mining and Biodiversity* (ICMM 2006); the Regulations, Guidelines and Standards of Federal/State Ministries of Environment concerning mining in Nigeria including the Mineral and Mining Act 2007, Nigeria Mineral and Mining Regulations 2011, National Minerals and Metals Policy 2008, and National Gender Policy; the laws, regulations, guidelines and standards of Federal Government of Nigeria on Land expropriation, compensation for land and resettlement and all International Conventions on Environmental Protection and treaties which Nigeria is a party to;
- Review of the existing legal, regulatory, and institutional frameworks, including roles and responsibilities, and the necessary reporting procedures for implementing the SESA; managing and monitoring the environmental and social concerns related to the various activities;

Task 5: Formulation of Recommendations

In view of achieving the project development objectives (PDO) of the MinDiver project, recommendations were made regarding:

- additional environmental and social baseline data to assess or mitigate negative impacts on the social and bio-physical environment associated with any MinDiver sub-project area of influence;
- feasible courses of action to address the institutional gaps and constraints;
- key SESA challenges
- the enhancement of the wider environmental and social benefits of the mining sector development, including advice to implementation and enforcement institutions to strengthen their capacity, and
- SESA Action Plan detailing key tasks, timelines and responsible parties, where possible.

The Action Plan specified measures for improving the environmental and social management of the mining sector that could readily be implemented within each relevant MinDiver Project components.

Task 6: Final Consultations, Review and Approval

In addition, key follow-up activities and discussions necessary to further disseminate and explain the findings and recommendations of the SESA to the public for inputs and information was carried out.

CHAPTER THREE: BASELINE DATA

This section explores the availability of baseline data on environmental and social issues, for two purposes:

a) To examine the current environmental and social issues of mining across Nigeria and equally assess the potential impacts of future development of mining in general; and

b) To determine the knowledge adequacy on the current state of environmental and social conditions of mining sites in Nigeria and the institutional capacity which will be relevant for future mining project-specific ESIAs.

3.1 Overview of Past, Present and Future Mining in Nigeria

3.1.1 History, Occurrences and Commodities

Although mining started in Nigeria over a hundred years ago, formal mining started in 1905 with the mining of iron ore by Royal Niger Company (see Table 3.1) after the mineral surveys of 1903 and 1904 in Southern and Northern Protectorates by the British authorities. This was thereafter followed by the discovery of coal in Enugu in 1909 and its mining which started in 1914 (Baiyewu-Teru, 2015)[4]. Coal mining came into full operation with Ogbete Mine yielding 24,511 metric tonnes of coal in 1916. Also, in 1914, gold mining started in present day Niger and Kogi States. Prior to the discovery of hydrocarbons in the 1950s, mining contributed immensely to the industrialization and development of Nigeria. Coal mining led to the establishment of the railway industry with the initial rail lines built for transporting coal to Port Harcourt seaport. Also, further growth of the sector especially with the mining of tin ore led to the establishment of the largest smelter in Africa, the Makeri smelter in 1961 and the power plant in Jos. Details of the land mark events in the mining sector is presented in Table 3.1.

The discovery of oil in 1956 led to the decline in the performance of the solid mineral sector especially with the switch from the use of coal by the Nigeria Railway Corporation (NRC) and the Electric Company of Nigeria to diesel. The two companies depended on coal for firing its locomotive engines and for power generation respectively. Other factors include the direct participation of government in mining which started in 1971 and the 1972 indigenization policy which led to the exit of foreign corporations involved in mining in Nigeria and the takeover of private sector mining by small scale local miners (Nigeria Extractive Industry Transparency Initiative (NEITI), 2019)[5]. At the time of its boom and with the export of coal, tin and columbite in the 60s and the 70s, the mining sector contributed 4-5 percent of the country's GDP. However, the decline in the performance of the sector led to the drop in its contribution from 5.6% in 1980, at 1990 basic prices, to 0.34 percent, 0.36 percent and 0.38 percent in 2010, 2011 and 2012 respectively (see Figure 3.1). Currently, the contribution of the sector to the GDP is among the lowest although the sector is picking up as a result of the several reforms happening in the sector. The sector's contribution to GDP at 2010 basic prices increased from 0.13 percent in 2016 and 2017 to 0.18 percent in 2018 (see Figure 3.2).

[4]Baiyewu-Teru, A (2015) History: The history of coal in Nigeria. Accessed on August 10 2019 from https://ng.boell.org/2015/12/03/history-history-coal-nigeria

[5]NEITI (2019) Improving Transparency and Governance for Value Optimization in Nigeria's Mining Sector. NEITI Occasional Paper Series Issue 4, Abuja, NEITI.

Table 3.1: Land Mark Events that happened in the Mining Sector

Year	Land Mark Event
1905	Mining of Tin Ore by Royal Niger Company begins
1909	Coal discovered in Enugu
1914	Coal mining begins in Enugu
1914	Gold mining begins in Niger and Kogi States
1919	Geological survey of Nigeria established
1950	Nigeria Coal Corporation Incorporated
1959	Minerals Act created to guide exploration and exploitation of minerals
1961	Makeri smelter established in Jos
1969	Quarries Act created
1971	Direct participation of government in mining begins
1971	The Nigerian Steel Development Authority (NSDA) was established to drive the development of iron and steel
1972	Enactment of Nigeria Enterprise Promotion (indigenization) decree
1972	Nigeria Mining Corporation established
1979	Ajaokuta Steel Company, Delta Steel Company and Inland Rolling Mills established
1995	Ministry of Solid Minerals created
1999	Mining Act instituted
2002	Nigeria Coal Corporation shut down operation
2003	Privatization of Steel Companies begins
2005	Sustainable Management of Mineral Resources (SMMR) project started
2007	1999 Mining Act repealed and 2007 Mining Act instituted
2008	Minerals and Metals Policy established
2011	Nigeria Minerals and Mining Regulations instituted
2012	First strategy roadmap outlining long-term goals of the sector
2016	Roadmap for the growth and development of the Nigerian mining industry was developed
2017	Mineral Sector Support for Economic Diversification (MINDIVER) project started

Source: Ministry of Mines and Steel Development

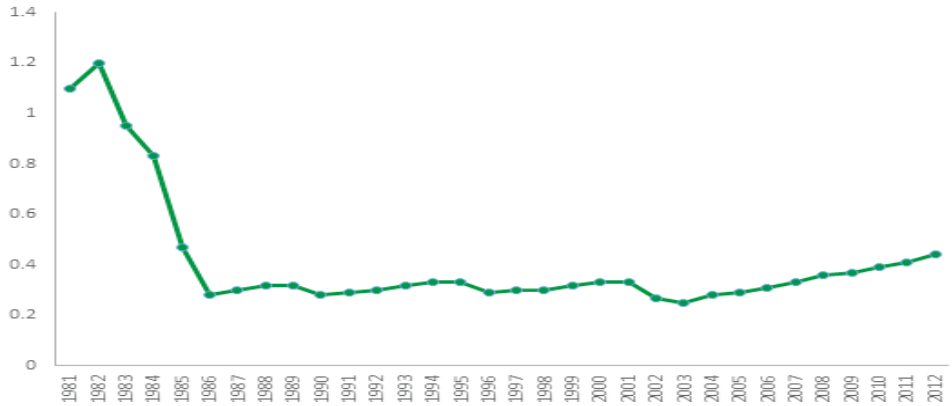


Figure 3.1: Mining and quarrying percentage contribution to GDP (1981-2012) at 1990 basic 1990. Source: Plotted by the authors using Ministry of Mines and Steel Development (MMSD), 2017[6] data.

[6]Ministry of Mines and Steel Development (2017) Nigeria's Mining and Metal Sector Investment Promotion Brochure. Abuja, MMSD.

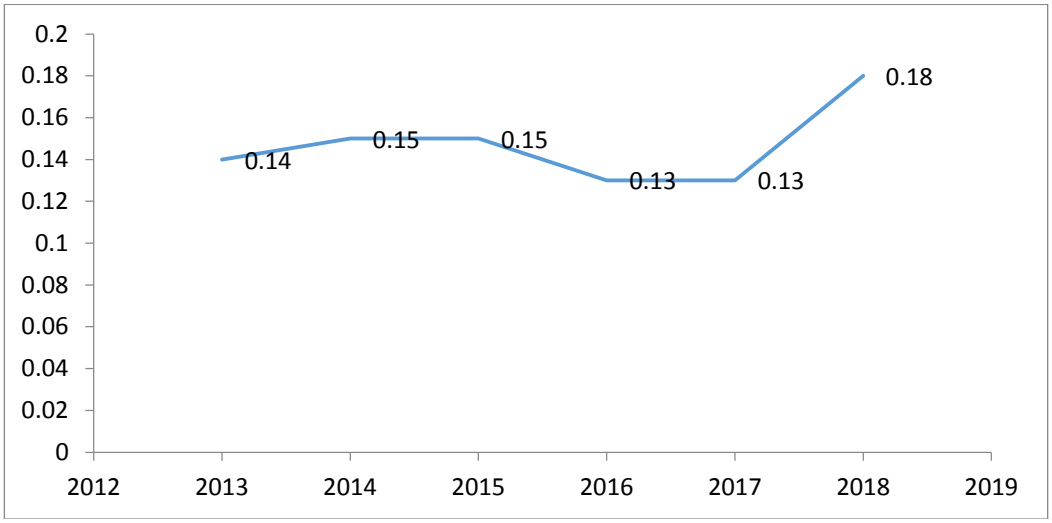


Figure 3.2: Mining and quarrying percentage contribution to GDP (2013-2018) at 2010 basic 2010 prices.
Source: Plotted by the Authors using data from NBS for the various years

In terms of occurrence of solid minerals in Nigeria, mineral resources categorization is done following its use and the geological occurence. In terms of use, five categories exist as follows:

- Industrial minerals (for example, barite, kaolin, gypsum, feldspar and limestone)
- Energy minerals (for example, coal, lignite, bitumen and uranium)
- Metallic ore minerals (for example, gold, columbite, iron ore, cassiterite, copper and lead-zinc)
- Construction minerals (for example, gravel, granite, laterite and sand)
- Precious minerals (for example, tourmaline, topaz, emerald, sapphire, garnet, amethyst)

In terms of the geological occurence, three main categories exist as follows (although some are found in more than one group):

- Pan-African basement rocks (for example, gold, iron ore and coltan)
- Mesozoic Younger Granites (for example, tin and columbite)
- Cretaceous-Tertiary sedimentary basins (for example, lead-zinc, limestone, barite, coal, bitumen)

Figure 3.3 shows the solid minerals locations in Nigeria while Table 3.2 shows the detail of potential minerals found in commercial quantities across the States in Nigeria.

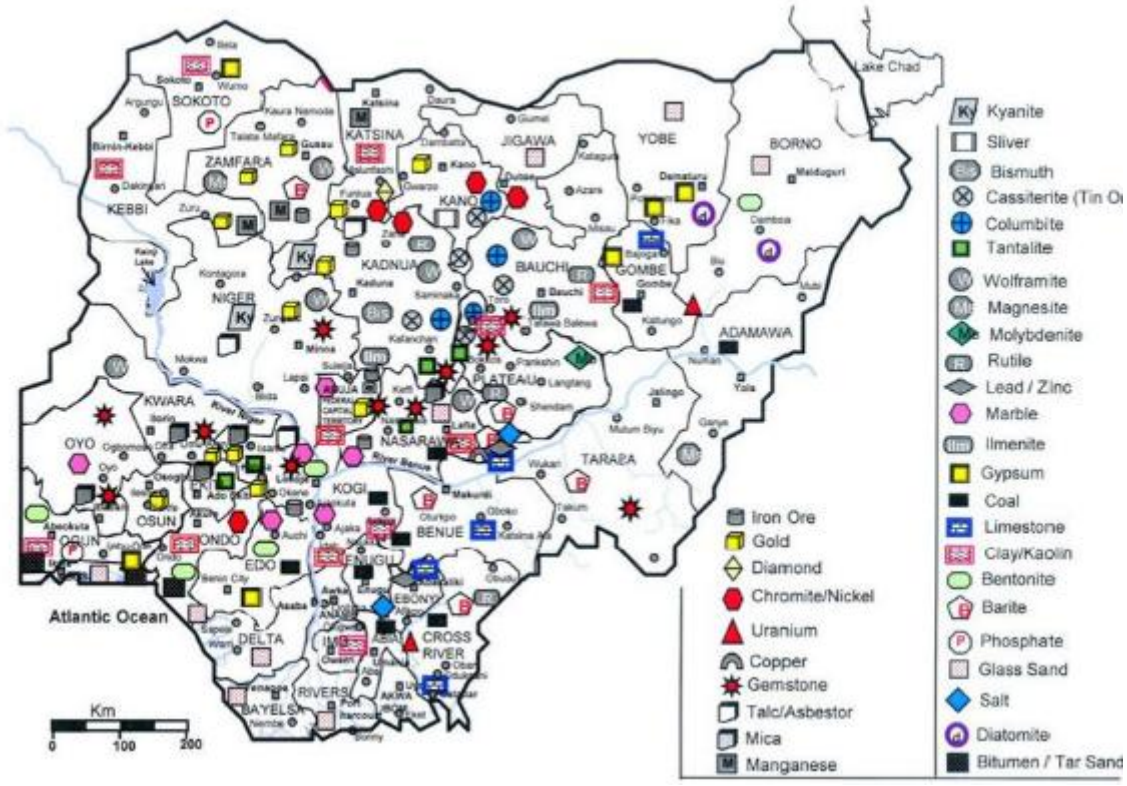


Figure 3.3: Map of Nigeria showing solid mineral locations

Source: Report of the Vision 2020 National Technical Group on Minerals and Metals Development[7] and Ministry of Solid Mineral Development, 2005[8]

The map shows that a total of 43 solid minerals were produced in the country in 2018 (NBS, 2018)[9].

[7]Report of the Vision 2020 National Technical Working Group on Minerals And Metals Development (July,2009).
[8]Ministry of Solid Mineral Development (2005) Sectoral Environmental and Social Assessment. Abuja, MSMD.
[9]NBS (2018) State Disaggregated Mining and Quarrying Data 2018. Abuja, NBS.

Table 3.2: Potential minerals in commercial quantities found in the States in Nigeria

S/No	State	Potential minerals in commercial quantities
1	Abia	Glass sand, limestone, salt, shale, ball clay, granite, galena, marble laterite, bentonite, phosphate, kaolin,pyrite, feldspar, petroleum, lignite, gypsum, sphalerite, clay
2	Adamawa	Feldspars, flourspar, marble, gypsum, magnesite, tantalite, rock crystal, laterites, topas, sandstones,mercury, glass sand, zircon, spinel, emerald, graphite, beryil, tourmaline, mica, iron ore, clay minerals,diatomite, coal, garnet, aquamarine, gold dust, zoisite, cassaterite, agates, amethyst chalcopyrite, kaolin,limestone, chalcedony, onyx, barytes, zinc, tin, uranium, quartz, mica, wolframite, columbite, platinum,ruby
3	Akwa Ibom	Clay, glass sand, salt, silica sand, granite, coal, petroleum, natural gas, kaolin, limestone, lignite
4	Anambra	Clay, iron stone, natural gas, petroleum, sand stone, kaolin, pyrite, lignite
5	Bauchi	Kaolin, trona, gypsum, cassiterite, mica, clay, tantalite, galena, iron ore, gemstone, sphalerite, silica sand,barite, columbite, zinc, lead, muscovite, quartz, tin, glass sand, monazite, feldspar, graphite, wolfram,coal, agate, rutile, tungsten, copper, talc, limenite, ziron
6	Bayelsa	Salt, natural gas, silica sand, bentonite, petroleum, limestone, glass sand
7	Benue	Gemstone, barites, feldspar, marble, mica, silica sand, quartz, galena, lead, zinc ore, silica sand, clay,crushed and dimension stone, fluorspar, wolframite, bauxite, shale, magnesite, illmenite.
8	Borno	Silica sand, natural salt, sapphire, topaz, mica, quartz, gypsum, uranium, iron ore, megnesite, fedspar,granite aquamarine, nepheline, limestone, kaolin, bentonite, laterite, refractory clay, trona, gold,tin, potash
9	Cross River	Salt limestone, coal, maganese, mica, limenite, gold, quartz, glass sand, tourmaline, petroleum, naturalgas, kaolin, tin ore, sharp sand, spring water, salt deposit, talc , granite, galena, lead, zinc, tin ore,muscovite, uranium, barite
10	Delta	Kaolin, lateritic clay, gravel, silica sand, natural gas, petroleum, ball clay, bauxite, granite, river sand, clay,spring water
11	Ebonyi	Lead, zinc ore, salt, limestone, ball clay, refractory clay, gypsum, granit
12	Edo	Charonokite, copper, gold, marble, granite, gypsium, petroleum, dorite, lignite, limestone, ceramic clay
13	Ekiti	Clay, charnokite, quartz, lignite, limestone, granite, gemstone, bauxite, cassiterite, clumbite, tantalite,feldspar, kaolin
14	Enugu	Laterite clay, crude oil, kaolinitic clay, iron ore, glass sand, petroleum, gypsum, coal, silica sand ceramics, limestone
15	Gombe	Graphite, kaolin, limestone, silica sand, uranium, coal, halites, clay, gypsum, diatomite, granite
16	Imo	Petroleum, shale, natural gas, kaolin, laterite sand, limestone, salt, marble
17	Jigawa	Glass sand, granite, laterite clay, silica, kaolin, iron ore, quartz, potash, talc, illmenite,gemstone, columbite
18	Kaduna	Muscovite, granite, gold, manganese, clay, graphite, sand, zircon, kyanite, tin ore, illmenite,gemstone, columbite
19	Kano	Clay, laterite, cassiterite, columbite, illmenite galena, phyrochlorite, kaoline, gemstone, silica,tin ore, monazite, wolframite, thorium, granite, hyalite, kaolin, beryl, amethyst, gold
20	Katsina	Gold, manganese, lateritic, clay, feldspar, black tourmaline, amethyst, quartz, kaolin, mica,gypsum, silimanite, clay, granite, sand, uranium asbestos, tourmalin, chromites, illmenite,diamond, graphite, iron ore, potash, silica sand
21	Kebbi	Salt, iron ore, gold, feldspar, limestone, quartz, bauxitic clay, manganese, kaolin, mica
22	Kogi	Clay, iron ore, gemstone, marble, limestone, feldspar, dolomite, phosphate, mica, cassiterite,granite, ornamental stone, coal
23	Kwara	Clay, kaolin, silica sand, quartz, dolomite, marble, feldspar, gold, tantalite, cassiterite, granite,limestone
24	Lagos	Silica sand, bitumen, sharp sand, gravel, petroleum, laterite
24	Nasarawa	Cassiterite, gemstone, amethyst, beryl, chrysolite, emerald, gamet, sapphire, topaz, barites,galena, monazite, zicron, glass sand, coal

26	Niger	Bell clay, kaolin, limestone, granite, glass sand, iron ore, red clay, feldspar, silica sand, quartz,asbestos, marble, talc, gemstone, gold, manganese and tantalite
27	Ogun	Kaolin, feldspar, silica sand, mica, granite, clay, phosphate, gypsum, limestone, quartz, tar sand
28	Ondo	Marble, gold, gemstone, diorite, lignite
29	Osun	Clay, granite, talc, dolomite, feldspar, quartz, limestone, mica, gold
30	Oyo	Clay, feldspar, granite, limonite, iron ore, kaolin, quartz, talc, marble, dolomite, tourmaline,aquamarine, amethyst, gemstones
31	Plateau	Monazite, columbite, feldspar, clay, cassiterite, gemstone, kaolin, dolomite, mica, zicron, marble,limonite, barite, quartz, talc, galena
32	Rivers	Petroleum, natural gas, silica sand, glass sand, clay
33	Sokoto	Silica sand, clay, salt, limestone, phosphate, gypsum, kaolin, laterite, potash, granite
34	Taraba	Fluorspar, gamet, tourmaline, sapphire, zicron, tantalite, columbite, cassiterite, barite, gelena,limestone, laterite, calcite, bentonitic clay, Sapphire
35	Yobe	Salt, trona, diatomite, clay, gypsum, kaolin silica sand, limestone, epsomite, iron ore, shale,uranium, granite, bentonic clay
36	Zamfara	Gold, alluvia gold, granite, chromites, chamorckite, clay, feldspar, spring water
37	FCT	Limestone, kaolin, granite, marble, feldspar, mica, dolomite, clay, sand, talc, Lead, Zinc and Gold

Source: Ministry of Mines and Steel Development (MMSD), 2017[10]

3.1.2 Legacy of Past Mining

Nigeria has, just like other countries, a legacy of dereliction from past and recent mining activities, arising from colonial mines in the 19th and early 20thCenturies and more recent artisanal mining. With the exception of some States, for example, Plateau State and Enugu State, this is not a widespread problem. However, some of the occurrences are serious; for example, the abandoned sites at Kuru, Jos South LGA (see Figure 3.4) which has become a major source of pollution and also the abandoned Okpara Mine site in Enugu (figure 5)which is now used by criminals as hideout and has become a major social problem. The environmental problems that are evident include abandoned tailings and other dumps, some toxic materials, open mine entries and open pits, with unstable slopes and unstable ground associated with shallow underground workings. Also, artisanal mining activity has left large areas of deforestation and degradation. Figure 3.6 shows pictures of abandoned mine sites at Umuoghara community in Izza North LGA of Ebonyi State, a site that was very active.

In view of the above an inventory of abandoned mines and quarries was carried out through out Nigeria by MMSD and the environmental and social effects of past mining activities were categorised according to their risk factors.

Another major issue regarding past mining in Nigeria is the incidence of lead poisoning in Zamfara State in March 2010. The poisoning which caused the death of about 400 children (MSF,2012)[11] affected villagers in three Local Government Areas (LGAs): Anka, Bukkuyum and Maru (WHO, 2011)[12]. Unsafe mining and ore processing was implicated as the root cause of the health crisis (MSF, 2012). Lessons from the crisis include the need for formalization of artisanal miners, mine site surveliance, enlightenment campaing and extension services, monitoring and evaluation and enforcement of the Mining Act.

[10]Ministry of Mines and Steel Development (2017) Nigeria's Mining and Metal Sector Investment Promotion Brochure. Abuja, MMSD.

[11] Medecins Sans Frontieres (MSF) (2012) Lead poinsoning crisis in Zamfara State Northern Nigeria. MSF Briefing Paper.

[12] WHO (2011) Nigeria: mass lead poisoning from mining activities, Zamfara State-Update https://www.who.int/csr/don/2011_11_11/en/ (assessed on 20 April 2020).

Figure 3.4: Abandoned mine sites and pits at Kuru mine site in Jos South LGA, Plateau State

Figure 3.5: Abandoned site at Okpara mine CPS Ogbete Enugu

Figure 3.6a: Abandoned mine site at Umuoghara in Izza North LGA

Figure 3.6b: Doctors treat lead-poisoned children in Zamfara
source:https://thenationonlineng.net/zamfara-doctors-treat-lead-poisoned-children/;
http://omojuwa.com/2013/12/zamfara-doctors-treat-lead-poisoned-children/

3.1.2 Current Mining Activities

With the exit of large foreign companies involved in mining in Nigeria in the early 70s following government's indigenization policy (NEITI, 2019)[13], mining is mainly carried out by artisanal and small-scale miners (ASM) that rely on manual labour and simple tools with few companies with heavy mining equipment. According to ASM Handbook (MMSD 2011)[14], Artisanal Miners accounts for over 90% of mineral mining in Nigeria. Available record shows that limestone and granite are the most mined minerals in Nigeria as at 2018 (see Table 3.3) and largescale companies, especially cement manufacturing companies, were mainly responsible for the output. Africa Check[15] disputes that ASM is responsible for 90% of mineral mining in Nigeria. ASM miners generally have poor access to finance which has limited their expansion and thus value addition and diversification although the situation is being ameliorated through the ASM credit scheme. Although some ASMs have access to the credit scheme administered through the Bank of Industry (BOI), many miners still complain of poor access to the credit facility due to stringent measures required and the difficulty in achieving the requirements. For example, artsinal miners complained that their cooperatives could not secure the mineral title required as large-scale mining companies have taken over the license for the minerals in their location even without "real community consent" due to administrative weaknesses in issuing of mineral titles.

In terms of mining output in Nigeria, production data is mixed in quality and depth and often understated given the fact that the greatest proportion of mineral production in Nigeria is being dominated by ASM operators (MMSD, 2017)[16]. However, this statement was disputed by Africa Check (Africa Check. 2018)[17]. Table 3.3 shows the detail of mineral production figure in 2018.

Table 3.3: Mineral Production Figure in 2018

S/No	Minerals	Production Figure (tonnes)
1	Aquamarine	6,820.11
2	Amethyst	6.30
3	Baryte	387.00
4	Beryl	35.00
5	Clay	3,468,007.79
6	Coal	352,679.01
7	Columbite	1,814.04
8	Coltan	139.00
9	Copper	30.00
10	Dolomite	17,877.00
11	Feldspar	41,355.38
12	Garnet	0.80
13	Gold	0.039111
14	Granite	9,627,160.29
15	Granite Aggregates	2,115,913.07
16	Granite Block	28,420.90

[13]NEITI (2019) NEITI Ocassional Ppaer Series, Issue 4. Abuja, NEITI.
[14]MMSD (2011) ASM Handbook for Nigeria. Abuja, MMSD.
[15]Africa Check (2018) Digging up the numbers of informal mining in Nigeria. www.africacheck.org/reports/digging-up-the-numbers-on-informal-mining-in-nigeria/.
[16]Ministry of Mines and Steel Development (2017) Nigeria's Mining and Metal Sector Investment Promotion Brochure. Abuja, MMSD.
[17]Africa Check (2018) Digging up the numbers of informal mining in Nigeria. www.africacheck.org/reports/digging-up-the-numbers-on-informal-mining-in-nigeria/.

17	Granite Dust	3,395,591.61
18	Gypsum	39,051.61
19	Iron Ore	1,582.77
20	Kaolin	11,706.80
21	Laterite	5,076,092.07
22	Lead/Zinc	310,653.00
23	Lithium	1,266.70
24	Limestone	27,195,278.76
25	Marble	16,695.23
26	Marble Aggregates	7,113.52
27	Manganese	159,529.36
28	Mica	3,546.67
29	Ruby	2.00
30	Sand	2,285,714.96
31	Sandstone	133.30
32	Sapphire	644,072.00
33	Shale	946,351.00
34	Silica Sand	37,721.00
35	Talc	2,667.99
36	Tantalite	920.10
37	Tin Ore (Cassiterite)	11,720.69
38	Topaz	22.24
39	Tourmaline	407.53
40	Wolframite	129.00
41	Quartz	928.20
42	Zircon	889.90
43	Zircon Sand	530.80
	Total	55,810,964.53

Source: National Bureau of Statistics (NBS), 2018[18]

The data on mining and quarrying output for 2018 shows that Nigeria produced a total of 55,810,964.53 tonnes of solid minerals. Limestone with a production figure of 27,195,278.76 tonnes had the largest output and this was followed by granite with 9,627,160.29 tonnes while the last was ruby with only 2.00 tonnes. In addition, the map of Nigeria showing the solid mineral location based on 2018 production (43 minerals were mined) is shown in Figure 3.7 while the actual production for each State is shown in Table 3.4

[18]NBS (2018) State Disaggregated Mining and Quarrying Data 2018. Abuja, NBS.

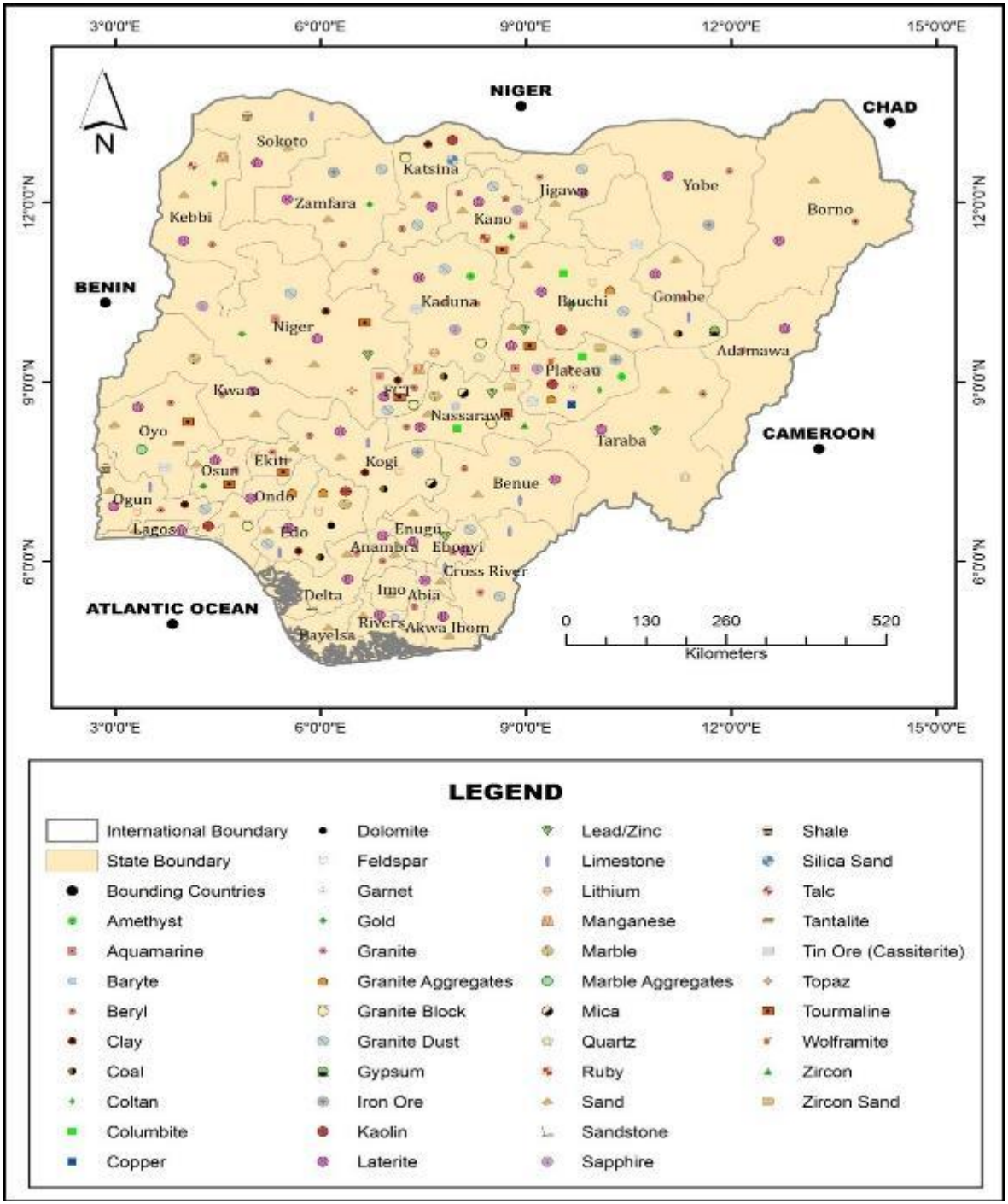


Figure 3.7: Map of Nigeria showing solid mineral location based on 2018 production
Source: Produced by the Authors

Table 3.4: Mineral Production Figure in 2018 according to States

State	Production Figure (tonnes)
Abia	174,562.12
Adamawa	76,567.70
Akwa Ibom	1,918,604.34
Anambra	221,675.52
Bauchi	191,989.20
Bayelsa	-
Benue	805,277.10
Borno	8,403.30
Cross River	3,493,458.00
Delta	242,300.60
Ebonyi	1,486,660.96
Edo	1,705,607.36
Ekiti	70,177.81
Enugu	136,672.60
FCT	1,894,280.63
Gombe	1,465,130.88
Imo	42,900.00
Jigawa	119,583.25
Kaduna	838,983.66
Kano	795,244.86
Katsina	928,331.35
Kebbi	176,878.35
Kogi	15,134,541.35
Kwara	75,596.55
Lagos	1,311,503.86
Nasarawa	108,276.21
National	55,810,964.55
Niger	107,124.48
Ogun	16,497,405.04
Ondo	1,435,697.92
Osun	84,202.25
Oyo	568,498.26
Plateau	90,654.90
Rivers	19,548.68
Sokoto	1,644,826.34
Taraba	336,328,00
Yobe	41,591.49
Zamfara	1,561,879.66

Source: National Bureau of Statistics (NBS), 2018[19]

The data on States disaggregated mining and quarrying output for 2018 shows that Ogun State produced the highest tonnes of solid minerals among the 36 States and the FCT. The State produced 16,497,405.04 tonnes of solid minerals representing 30 percent of the total tonnes of solid minerals produced in the year under review. Likewise, Kogi and Cross River States followed closely with 15,134,541.35 and 3,493,458.00 tonnes of solid minerals produced representing about 27 percent and 6 percent of the total tonnes of the minerals produced while Bayelsa and Borno States produced the least tonnes of solid minerals with zero and 8,403.30 tonnes of minerals produced respectively.

[19]NBS (2018) State Disaggregated Mining and Quarrying Data 2018. Abuja, NBS.

Table 3.5 gives a summary of the environmental and social issues encountered through the field visits in Nigeria. The detail of environmental issues associated with different minerals is presented in Appendix 5.

Table 3.5: Summary of mine sites visited and the environmental and social issues encountered through the field visits in Southern and Northern Nigeria

Site No.	Name of Site	State/location	Mineral	GPS Coordinates	Category	Mining/processing	Environmental & social issues
1	Omene Miners Multipurpose Cooperative Society (MPCS)	Opi, Nsuka LGA, Enugu	Sand	Lat. N 6°45'8.97" Long. E 7°29'21.264"	ASM	Manual digging of sand, loading of sand in trucks, and abandoned mining pits.	Destruction of vegetation, Gully erosion, destruction of access roads, conflicts between miners and youths and social ills and lack of shelter at mining sites.
2	Tinug Resources Concept Ltd	Nyama-Attakwu, Nkanu West, Enugu	Sand	Lat N06^{0}45^{I}41.4^{II}Long E 07^{0}28$^{'}$38.7$^{''}$	Licensed-SSML	Manual digging and machine excavation of sand, loading of sand in trucks.	Destruction of vegetation, Gully erosion, destruction of access roads, conflicts, and social ills (for example use and abuse of drugs at mining site)
3	Okposi Umuoghara Stone Dealers Association	Umuoghara Izza North LGA, Ebonyi	Limestone and Granite	Lat N6^{0}18^{I}51.9^{II} Long E08^{0}02^{I}19.9	ASM	Machine crushing and sorting of stones, men and women involved in the activities.	Air pollution from dust particles, noise from machines, destruction of vegetation and deforestation, flooding, health and safety issues as workers have no protective clothing.
4	Jidech Mining Company,	Mkpumakpatakpa Izzi LGA	Lead and Zinc	Lat. N 6°23'35.26302" Long. E 8°9'49.59875"	Licensed-Mining Lease	Digging, splitting/sorting and bagging of lead/zinc ore	Air pollution from dust particles, noise from machines, destruction of vegetation and deforestation, health and safety issues as workers are exposed to lead poisoning, pollution of stream used by locals.
5	Abimfam community miners	Akamkpa LGA, Cross River	Limestone	N 05' 04' 57.3" E 08' 31' 31.75"	ASM	Open pits, digging, splitting and bagging of limestone	Air pollution, destruction of vegetation, health and safety issues (chest pain, waist and shoulder pain, palm tear), poor market access.
6	Ebiang Achu Enterprises	Camp 11, Mfamosing, Akamkpa LGA, Cross River	Iron ore	Lat. N 5°5'13.54376" Long.E 8°31'52.26634"	Licensed - SSML	Excavation and digging to retrieve ore,	Air pollution, destruction of vegetation, erosion due to abandoned mine pits, polluted water (streams and boreholes), and cracking of walls of houses due to heavy vibration from blasts.

7	Oguotso MPCS	Ikpeshi Community Akoko Edo LGA, Edo	Limestone		ASM	Manual Digging, crushing and loading of limestone into trucks.	Destruction of vegetation and biodiversity, air pollution, noise, health and safety risks of workers at mine sites.
8	Somak Industries Nig Ltd	Ikpeshi Community Akoko Edo LGA, Edo	Limestone	Lat. N7°9 ' 50.886 " Long. E6°12 ' 8.058 "	Licensed-Quarry Lease	Blasting of stone, machine crushing, bagging of limestone, and loading of limestone into trucks.	Destruction of vegetation and biodiversity, air pollution, noise, health and safety risks of workers at mine sites, blasting with explosives resulting to damage to buildings, destruction of land for farming.
9	Ajasqo Quarry	Ajegunle, Akure South, Ondo	Sand, stone and gravel		ASM	Manual digging of sand and braking of stones, loading into trucks.	Deposition of harmful material into streams, clearing and destruction of vegetation, noise, health and safety issues, contamination of drinking water.
10	EBH Granite Limited	Ofosu, Idan LGA, Ondo State	Granite	Lat. N6°46 ' 3.534 " Long. E5°6 ' 19.296 "	Licensed – Quarry Lease	Blasting and machine crushing of granite, grading/separation into different sizes and loading into trucks.	Deposition of harmful material into streams, clearing and destruction of vegetation, health and safety issues, and contamination of drinking water.
11	SID Farms Global Resources Ltd.	Momi Village, Odeda LGA, Ogun	Feldspar		Licensed – SSML	Drilling and blasting; loading into trucks; and Open pits filled with water.	Noise pollution, cracking of walls and collapse of building due to blasting, drinking water contamination from mining activity, and destruction of community roads.
12	DLK Stone quarry Limited	Odugbayi Village, Odeda LGA, Ogun	Granite	Lat. N7°19 ' 47.676 " Long. E3°36 ' 5.718 "	Licensed – Quarry Lease	Drilling and blasting; machine crushing and separation of different sizes of stones; and loading into trucks.	Noise, air pollution, loss of vegetation and biodiversity, health and safety issues at site.
13	Ishiagu Quarry-Crush Rocks Ltd	Ishiagu, Ivo LGA, Ebonyi	Granite		Licensed	Reduced operation due to breakdown of equipment, machine crushing and separation of different sizes of stones.	Destruction of vegetation, pollution from dust from mining, nose from use of heavy equipment, conflict over ownership of mine sites with a new company, Pioneer Siro Chino;
14	Ishiagu Mine-	Ishiagu, Ivo LGA	Lead and	Lat	Licensed	Open pits, Digging,	Flooding, air pollution from dust

	Gexpam Nigeria Ltd	Ebonyi	Zinc	N05^{0}55^{I}41.4^{II} Long E07^{0}29^{I}38.4^{II}		splitting/sorting and bagging of lead/zinc ore	particles, noise from machines, destruction of vegetation and deforestation, health and safety issues as workers are exposed to lead poisoning, pollution of stream used by locals.
15	Okpara Mine	Enugu North LGA, Enugu	Abandoned Coal mine			Nil	Abandoned and rusting structures, open mine tunnel used by criminals as hideouts.
16	Ogbete CPS Mine	Enugu North LGA, Enugu	Abandoned Coal mine			Nil	Abandoned and rusting structures, open mine tunnel used by criminals as hideouts.
17	Galadima Kogo	Shiroro LGA, Niger State	Gold	Lat N 10 03 19.4" Long E 006 48' 41.4"	ASM	Excavation/digging, identify and select gold vein, crushing, milling into powder, wash off sand from Gold Dust/Nuggets, sieve, use mercury to amalgamate, heat to 500^{o}C to evaporate the mercury, melt the Gold to 1200^{o}C and pour into the mold to get the Gold bar	Destruction vegetation, Groundwater pollution; heavy metal poisoning; pitfalls in abandoned mining areas; devastation of farmlands, high rate of school dropout. (children abandon school for mining), minor conflicts between landowners/farmers and miners.
18	African Mineral and Logistics Limited	Shiroro LGA, Niger State	Gold	Lat N10 02' 18.5" Long E006 46' 34.2"	Licensed-SSML	As Above	As above
19	Checheyi village artisanal mining site	Kwali Area Council, FCT	Gold and Wolframite		ASM	Excavation/digging, identify and select gold vein, crushing, milling into powder, panning using chemicals, etc	Destruction of vegetation, Water pollution especially from panning, heavy metal poising, loss of farm lands. There is increased income from mining including acquisition of assets e.g. motorbikes; also increased crime rate due to influx of visitors and strangers, very high rate of school dropouts, prostitution, sexual abuse of young girls as indicated by

							participants at the focus group discussion.
20	Perfect Stone Quarries Limited	Durumi village – Galuwyi district, Mpape in Bwari Area Council	Granite	Lat. N9°10ˈ 45.6" Long. E7°30ˈ7.014"	Licensed	Blasting and machine crushing of granite, grading/separation into different sizes and loading into trucks.	Deposition of harmful material into streams, clearing and destruction of vegetation, health and safety issues, contamination of drinking water, noise from heavy machines.
21	Hongyun Mining Industrial Limited	Durumi village – Galuwyi district, Mpape in Bwari Area Council	Granite	Lat. N9°9ˈ43.5" Long. E7°29ˈ 58.9"		As above.	As above
22	Kuru Miners MPCS	Jos South LGA, Plateau State	Tin and Columbite	Lat $N09^{0}41^{I}39.4^{II}$ Long $E008^{0}50^{I}41.6$	ASM	Digging long trenches to extract the minerals.	Reduced land for agriculture, health issues especially due to stagnant water in abandoned mine sites, water pollution, air and noise pollution, and also no discrimination due to gender.
23	Solid Unit Nigeria Limited	Kampany Zurak, Wase LGA, Plateau State	Lead-Zinc		Licensed, SSML	Open pits, Digging, splitting/sorting and bagging of lead/zinc ore	Pollution from dust particles, noise from machines, destruction of vegetation and deforestation, health and safety issues as workers are exposed to lead poisoning, pollution of stream used by locals.
24	Al'Saab Quarry multipurpose Society	Sauna, Gezawa LGA, Kano State	Granite	Lat. N12°1ˈ 41.11" Long. E8°36ˈ3.17"	ASM	Hand crushing of granite, grading/separation into different sizes and loading into trucks	Clearing of vegetation, air pollution, water contamination, noise, health and safety issues

25	Sauna Quarry Hand Crushers Asso	Sauna, Gezawa LGA, Kano State	Granite	Lat. N12°1' 41.38" Long. E8°36' 3.38"	QL	Blasting and machine crushing of granite, grading/separation into different sizes and loading into trucks	Clearing of vegetation, air pollution, water contamination, noise due to heavy machines, health and safety issues
26	Malali Quarry	Kaduna North LGA	Granite		ASM	Working with hand tools e.g. shovels, hammers. Hand crushing, grading/separation into different sizes and loading into trucks	Deterioration of ambient air quality due to the release of fugitive dusts, occupational accidents and injuries as a result of lack of clothing and protective equipment, child labor, risk of communicable diseases for example, HIV/AIDS due to influx of people.
27	Datum Construction Company Limited	Chikun LGA Kaduna	Granite	Lat. N10°29' 17.86" Long. E7°37' 43.68"	Quarry Lease	The operation is carried out with excavator, bull dozer, etc.It involves machine crushing of granite, grading and separation into different sizes and loading into trucks.	Air pollution due to dust particles, noise pollution, issues of health and safety of workers, destruction of vegetation.
28	Hamdala Multipurpose Cooperative Society Ltd,	Nafada, Nafada LGA., Gombe State	Gypsum	Lat 11 6'7.17444" Long 11 21'49.90068"	ASM	They miners use digger, shovel, head pan and axe in the operation. The operation involves digging of pit and extraction of gypsum.	Disruption of landscape which is visible even from a distance, noise pollution/vibration from moving vehicles to and from the mine site, occupational accidents, and risk of communicable diseases.
29	Triacta Nigeria Limited.	Akkao LGA, Gombe State	Granite	Lat 11 12' 45.3" Long 10 18' 26.0'	Quarry Licence	It involves machine crushing of granite, grading and separation into different sizes and loading into trucks.	Air pollution due to dust particles, noise pollution, issues of health and safety of workers, destruction of vegetation.

30	Gypsum Miners Association Tongo	Funakaye LGA, Gombe State	Gypsum	Lat 10 42'47.8" Long 11 23'14.5"	ASM	The miners use mattock, shovel, head pan and axe in the operation. The operation involves digging of pit and extraction of gypsum.	Disruption of landscape, noise pollution/vibration from moving vehicles to and from the mine site, clearing of vegetation, air pollution, occupational accidents, and risk of communicable diseases.
31	Dawa Multipurpose Cooperative Mine	Wundi Village, Toro LGA Bauchi State	Tin and Columbite		ASM		Destruction of vegetation, air pollution, increases in crime rate as a result of mining in the community, child labour/under age mining, increase in drop out of children from school, health and safety issues.
32	SLAG Global Investment	Gadabiu Village, Bauchi, Toro LGA	Tin and Gold		SSML		Destruction of vegetation and landscape, air and water pollution ,
33	Gwaram Multipurpose Cooperative	Alkaleri LGA , Bauchi	Kaolin	Lat. N10°11 ' 28.1" Long. E10°15 ' 36.8"	ASM		Air and water pollution, destruction of vegetation and landscape, child labour and increased school dropout rate.
34	Xenotime Nigeria Ltd	Gadabiu, Toro LGA, Bauchi	Tin, Columbite, Gold and Copper		Licensed		Destruction vegetation, Groundwater pollution; heavy metal poisoning; pitfalls in abandoned mining areas; devastation of farmlands, abandoned pits.

Source: SESA Field Work 2019.

3.1.3 Future Mineral Extraction

Nigeria has designated some minerals as strategic given their potential to contribute to economic development of the country. The minerals are coal, gold, iron ore, lead/zinc, bitumen, barite, and limestone. To achieve the desired diversification of the sector, there is need to focus on large scale mining without neglecting the ASM which is also very relevant in rural development and poverty reduction. In fact, government and donor agencies consider formalised ASM as a means of facilitating socioeconomic development and poverty reduction.

ASM ranges from artisanal miners to small scale mechanised outfits of various levels depending on financial capacity (MMSD, 2011)[20]. The Minerals and Mining Act, 2007 defines artisanal mining as mining operations limited to the utilisation of non-mechanised methods of reconnaissance, exploration, extraction and processing of mineral resources within a small-scale mining lease area. Artisanal mining makes use of mainly hand tools (Figure 3.8) which will not drive large scale extraction of minerals. On the other hand, the Minerals and Mining Act defines small-scale mining as artisanal, alluvial and other forms of mining operations involving the use of low-level technology or application of methods not requiring substantial expenditure for the conduct of mining operations within small-scale lease areas. Figure 3.9 shows a small-scale mining site in Ebonyi State. Since the 70s, ASM has continued to dominate mining activities in Nigeria (MMSD, 2011)[21], although current data shows that largescale mining, especially by cement companies is responsible for solid minerals produced in largest quantity in Nigeria currently, namely, limestone, granite and laterite.

Figure 3.8: Limestone mining by artisanal miners in Abimfam community in Akamkpa LGA of Cross River State

[20]MMSD (2011) ASM Handbook for Nigeria. Abuja, MMSD.
[21]MMSD (2011) ASM Handbook for Nigeria. Abuja, MMSD.

Figure 3.9: Small scale Mining of Lead and Zinc Ore at Jidech Mining Company, Mkpumakpatapa, Izzi LGA Ebonyi State

3.2 Baseline Environmental Conditions in Nigeria

The baseline Environmental data relevant to the mining sector is available in Nigeria. A compilation of this data, including a summary of the environmental conditions and its relevance is given in the following sections.

3.2.1 Physical Environment

3.2.1.1 Availability of data

Table 3.6 summarises the data availability on a range of physical themes.

Table 3.6: Summary of data availability on physical themes

Factor	Responsible MDA	Baseline data available	Area Covered	Information availability
Climate	NIMET	P, D, HQ, S, **	National	General Climate information about Nigeria is available.
Soils	Agriculture	P, HQ, **	National Area (all old)	Secondary data on Nigeria land area including arable land area is available even from Food and Agriculture Organization (FAO)
Hydrology	Water Resources	P, D, HQ, S, to **	National River basins	Data on national rivers and basins are readily available from various sources including FAO.
Geology	Geology	P, HQ, S, to **	National State Quarter degree	Some information on Nigeria geology is readily available.
Hydrogeology	Water Resources Geology	P, D, HQ, RL, ** P, HQ,	11 in north east, some state None	Water resources and geological information about Nigeria is readily available from literature.
Air quality	NESREA	P, RL, HQ,	National	Some information on previous studies I some stats are readily available
Noise	NESREA	A,	National	Readily available from researches done in universities
Key: P – Paper copy, D – Digital data, HQ – headquarters, S – state office, A – university, RL – reference laboratory * poor quality data, ** adequate quality data, *** good quality data				

3.2.1.2 Meteorological Data

The annual distribution of weather patterns, including seasonal patterns of rainfall and evaporation, in Nigeria is comparatively well understood. Weather patterns are influenced by two wind systems, the south-westerly that brings rain and the north-westerly from the Sahara Desert that brings the dry and dusty harmattan. The seasonal movement of the Intra Tropical Convergence Zone controls weather patterns on a regional scale. Annual distributions of wet and dry seasons, the impact of climate change and the resultant impact of desertification on a regional scale in Nigeria are aspects to be studies as they impact upon all sections of the national economy. To fully understand these natural phenomena requires long term monitoring of rainfall and other climatic factors to generate the necessary databases required to model their possible impacts.

There are sufficient long-term and spatial climatic data available to understand regional variability in weather patterns within Nigeria. Nigeria has four main climatic zones (Ita, 1994):

1 The Equatorial Climate which extends from the coast to about 150km inland. Rainfall is between 1500 and 3000mm per annum, with an average temperature range of 17–24°C and relative humidity ranges between 60–90 percent. It has two seasons, the wet season March to October, and dry season November to March.
2 Tropical Hinterland, about 150–240km northwards from the coast, with 1000 to 1500mm rainfall, temperature range of 21–25°C and relative humidity range of 50–80 percent. It has a longer dry season, of 4–5 months, compared with the equatorial zone which lasts from October to April.
3 Tropical Continental which falls into the Sudano-Sahelian vegetation zone with rainfall of 250–1000mm, temperature of 25–30°C (with lower night temperatures especially during the harmattan) and low relative humidity of 20–40 percent. The characteristic dry hot harmattan wind can last from October to May.
4 Montane or Plateau type climate is limited to the highland areas, with a high annual rainfall of 1400–4000mm, relatively low temperatures of 5–20°C and high humidity of 30–90 percent.

An understanding of weather patterns is important to mining for the following reasons:

1 A greater part of smallscale mining and quarrying activities are carried out in the dry season because during the wet season the miners battle with flooding of mines and smallscale miners have limited facility to pump out water from mine sites.
2 During the wet season the rural population take advantage of the rains and are primarily engaged in agricultural/ farming activities.
3 Knowledge of storm intensity and duration patterns are necessary to understand and manage erosion. This is important in areas where the natural vegetation has been removed due to mining activities, otherwise remedial action has to be undertaken to return the land to its former state after mining has ceased. If there has been insufficient compaction of replacement material and/or the vegetation cover has not been replaced, then excessive rainfall runoff will results in excessive land surface erosion commonly resulting in the formation of deep gully systems. This is noted in parts of the Jos Plateau and in South Eastern Nigeria.
4 Knowledge of evaporation rates is needed to estimate the rate of natural removal of water from open pits during the dry season.
5 Wind direction and strength may impact dust production at open cast and treatment sites.

6 The likelihood of some dry season rainfall necessitating dewatering of workings, adding to operational costs is a risk to be included in mine operation planning.
7 Rainfall/runoff characteristics will impact upon the generation of leachates from mine workings and waste disposal dumps. Retaining walls may have to be constructed to minimize flow of polluted discharges to local streams.

3.2.1.3 Soils

The collection and collation of soils data in Nigeria is the responsibility of the Ministry of Agriculture and Natural Resources. The Reconnaissance Soil Survey of Nigeria Project produced the most comprehensive study of soils of the country. The field survey results and soil analyses are presented in a four-volume report 'The Soils of Nigeria (1990)'. The agricultural economy of Nigeria is based upon access to good quality soils for the cultivation of crops. Within the tropical and savannah regions, this has necessitated removal of the natural vegetation exposing the soil cover to erosion especially during heavy tropical rainstorms. The resultant erosion of soils by runoff and incision of deep gullies are major causes of concern to Agriculture.

An understanding of the nature and distribution of soils is important to small-scale mining for the following reasons:

1 Forest cover clearance at a mine site and the surrounding area exposes soil layers to greater risk of erosion especially fragile deeply weathered tropical soils that can be rapidly eroded during tropical high intensity rain storms. Rapid runoff results in rapid land surface erosion through removal of surface layers and intense stream gullying with siltation of downstream river channels.
2 Awareness is needed of cropping patterns undertaken at the proposed mine site before operations start. At the cessation of mining, attempts should be made to return the site to such a state that former agricultural activities could be resumed. This may require the removal of topsoil to a safe storage area from where it can be returned to its original position and conditions.
3 The manual mining of near surface deposits is often dependent upon the depth and patterns of rock weathering. In areas of shallow weathering patterns, explosives may be needed to mine competent rock layers.
4 Near surface zones of water flow often occurs within lateritic soils especially during the wet season. Such occurrences will impact upon seasonal working patterns in shallow pits that may be prone to flood during the wet season. These patterns of surface flow may be important factors in the provision of domestic water supply via shallow wells to the local community. The excavation of pits draining shallow weathered zones will cause reduction in community water supply so that alternative sources of water may have to be found.
5 Leachates from mine workings spoil, heaps and mineral-processing plants may seep into local soils resulting in changes to soil chemistry which could be toxic to plant life and local communities who consume crops produced on affected lands.

The nature of the soil types present in Nigeria and their regional distribution is well understood and has been studied in-depth. In order to achieve some level of understanding on specific mine sites, a more detailed investigation of soil environment was carried out for all the mine sites visited. Effects of mining on physical properties of soil was observed in Opi in Nsukka LGA of Enugu State and Umuoghara in Izza North LGA of Ebonyi State (Figure 3.10 and 3.11 respectively) where the sand mining and removal of the natural vegetation cover has resulted in gully erosion and land degradation respectively.

Results showing the concentration of the heavy metals in the soil environment within the mining sites across two of the sites visited in Ebonyi and Cross River States and various quality guidelines (Qing et al. 2015[22]; Hakanson 1980[23]) for comparing the results are presented in Box 1. Using pre-industrial values, which is a more universally acceptable quality guideline for both soil and sediments, the result in Box 1 shows that lead concentration for all the samples collected from less than 100m to 200m in both mining were above the the recommended value of 70mg/kg. The same applies for cadmium in some of the samples collected from both sites.

Furthermore, pollution assessment carried out shows that the contamination factor (CF) for each of the heavy metals in the soil of Lead and zinc mining site at Mkpumakpatakpa Izzi LGA of Ebonyi State is less than unity except for lead and cadmium that are each 1.4. Therefore the contamination from Ni, Cr, Zn and Cu is low or insignificant whereas that of Pb and Cd at 1.4 each is of moderate contamination. This indicates that moderate contamination of the soil is only as a result of lead and cadmium. Given the degree of contamination of 4.4 for the soil which is less than 8.0, the degree of contamination of the soil is classified as low. The pollution load index (PLI) is less than unity suggesting no pollution generally. The geo-accumulation index (Igeo) of all heavy metals is less than zero for each of the heavy metals indicating non-pollution. The potential ecological risk index of the heavy metals in the soil is evaluated as 52 which is greater than 40 but less than 80 indicating moderate ecological risks.

Also, the contamination factor (CF) for each of the heavy metals in the soil of Iron Oxide Mining site at Mfamosing Community in Akampa Local Government Area of Cross River State is less than unity except for cadmium at 1.14. Therefore, the contamination from Ni, Cr, Pb, Zn and Cu is low or insignificant whereas that of Cd at 1.14 is of moderate contamination. This indicates that moderate contamination of the soil is only as a result of cadmium. Given the degree of contamination of 2.9 for the soil which is less than 8.0, the degree of contamination of the soil is classified as low. The pollution load index (PLI) is less than unity suggesting no pollution generally. The geo-accumulation index (Igeo) of all heavy metals is less than zero for each of the heavy metals indicating non-pollution. The potential ecological risk index of the heavy metals in the soil is evaluated as 41 which is greater than 40 but less than 80 indicating moderate ecological risks.

The detailed report of the study including methodology, sample locations, GPS coordinates and results from the other sites visited is in MMSD (2020)[24]

[22]Qing, X., Yutong, Z., Shenggao, L. (2015). Assessment of heavy metal pollution and human health risk in urban soils of steel industrial city (Anshan), Lianoning, Northeast China.

[23]Hakanson, L. 1980. An ecological risk index for aquatic pollution control of sediments: ecological approach. Water research, 14, 975-1000.

[24] MMSD (2020) SESA Volume 2: Technical Report on the Environmental Effects of Solid Mineral Mining in Nigeria.

Figure 3.10: Erosion caused by sand mining at Omene Opi in Nsukka LGA, Enugu State.

Figure 3.11: Land degradation due to mining at Umuoghara in Izza North LGA Ebonyi State

3.2.1.4 Stream Sediment Load

A marked increase in soil erosion has resulted in the siltation of numerous streams and rivers becoming a major problem. This with the effects of over abstraction of river waters for township use has rendered numerous formerly perennial river courses ephemeral in character during the dry season. The extent of this phenomenon has only become apparent with the availability of detailed remotely sensed satellite imagery. Also, a detailed sediment analysis was conducted as part of this study; the result is presented as part of the technical annex.

3.2.1.5 Water Resources and Water Quality

Water resources in Nigeria are abundant although distributed unevenly across the different parts of the country (Anukam, 1997)[25]. The four major drainage systems in Nigeria according to Anukam (1997) are:

- The Niger River Basin Drainage System with its major tributaries of Benue, Sokoto-Rima, Kaduna, Gongola, Katsina-Ala, Donga, Tarabe, Hawal and Anambara Rivers.

- The Lake Chad Inland Drainage System comprising the Kano, Hadejia-Jama'are Misako madougou-Yobe, Yedoseram and Ebeji Rivers.

- The Atlantic Drainage System (east of the Niger) comprising the Cross River, Imo River, Qua Iboe and Kwa Rivers.
- The Atlantic Drainage System (west of Niger) made up of the Ogun, Oshun, Owena and Benin Rivers.

[25]Anukam, L. C (1997) Case study IV*- Nigeria. In Helmer, R and Hespanhol, I (eds) Water Pollution Control - A Guide to the Use of Water Quality ManagementPrinciples. WHO/UNEP.

Box 1: Concentration of heavy metals in soil environment within Mining sites visited

Jidech Mining Company (Lead and Zinc), Mkpumakpatakpa, Izzi LGA, Ebonyi State

Sample	Distance from mine site	Ni (mg/kg)	Fe (mg/kg)	Pb (mg/kg)	Cu (mg/kg)	Cr (mg/kg)	Zn (mg/kg)	Cd (mg/kg)
JSO 1	<100m – 200m	48.401	1.400	10.65	1.851	128.91	59.439	1.880
JSO 2	<100m – 200m	80.406	1.391	91.94	0.455	52.38	55.761	<0.001
JSO 3	<100m – 200m	37.840	1.375	239.09	8.205	12.63	61.869	0.134
JSO 4	<100m – 200m	43.081	1.495	97.70	3.980	70.24	95.295	<0.001
JSO 5	<100m – 200m	79.603	1.393	232.17	6.146	111.21	77.988	7.550
JSO 6	<100m – 200m	58.281	9.133	97.89	5.978	66.42	43.452	1.265
JSO 7	<100m – 200m	57.110	1.513	94.34	6.646	152.17	168.427	<0.001
JSO 8	<100m – 200m	36.915	1.326	12.3	3.338	111.70	69.539	0.877
JSO 9	<100m – 200m	44.346	1.394	97.38	6.989	106.96	79.607	1.714
JSO 10	2.5km-4km	59.964	1.412	6.92	10.916	146.95	58.561	1.038

Ebiang Achu's Enterprise, Iron Oxide Mining

Samples	Distance from mine site	Pb (mg/kg)	Cu (mg/kg)	Cr (mg/kg)	Zn (mg/kg)	Fe (mg/kg)	Ni (mg/kg)	Cd (mg/kg)
EBSO1	<100m – 200m	86.301	1.419	11.21	3.231	76.05	65.451	<0.001
EBSO2	<100m – 200m	81.895	1.404	11.95	7.374	11.60	65.667	2.974
EBSO3	<100m – 200m	69.294	1.367	63.96	1.570	9.8	39.601	0.000
EBSO4	<100m – 200m	80.902	2.343	86.65	6.126	156.43	77.464	1.249
EBSO5	<100m – 200m	60.545	1.496	34.56	<0.001	122.01	36.567	<0.001
EBSO6	<100m – 200m	23.723	1.197	44.63	2.481	8.9	71.123	<0.001
EBSO7	<100m – 200m	50.485	1.209	201.74	5.836	134.55	87.279	3.537
EBSO8	<100m – 200m	73.049	1.345	96.43	5.043	46.45	78.970	<0.001
EBSO9	<100m – 200m	73.587	1.038	55.79	4.204	69.60	65.884	1.604
EBSO10	2.5km-4km	39.730	1.067	325.53	3.711	62.61	46.767	3.352
EBSO11	2.5km-4km	17.691	1.057	86.02	8.258	146.90	44.909	0.183
EBSO12	2.5km-4km	40.106	1.033	96.430	<0.001	69.70	41.635	0.947

Heavy metals	Various soil quality guidelines/standards			
	Chinese soil quality (mg/kg)	Canadian soil quality (mg/kg)	Dutch soil quality (mg/kg)	Pre-industrial sediment quality (mg/kg) *
Cr	200	87	100	90
Cd	0.3	22	0.8	1.0
Pb	300	600	85	70
Zn	250	360	91	175
Cu	100	91	36	50
Ni	50	50	35	68

*the study applied the pre-industrial values as the more universally acceptable quality guideline for both soil and sediments.

Key: JSO means Jidech soil

EBSO means Ebiang Achu soil

Source: SESA field work, 2019.

Besides the Lake Chad Drainage System, the other drainage systems terminate in the Atlantic Ocean. The ground water resources are dependent on the geological structure of the

country which comprises mainly of the Precambrian basement complex and sedimentary formation and they yield ground water in varying quantities (source: Nigerian Geological Survey Agency).

The main hydrogeological units comprise:

1 The Precambrian Basement blocks of Central, Western and Eastern Nigeria form shallow low permeability weathered bedrock and fracture aquifers providing limited quantities of water
2 Cretaceous sediments within the limbs of the failed rift along the Benue and Niger River valleys include low porosity and permeability sandstones, limestone and shale formations that provide limited to very small quantities of groundwater. Brackish to saline waters occur in some formations.
3 The Tertiary and Quaternary sediments of the Sokoto and Chad Basins. These sedimentary formations form a wide range of aquifers. Sandstones in the Chad Basin can contain large amounts of groundwater under artesian pressure. Water quality can be a problem.
4 Tertiary to Recent sediments of the Niger Delta. These sedimentary formations form a wide range of aquifers. Developing groundwater in the Delta region is problematic due to collapsing formations, the presence of saline water and pockets of oil and gas.

The water bodies in Nigeria serve different purposes such as for sand mining, fishing, irrigation, transportation, electricity generation, recreation, and for abstraction for industrial and domestic purposes. The water bodies are often polluted especially due to anthropogenic activities. To stem water pollution, safeguard public health and water resources, water quality monitoring is usually carried out. In this regard, the Federal Environment Protection Agency (FEPA), now Federal Ministry of Environment in collaboration with the National Water Resources Institute (NWRI) organised a seminar on "Water Quality Monitoring and Environmental Status in Nigeria" in 1991. The outcome of the national seminar was published in a FEPA monograph in 1996 (Aina and Ogundipe, 1996). Since then, some researchers have monitored both surface (especially rivers) and ground water quality in Nigeria, although there is no national baseline of surface and ground water quality in Nigeria.

3.2.1.6 Surface and Ground Water Quality

Polluted mine water discharged from operational and abandoned mine workings, together with accumulations of polluted waters within abandoned open cast mining pits are the main areas of water quality concern. These are perceived to be pollution threats to groundwater and surface water bodies.

An understanding of the nature and distribution of surface water systems is important for the following reasons:

1 Siltation of river courses that may cause changes in channel patterns, especially in alluvial deposits. Working of alluvial deposits for alluvial mineral extraction can cause accumulation of sediment downstream of workings, resulting in changes of river courses. Excessive siltation can result in river flows being transformed from perennial to ephemeral in form.
2 The stream flow and sediment load characteristics limit accessibility to streambeds for the working of alluvial deposits such as tin, gold and columbite. Alluvial gold workings in the Minna area are only accessible during periods of low river flow.
3 Leachate flows occur from mines, open pits and spoil heaps during the wet season adversely affecting water quality in downstream watercourses.

4 Introduction of toxic elements in solution from discharges of mineral workings or processing plants.

Groundwater pollution caused by mining activity is mainly due to the invasion of aquifers by leachates generated in underground workings, mostly noticeable on discharge from mine workings during operation or after mine abandonment. They may also be generated during mineral treatment or during the degenerating of spoil heaps. Such pollutants discolouring mine discharge and open pit pond waters have been recognised at former mining sites near Jos, Enugu and Abakaliki.

An understanding of the nature and distribution of hydrogeological systems is important to small-scale mining for the following reasons:

1 Seasonal water tables in open pits usually limit the depth of pit operation. To excavate at deeper levels requires dewatering by pumping which results in the lowering of water tables that can adversely affect the yield characteristics of boreholes located adjacent to workings. Water removal is a major cost factor; therefore, small scale miners need to be informed of likely water inflow problems
2 Linear fracture systems that commonly form mineral lode deposit sites frequently form sources of groundwater especially in low permeability bedrock environments
3 Production of leachates can result in the pollution of aquifer systems. There is need to assess the vulnerability of the aquifer to leachate pollution.
4 Low pH waters discharging from coal mines rotted pumps

Groundwater is important to the community for water supply for domestic use, irrigation, watering of stock. To further understand the impact of mining operations on surface and ground water, sampling and analysis of surface and ground water were carried out from mine sites visited and control samples from locations outside the mine sites. The detailed result of the physico-chemical parameters and concentration of heavy metals in the stream closest to the mining sites visited and the groundwater are presented in the technical annex to this report. Summary result from a lead and zinc mining site is presented in Box 2 while result from iron ore mining site is presented in Box 3.

Box 2: Concentration of heavy metals in the surface and ground water environment of Lead and zinc mining site, Mkpumakpatakpa Izzi LGA, Ebonyi State

Samples	Type of Sample	Pb (mg/L)	Cu (mg/L)	Cr (mg/L)	Zn (mg/L)	Fe (mg/L)	Ni (mg/L)	Cd (mg/L)
		Surface Water						
JW1	Test	0.121	0.032	0.045	<0.001	0.011	0.239	0.002
JW2	Test	0.161	0.020	0.022	0.150	<0.001	0.125	<0.001
JW3	Test	0.116	0.028	0.064	0.067	0.008	0.09	0.004
JW4	Test	0.098	0.022	0.022	<0.001	0.005	0.05	0.002
JW5	Test	0.179	0.001	0.024	<0.001	0.009	0.536	0.001
JW6	Control	<0.001	0.011	<0.001	<0.001	0.194	0.160	<0.001
JW7	Control	<0.001	0.006	<0.001	0.141	0.201	0.086	<0.001
JW8	Control	<0.001	0.027	<0.001	0.043	0.211	0.107	<0.001
WHO		0.01	2	0.05	-	-	0.07	0.003
SON		0.01	1	0.05	3	0.3	0.02	0.003
	Groundwater							
JG1	Control	<0.001	0.045	<0.001	0.009	0.331	0.078	<0.001
JG2	Control	<0.001	0.031	<0.001	<0.001	0.341	<0.001	<0.001

JG3	Test	0.083	0.022	0.009	0.015	0.001	<0.001	0.04
JG4	Test	0.067	0.031	0.007	0.023	0.001	<0.001	0.03

Water quality of water systems in the mining environment

S/N	Water Systems	Water Quality Index (WQI)
1	Surface Water (Test)	327
2	Surface Water (Control)	60
3	Borehole 1	24
4	Borehole 2	117

The concentration of lead and nickel exceed the maximum allowable limits of WHO and SON standard for drinking water in the sampled test surface water whereas only nickel exceeded the maximum allowable limits for the control sample. Consequently, the surface water control sample has WQI of 60 in comparison to 327 for the test surface water. WQI of 60 indicates that the control water quality is good enough for drinking based on the parameters assessed whereas the WQI of 327 indicates that the test surface water is not fit for drinking. This shows that the mining activities in the area must have been responsible for the heavily deteriorated surface water quality of this stream at the locations investigated.

The WQI of 24 for Borehole 1 indicates that the water quality of Borehole 1 is excellent. However, the concentration of Nickel was found to be marginally higher than the permissible limit. On the other hand, the WQI of Borehole 2 at 117 indicates poor water quality and is due to high concentration levels of lead and cadmium especially lead in the water. It is most likely that the mining activities are responsible for the high levels of lead and cadmium in Borehole 2.

Box 3: Concentration of heavy metals in the surface and ground water environment of Iron Ore mining site, Mfamosing, Akamkpa LGA, Cross River

Samples	**Type of sample**	**Pb (mg/L)**	**Cu (mg/L)**	**Cr (mg/L)**	**Zn (mg/L)**	**Fe (mg/L)**	**Ni (mg/L)**	**Cd (mg/L)**
		Surface Water						
EBW1	Test	<0.001	<0.001	<0.001	0.03	0.004	0.018	0.029
EBW2	Test	<0.001	0.001	<0.001	0.07	0.008	0.025	0.031
EBW3	Control	0.002	0.013	<0.001	0.101	0.003	<0.001	<0.001
EBW4	Control	<0.001	0.009	<0.001	<0.001	0.004	0.200	<0.001
	Groundwater							
EBG1	Test	0.083	0.001	0.014	<0.001	0.029	<0.001	0.002
EBG2	Test	0.059	0.017	0.019	0.014	0.025	0.16	<0.001
EBG3	Control	0.01	<0.001	<0.001	<0.001	0.012	<0.001	<0.001
WHO		0.01	2	0.05	-	-	0.07	0.003
SON		0.01	1	0.05	3	0.3	0.02	0.003

Water quality of water systems in the mining environment

S/N	Water Systems	Water Quality Index (WQI)
1	Surface Water (Test)	102
2	Surface Water (Control)	54
3	Borehole 1	107
4	Borehole 2	142
5	Borehole 3	13

The surface water at the downstream of the mining site (test surface water) was polluted with cadmium and nickel as these two heavy metals occurred at higher concentration than the prescribed levels of WHO and SON. Consequently, this deteriorated the water quality as could be observed by WQI of 102 as opposed to WQI of 54 for the control where concerns are with respect to nickel contamination. Within the limit of the assessed

parameters, it could be inferred that the surface water downstream the mining activities is of poor quality for drinking purposes whereas that of the control located upstream the mining activities is of good quality. Locals observed fetching water at the sampling station downstream for drinking purposes are advised to stop using the water. Boreholes 1 and 2 which are located downstream and close to the mining activities have poor water quality with WQI of 107 and 142 respectively having been polluted by lead whereas the water quality of Borehole 3 with WQI of 13 is adjudged excellent even though the level of lead should continually be monitored as its present level is just at par with standard allowable level.

3.2.1.7 Air Quality

Although studies regarding air pollution attributed to mining activities in Nigeria have been very limited, the effect of dust on working conditions and workers' health has long been recognised as a major problem in the Enugu coal mines and quarrying sites across the country. Peter *et al* (2018)[26] in a study of air quality at Akpoha new quarry and old quarry at Ishiagu in Ebonyi State found that the level of CO, NOx, SOx, VOC and PM_{10} at the edge and 250m from the two sites in both rainy and dry season exceeded the Federal Ministry of Environment recommended rates of 1000, 20, 20, 1500, and 20 $\mu g/m^3$ for the gases respectively. They found that the concentration of the gases decreased with increase in distance although still high for the old quarry at Ishiagu. Sources of air pollution from mining operation include excavations (which produced particulate matter easily transported by wind), blasting, material transportation, tailings facilities that emit fugitive dust, wind erosion (often produced from open-pit mining operations), waste dumps, mobile sources, for example trucks and heavy equipment (Environmental Law Alliance Worldwide, 2010)[27]. Field visits undertaken at various operational sites indicate that notable sources of dust during mining and quarrying include:

1 Digging and excavation at artisanal and smallscale mining sites;
2 Blasting during quarry operation;
3 Operating mechanical extraction machinery;
4 Operating grading and processing plant;
5 Operating loading machinery; and
6 Heavy transport equipment moving to and from loading sites, especially along badly rutted non-metalled access roads that pass through local villages.

The impact of excessive dust generated by mine, quarry and treatment plant operations were noted at several sites visited, for example at Ajasquo quarry, EBH granite limited all in Ondo State and Ishiagu quarry in Ebonyi State.

These operations could adversely impact on the quality of the air at the work sites and nearby villages.

[26]Peter, C., Alozie, M. c., and Azubuine, C.E. (2018) Stone quarrying impact on air soil water in Ebonyi State, Nigria. Journal of Pollution Effects and Control, 6:2. DOI: 10.4172/2375-4397.1000225

[27]Environmental Law Alliance Worldwide (2010) Guide Book for Evaluating Mining Projct EIAs. Eugene, Oregon: ELAW.

Further studies of air quality of the immediate environment of the mining sites visited were carried out. The details are in the Technical Annex. The measured parameters for characterizing the air quality at the immediate environment of Jidech, Ebiang Achu's and Opi sand mining sites were all within the permissible limit of the Federal Ministry of Environment (FMEnv). However, there were no mining activities at the site during the field study hence values of the particulate matter ($PM_{2.5}$ and PM_{10}) could change significantly during mining activities especially in the dry season.

Better access to scientific knowledge is needed to fully understand how to assess the impacts on environmental, economic and social aspects of poor air quality. Little effective monitoring and maintenance of acceptable air quality is done in Nigeria. There is a need to produce emissions inventories of all mineral-processing plants, source apportionment and to study the effect of dust production and deposition on the vegetation, human settlement and health in areas adjacent to operational quarries and crushing plants.

Current problems and constraints impacting on air quality in mining include:

1 poor awareness of the detrimental effects of poor air quality and dust.
2 use of trucks and machinery with old emission control technology and poor engines and high emission rates,
3 inadequate baseline data and information on air quality,
4 inadequate funding of air quality programmes,
5 poor enforcement of laws and regulations,
6 no national air pollution monitoring network.

3.2.1.8 Noise

Noise as a source of environmental pollution has been recognised in Nigeria, although no information is available on the extent of noise pollution experienced in different parts of Nigeria. The impact of excessive noise generated by mine, quarry and treatment plant operations were noted at several sites. Field visits undertaken to various mining sites indicate that notable sources of noise during mining and quarrying include:

1 explosions during blasting;
2 operating mechanical extraction machinery;
3 operating grading and processing plant;
4 operating loading machinery; and
5 heavy transport equipment moving to and from loading sites.

To obtain first-hand information on the level of noise in mine sites in Nigeria, the SESA team determined the noise level at the mine sites visited. The measured parameters for characterizing noise level at the immediate environment of Jidech and Royal Salt mining companies were all within the permissible limit of the Federal Ministry of Environment (FMEnv). The result of the noise level at the various sites visited is presented as part of the Technical Annex to this report.

3.2.1.9: Summary of Findings as Regards the Impact of Mining Activities in Nigeria on the Environment

The study which was carried out to establish the environmental *status quo* as attributable to mining activities in the various states studied, provides information not only on the potential pollution status of the biophysical environment due to mining activities but also potential health exposure risks by humans caused by heavy metals. The findings showed that virtually in all the states visited and where mining is taking place, the surface water and mine pit water is polluted

by mainly lead, chromium, nickel and cadmium. Exposure risks to the heavy metals are significant in the surface and pit water. Discharge of mine wastewater and run off into surface water bodies are most likely responsible for the contamination of the surface water. This has rendered water bodies downstream mining sites to be unsafe for drinking. Pollution of soil and sediments are not significant except in some states like Ebony State, Cross River State, Plateau State, Bauchi State, and Gombe State where lead and chromium contamination based on contamination factor (CF) values is significant.

Noise levels in most sites visited were low because at the time of study, mining activities were not on-going. For mining sites close to granite production facilities, noise levels were approaching FMEnv regulatory limits. Results of air quality measurements indicate that there are no concerns of deteriorating air quality arising from air pollutants such as CO, NO_2 and SO_2. It will not be possible to categorically state that there are no concerns with particulate matter as its dispersal is a function of moisture availability, hence during rainy season, particulate matter will tend to be low but high during dry season. Results of particulate matter measurements were low but could change significantly during dry season. See MMSD (2020)[28] for full detail of impacts of mining activities in Nigeria on the environment.

3.2.2 Biological Environment

3.2.2.1 Information on Nigeria Ecology

An understanding of the nature and distribution of ecological systems is important to small-scale mining for the following reasons:

1 Where many miners undertake small-scale mining over a large area then the cumulative effect will impact upon the local ecology.
2 Where mine pit waters discharge from overflowing ponds during the wet season, toxic elements may be distributed to adjacent fields polluting local soils. These toxic elements are then taken up by crops and ultimately ingested by local communities.

The Nigeria ecological zone covers the derived savannah, the low land, fresh water swamp forest, and mangrove forest/coastal vegetation. Figure 3.12 shows the map of Nigeria indicating the ecological zones.

[28] MMSD (2020) SESA Volume 2: Technical Report on the Environmental Effects of Solid Mineral Mining in Nigeria.

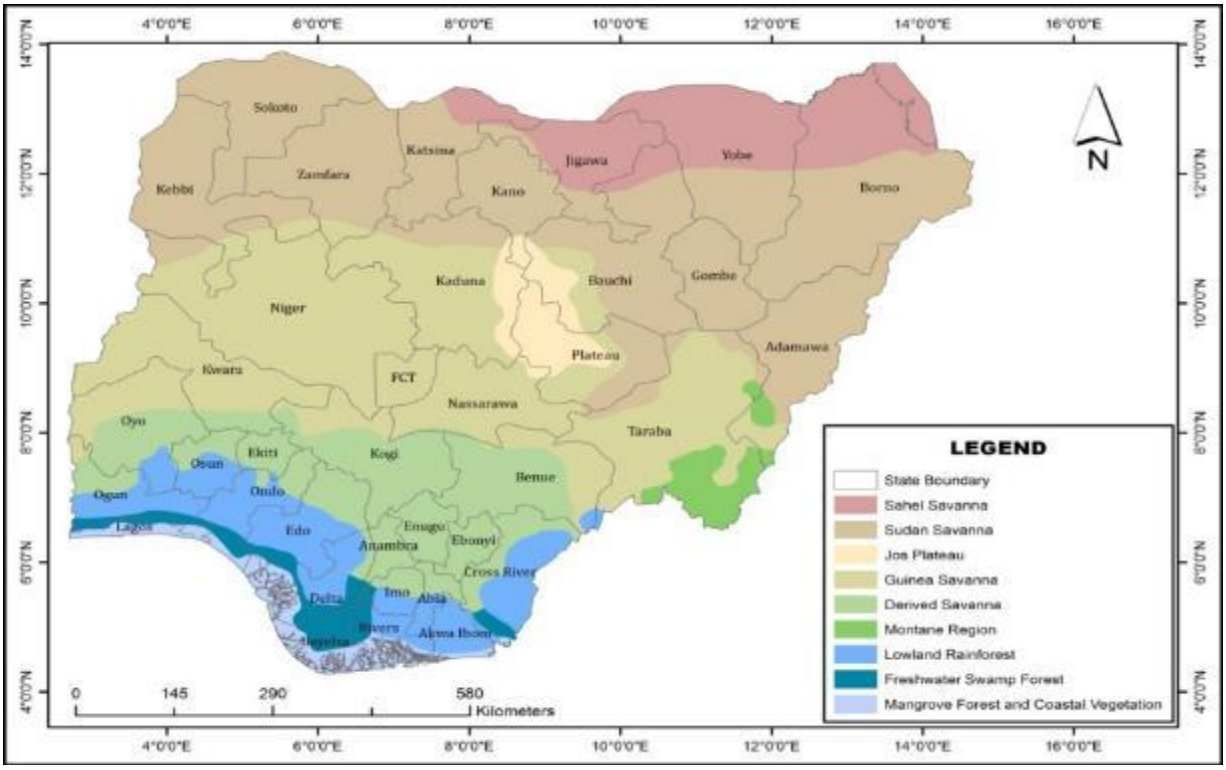


Figure 3.12: Map of Nigeria indicating the ecological zones.

Two zones have been greatly affected by anthropogenic effects that include mining activities. These are:

The Jos Plateau Zone

This distinctive ecological zone is located in the central part of the country within the Guinea Savanna Zone. The vegetation of Jos Plateau Zone (altitude about 1200m) is distinct but anthropogenic activity has degraded the high plateau such that it is almost treeless with only relics of Guinea woodland remaining. Alexander and Kidd (2000) estimates that about 4percent (320 km^2) of the plateau area has been disturbed by mining activity. The flora on the plateau is peculiar with many species of woody and herbaceous plants not found elsewhere in West Africa, alongside many typical Guinea Savanna species. The ephemeral fadama drainage system of the area is utilised for dry season cultivation with farmers utilising mining ponds as sources of dry season irrigation water.

The Derived Savannah Zone

The derived savannah was originally the drier part of the high forest. Due to bush burning and overgrazing, as well as cultivation and hunting activities over a long period, the high forest trees were destroyed and the forest that used to exist has now been replaced with a mixture of grasses and scattered trees. However, along the streams and in wet low-lying areas where surface water accumulates, there are still some traces of forests.

3.2.2.2 Flora and Fauna

Nigeria is rich in biodiversity. About 4,614 vascular plants have been recorded in Nigeria. According to Hutchinson and Dalziel (1936)[29], these include 38 endemic species of the defunct Western and Mid-western area, 39 endemics from what used to be the Northern region and 128 from the former Eastern region. In terms of fauna, Nigeria is rich because of the diversity of the vegetation types found in the country. With 18 species, the Okwangwo Division of Cross River National Park has the highest diversity of primates recorded at any single site in Africa, including the endangered Cross River Gorilla *Gorilla gorilla diehli*. Some endemic vertebrate species of mammals found in Nigeria include *Cercopithecussclateri* (PrimatesCercopithecidae) Sclater's Guenon and *Crociduralongipes*(Soricomorpha -Soricidae) Savanna SwampShrew; birds include *Malimbusibadanensis* (Ploceidae) Ibadan Malimbe and *Estrildapoliopareia* (Estrildidae) Anambra Waxbill; fresh water fishes include *Alestopetersiussmykalai* (Alestiidae) Blue Diamond Tetra and *Arnoldichthysspilopterus* (Alestiidae)Niger Tetra; while marine fishes include *Grammonuslonghursti*(Bythitidae) and *Meganthiascarpenteri* (Serranidae) Yellowtop Jewelfish. For details of vertebrate endemic species in Nigeria, see National Biodiversity Strategy and Action Plan, 2016-2020.

Despite Nigeria's rich biodiversity, the country's biodiversity is highly threatened. The IUCN Red list shows that the country has a total of 309 threatened species in the following taxonomic categories: Mammals (26), Birds (19), Reptiles (8), Amphibians (13), Fishes (60), Molluscs (1), other Invertebrates (14) and Plants (168) (IUCN, 2013)[30]. In fact, Nigeria is equally one of the countries that had the greatest forest reduction between 2010 and 2015 with a loss of 410,000 hectares (4.5percent of 2010 forest area) (FAO, 2015)[31]. Key direct drivers of forest degradation include: agriculture, fuel wood collection, population, urbanization and settlements, mining, bush burning, timber logging, infrastructure development and grazing.

Solid minerals are located widely in many forest reserves all over the country and mining is done everywhere virtually by artisanal miners who use open-cast method. The use of open-cast method necessarily requires that vegetation is removed in and around areas where the mineral could be found. Deforestation is thus usually very severe in mining areas. Thus, mining activities follow closely urbanization and settlements as drivers of deforestation and forest degradation in Nigeria.

To reduce the level of biodiversity depletion in Nigeria, experts have indicated that there is need to reduce the effect of the drivers of deforestation and degradation and also facilitate the conservation of the nation's resources in the existing biodiversity sites. The categories of

---

[29] Hutchinson, J. and J. M. Dalziel (1936) *Flora of West Tropical Africa*, London: Crown Agents.

[30] International Union for the Conservation of Nature (IUCN) 2013. 2013 IUCN red list of threatened species: A global species assessment. IUCN: Gland, Switzerland and Cambridge, UK.https://www.iucnredlist.org/.

[31]FAO. 2015. Global Forest Resource Assessment 2015. FAO, Rome. http://www.fao.org/3/a-i4808e.pdf.

biodiversity sites in Nigeria are presented in Table 3.8 while Figure 3.13 shows Nigeria vegetation zones and some important biodiversity sites.

Table 3.8: Categories of Biodiversity Sites in Nigeria

Category of Biodiversity related sites	Number	Comments
National Parks	7	The National Parks are high priority conservation areas and are found in seven locations namely: Old Oyo National park in Oyo State, Cross River National Park in Cross River state, Gashaka-Gumti in Taraba/Adamawa states, Okomu National Park in Edo state, Chad Basin National Park in Borno State, Kainji Lake National Park in Niger State and Kamuku National Park in Kaduna state.
Important Bird Areas	27	These are identified as important biodiversity areas. All National Parks have IBAs (Important Bird Areas) within them and 60percent of Nigeria Ramsar sites are also IBAs
Ramsar Sites	11	Management plans have been developed for four of these sites (Apoi Creek, Lower Kaduna, Oguta Lake and Baturiya) but are yet to be implemented due to lack of funding. The national wetland policy is at draft stage and there are plans to designate four more sites (Chingurme, Ibom/Cross River estuary, Wawan Rafi Wetlands and Akassa coastal wetland.
World Heritage Sites	2	The Sukur Kingdom in Mandara Mountains in Madagali LGA of Adamawa State in northeastern Nigeria is the first Nigerian landmark to be listed on the World Heritage Sites while Osun Osogbo Grove made the list later in 2005.
Forest Reserves	994	50 percent still maintain their FR status while the remaining 50% have either been de-reserved or have been encroached upon and converted to either farmlands or residential areas
Game Reserves (State governments and a few managed by communities)	32	60 percent under various levels of management
Biosphere Reserve	1	The only named Biosphere Reserve according to UNESCO is in Omo Forest Reserve, Ogun State, Nigeria
Sacred Grooves	N/A	Many in number and at varied level of protection

Source: Federal Ministry of Environment, 2015[32]

[32]Federal Ministry of Environment (2015) Nigeria Biodiversity Strategy and Action Plan 2016-2020. Abuja: Federal Ministry of Environment.

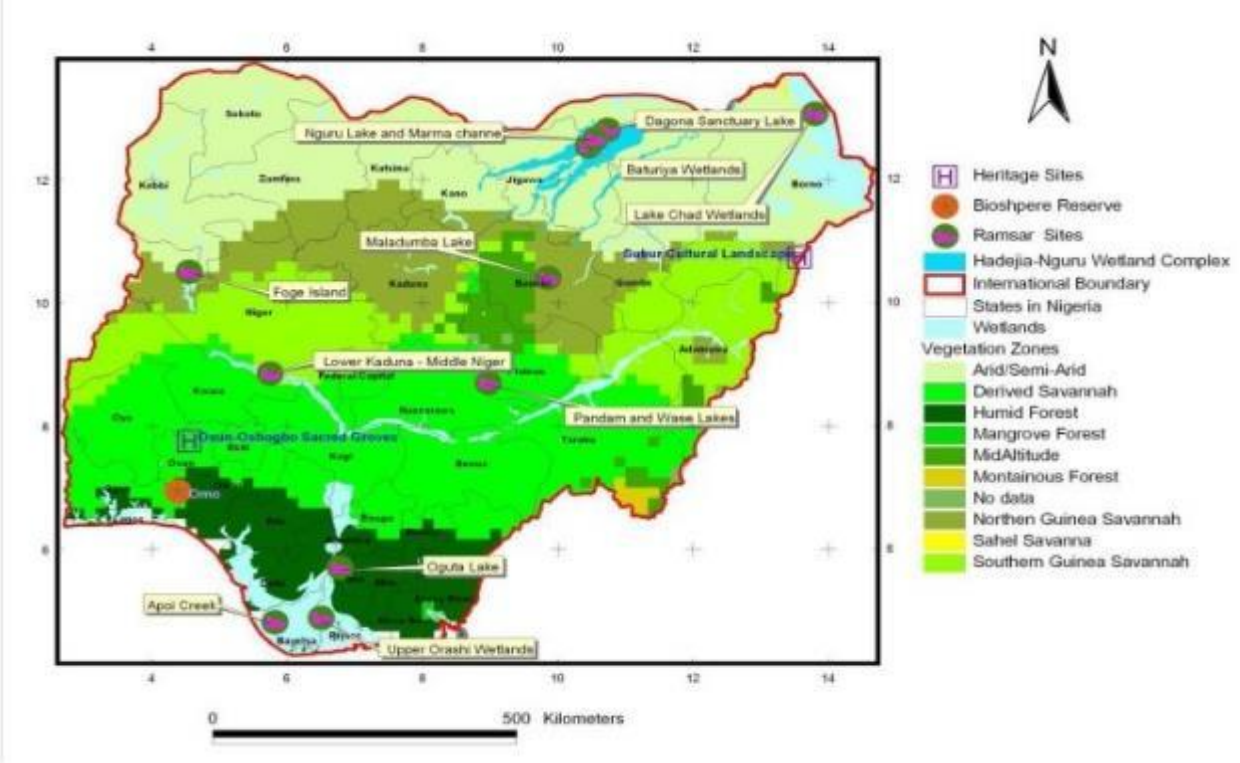


Figure 3.13: Map of Nigeria showing vegetation zones and some important sites for biodiversity
Source: Federal Ministry of Environment, 2015[33]

3.2.2.3 Aquatic Baseline

Aquatic areas of interest include the following wetland areas:

1 Coastal Wetlands
   - o Lagos and Lekki Lagoons – SW Nigeria
   - o Niger Delta
   - o Wetlands of Cross River – SE Nigeria

2 Riverine wetlands
   - o The Niger/Benue River system – Central Nigeria
   - o The Komadugu Yobe – Northern Nigeria, draining the Jos Plateau
   - o The Ngadda, Yedseram and El Beid Rivers – North Eastern Nigeria

3 Lake Chad area – North Eastern Nigeria

An understanding of the nature and distribution of aquatic fauna is important to small-scale mining for the following reasons:

1 Water is required for alluvial mining operations, especially for the abstraction of alluvial gold, cassiterite and kaolin.
2 Harmful effects due to the mobilisation of silts and clays in suspension can have detrimental effects upon aquatic life forms and user communities for tens of kilometres down stream of alluvial mining operations.

[33]Federal Ministry of Environment (2015) Nigeria Biodiversity Strategy and Action Plan 2016-2020. Abuja: Federal Ministry of Environment.

3 Sands and gravels disturbed and redistributed during alluvial mining operations can cause changes in channel dimensions and river flow patterns,
4 Alluvial mining possibly releases harmful toxic elements and compounds that could have detrimental health effects upon local downstream riverside communities and aquatic life forms that are not apparent until several years after mining operations began. Unfortunately, medical facilities at village level are reported to be very poor, symptoms may not be recognised as being due to the effects of toxicity.
5 Mine water leachates discharged into rivers, streams, and discoloured waters accumulating in former mine ponds need to be hydrochemically assessed to determine the presence of toxic materials in solution. Uptake of such materials may have detrimental effects on plants and animals, and subsequently upon local communities.

3.3 Socio-economic, Cultural and Mining Environment

3.3.1 Culture, Religion, Community and Gender Issues in Nigeria

Nigeria counts 250 different ethnic groups (NPC), making it rich in customs, languages, and traditions and at the same time vulnerable to socio-cultural conflict. The dominant ethnic group in the northern two-thirds of the country is the Hausa-Fulani. Other major ethnic groups of the north are the Nupe, the Tiv, and the Kanuri. The Yoruba people predominate in the southwest, whilst the Igbo are the largest ethnic group in the southeast, with the Efik, Ibibio, and Ijaw (the country's fourth-largest ethnic group) comprising a substantial segment of the population in that area. The official language is English.

The dominant religions are Christianity and Islam. There is a strong correlation between religious affiliation, ethnic and regional diversity. The north is predominantly Muslim, although there are significant numbers of Christians in the urban centres of the north. Both Muslims and Christians are found in large numbers in the Middle Belt. Yorubas in the South. West practice either Islam or Christianity, while others continue to practice the traditional Yoruba religion, which includes a belief in the Supreme Deity and the worship of lesser deities that serve as agents of the Supreme Deity in aspects of daily life. In the East, Catholics and Methodists constitute the majority, although many Igbos continue to observe traditional rites and ceremonies. Traditional beliefs and taboos still play an important part in the lives of many Nigerians.

Generally, States with a clear Christian or Muslim majority favour the majority faith and private businesses are also frequently guilty of informal religious and ethnic discrimination in their hiring practices and purchasing patterns. Rivalries between majority groups and minority immigrants lead to some societal discrimination against minority ethnic and religious groups.

3.3.2 Gender

The process for the development of a strategic framework for the implementation of the National Gender Policy started in 2007 following the approval of the National Gender Policy for Nigeria by the Federal Executive Council in 2006. Two local experts with support from a foreign agency were recruited to harmonize and review the multi-sector Gender Policy and propose pathways for achieving the policy target of providing a framework in consultations with critical stakeholders on gender mainstreaming in Nigeria.

The Strategic Results Framework and Implementation Plan of the National Gender Policy of the Federal Republic of Nigeria was developed when the government re-committed itself to economic reforms and the repositioning of the country to move from the 41st economy to the first

twenty economies by the year 2020. There were renewed commitments to the implementation of national and international conventions and laws in support of gender equality, the empowerment of women and respect of women's rights. The Strategic Results Framework was developed from priorities within the National Gender Policy. Gender differences are still an important factor in the Nigerian society. In many parts of the country, girls are discriminated against in their access to education for social, economic and religious reasons. Girls living in the more traditional rural areas, both in the predominantly Muslim north and the predominantly Christian south are disadvantaged even more than their urban counterparts. Purdah, the Islamic practice of keeping girls and women in seclusion from men outside the family, continues among some families in some parts of the north.

While some women have made considerable individual progress, both in the academic and business world, women remain underprivileged. Although women are not barred legally from owning land, under some customary land tenure systems only men can own land, and women can gain access to land only through marriage or family. In addition, many customary practices, especially in Eastern Nigeria, do not recognize a woman's right to inherit her husband's property, and many widows are rendered destitute when their in-laws take virtually all of the deceased husband's property. Widows are subjected to unfavourable conditions as a result of discriminatory traditional customs and economic deprivation. "Confinement" is the most common rite of deprivation to which widows are subjected, and it occurs predominately in Eastern Nigeria.

Women remain under represented in the formal sector but play an active and vital role in the country's important informal economy. While the number of women employed in the business sector increases every year, women do not receive equal pay for equal work and often find it extremely difficult to acquire commercial credit or to obtain tax deductions or rebates as heads of households. Unmarried women in particular endure many forms of discrimination.

3.3.2.1 Gender Involvement and Other Socioeconomic Attributes of Mine Sites Visited

To further understand the gender involvement and socioeconomic dynamics in ASM sites, data was collected on socioeconomic attributes of miners including gender involvement and their perception. The detailed result is presented in Appendix 5. Figure 3.14 shows the results regarding the perception of miners and non-miners on women involvement in mining and discrimination against women.

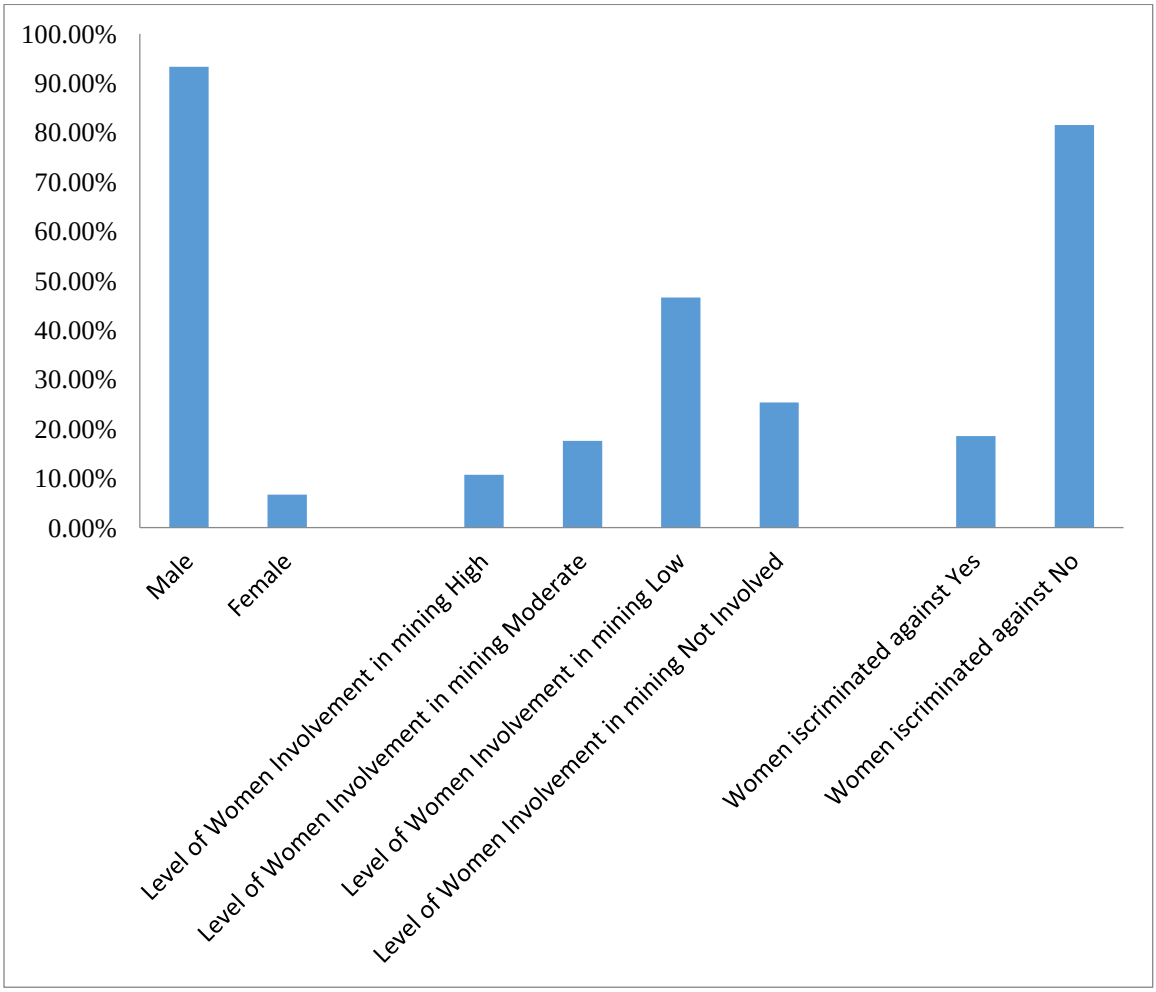


Figure 3.14: Result of perception of miners and non-miners on women involvement in mining and discrimination against women

From the result of the survey, the majority of participants (93.33percent) are males while only 6.67percent are females. This shows that the participation or level of involvement of females in mining generally in Nigeria is low. It was gathered during consultation with women that miners (males and females) are asked to bring land and housing titles as collateral for financial credit which appears difficult for women. Also, other elements that discriminate women from active participation in mining are religion and cultural barriers.

Despite the low participation of women in mining in many parts of the country, it is important to note that in some of the mine sites visited, women were engaged in evacuation and loading of minerals especially among ASM that are involved in quarrying. Women are involved in some aspects of mining work; discovering gold deposits (in Niger State), mining of tin and columbite (in Plateau State), and in Ebonyi and Cross River States (they are active in

Federal Government should ensure that cultural and credit rigidities are removed through strengthening and encouraging the Association of Women Miners and helping them to attract funding and other assistances.

quarrying especially as labourers). The implication of the above result is that women are interested in mining except for discriminations including religion, social and economic barriers which they are unfortunately confronted with.

3.3.3 Employment and Economic Activity

Employment

Detailed information is not available regarding the number of miners involved in ASM activity in Nigeria or about detailed employment generation of the mining sector. However, evidence shows that the sector is a potential major employer of labour if well harnessed. Table 3.9i shows the distribution of employed persons in the mining and quarrying sector by economic activity and sex.

Table 3.9i: Distribution of Employed Persons in the Mining and Quarrying Sector By Economic Activity and Sex

Economic activity	Male	Female	Both sexes
Mining of coal and lignite	6,340	3,598	9,938
Mining of metal ores	38,712	11,919	50,630
Other mining and quarrying	32,550	5,969	38,515
Mining support service activities	21,246	4,361	25,607

Source: NBS, 2010

The data shows that more males are involved in mining activity than females and even in mining support services. This corroborates the finding of SESA team from the mine sites visited.

Income and Livelihoods from Mining

Interviews with miners in the 12 states and FCT visited, mining livelihoods in Nigeria tend to fall into the categories set out in Table 3.9ii below as documented in 2005 SESA.

Table 3.9ii: Mining Livelihoods

Mining type	Settlement status	Link with other livelihood activities
Large/Medium scale	Mainly local (unskilled & semi-skilled) labour	Household farms using inputs purchased with mining income. Miners do limited farming themselves.
ASM	Local	Household farms using inputs purchased with mining income. Many miners are part-time farmers. Some invest in productive assets in nearby rural towns.
ASM	Migrant	Most remit some money but do not have local land. Money may be used to purchase inputs for farming "back home" or for productive assets

Source: SESA fieldwork 2019 and 2005 SESA of MMSD

The link between mining incomes and agriculture is logical given that this sector provides employment to more than 70percent of the rural population. However, cash income from the mining sector is valued for more than its ability to purchase fertiliser or hired labour and cash is often used to pay school fees, medical or other expenses.

In comparison of ASM income against expenditure is presented in Table 3.10.

Table 3.10: Monthly Income and Expenses from Mining Activity as Given by Miners

Item	Category	Percentage	Ave. (Naira)
Monthly income from mining	Less than 50,000	32.59	118,492.60
	50,000-100,000	37.04	
	101,000-150,000	9.63	
	151,000-200,000	9.63	
	201,000-250,000	3.70	
	More than 250,000	7.41	
Monthly expenses from mining	Less than 50,000	38.94	114,700.00
	50,000-100,000	33.63	
	101,000-150,000	10.62	
	151,000-200,000	5.31	
	201,000-250,000	2.65	
	More than 250,000	8.85	
Difference between income and expenses			3,792.60
Experienced food shortage in the last one year	Yes	53.33	
	No	46.67	
Reason for experiencing of food shortage	Did not have enough money to buy food	78.43	
	There was flood/draught in our area that destroyed our food items	12.16	
	There was conflict in our community that prevented us from going out to get food items	5.41	
	No Job	4.05	

Source: Field data, 2029

The result shows that the highest proportion (37.04 percent) earned between 50,000 and 100,000 naira only monthly. This was followed by those (32.54 percent) that earned less than 50,000 naira. The lowest proportion (3.70 percent) earned between 201,000 and 250,000 naira only. The average amount earned per month by the miners was 118,492.60 naira. In terms of expenses, the result based on the information from miners shows that the highest proportion (38.94 percent) spent less than 50,000 naira only on mining operation. This was followed by those that spent between 50,000 and 100,000 naira. The lowest proportion (2.65 percent) spent between 201,000 and 250,000 naira. The average amount spent by the miners was 114,700.00 naira monthly. Given the average amount earned and that was spent by the miners monthly, it is deduced that the average amount (in Naira) gained after expenses per month was only 3, 792.60 naira. This finding suggests that the ASM operation as it is carried out currently is not very profitable. Thus, the majority (53.3 percent) of the miners experienced food shortages in the last one year of which the majority (78.4 percent) indicated that the reason was due to lack of enough money to buy food (see Table 3.29). This suggests the need to find ways to stimulate the mining operations so as to enhance their income from mining.

3.3.4 Occupational Health

For a number of reasons, the health and safety (H&S) risks to which artisanal and small-scale miners are exposed to can be significantly greater than for large-scale mining. Most obviously, the informal and unregulated nature of ASM in Nigeria means that it usually operates

beyond the scope of legislation or enforcement on H&S guidelines even if they existed. ASM miners are particularly vulnerable to mine collapses, rock falls, exposure to dust and other chemicals, the effects of noise and vibration, poor ventilation, over exertion, inadequate work-space and inappropriate equipment use. Often these individuals are not aware of the risks they are taking and even simple safety items represent a costly investment with no immediate return. Moreover, some miners have introduced more mechanised equipment or techniques without the complementary safety measures and often these individuals are not aware of the risks. The dangerous environment extends beyond the mines, something that is considered a major problem given the current high infant mortality rates and low life expectancies in the rural areas. Those engaged in ASM are already some of the poorest people in Nigeria and are therefore, likely to have inadequate sanitation, with little access to clean water or basic health care. These problems are likely to be even worse where miners have converged around a freshly discovered deposit or settled in unorganised camps. Such remote and temporary settlements are unlikely to have public health facilities. In addition to harboring diseases related to poor sanitation, they are also breeding grounds for crime, prostitution, sexually-transmitted diseases (STDs) and other forms of moral depravity. Other threats include malaria and yellow fever, spread by mosquitoes breeding in water filled pits left by the miners, also cholera, diarrhoea, tuberculosis, bilharzia, and other parasitic and infectious diseases are common in informal mining camps in Nigeria.

In Nigeria, under the EIA Act, there are regulations and standards on occupational health and safety for investors/project proponents' compliance while enforcement of these laws is the responsibility of the monitoring and enforcement department of the Federal Ministry of Environment and also by NESREA. It was, however, revealed that even though Federal Ministry of Environment and NESREA have the technical capacity to monitor and enforce these regulations, they are crippled by paucity of funding (for operational vehicles, staff training and recruitment). On the other hand, there are no specific H&S guidelines for the ASM or mining sector. A few countries in Africa that have attempted to formulate ASM specific H&S guidelines include the new Mineral & Mining Policy of South Africa and the 1971 Mining Regulations of Zambia. Outside of Africa, the Philippines and China have national H&S legislation specifically for their ASM Sectors.

Nigeria Minerals and Mining Regulations 2011 has considerable detailed regulation guiding mine and safety (in Part 4) but this is not narrowed down to sector requirements, ethics and penalties guiding operational health and safety. Also, operational mandate indicating responsibility for enforcement is lacking. Although, the ASM department has Extension Officers who are providing professional guidance and register cooperatives to ensure that safer mining is carried out (supported by the SMMR Project, 2005-2013).

MinDiver should extend the assignment by developing a robust OHS standard and train the staff of Mines Environmental Compliance (MEC) department on OHS operations including monitoring and enforcement of OHS compliance.

3.3.5 Challenges of Artisanal and Small-Scale Mining in Nigeria

Miners face many challenges which need to be substantially resolved to facilitate the diversification of the sector. Thus, the SESA team collected data and information from the miners on challenges they face and how it can be resolved. These challenges were grouped into environmental and social, financial, infrastructure/equipment, institutional, health and safety.

These challenges were rated as high, medium, low or not at all. The result is presented in Table 3.11.

Table 3.11: Challenges Miners Face as Regards Artisanal Mining Activity in Their Locality

S/No	Challenges	High (%)	Medium (%)	Low (%)	Not at all (%)
	Environmental and social				
1	Stagnant water in abandoned quarries and mine pits	44.07	15.25	16.10	24.58
2	Lack of land ownership for women in the area	50.42	16.81	17.65	15.13
3	Discrimination against women	15	41.5	30	13.5
4	Labour influx and its attendant social vices	45	30	15	10
5	Lack of food and water	17.95	21.37	32.48	28.22
6	Long distance of mining sites in the wilderness	23.73	27.97	20.34	27.97
7	Conflicts as a result of land ownership of mining sites	15.25	19.49	23.73	41.53
8	Conflicts as a result of changes in mining rights	15.97	17.65	23.53	42.86
9	Poor or lack of shelter in mining sites	38.66	26.89	20.17	14.29
10	Wildlife menace	4.24	5.06	15.25	75.42
11	Menace of armed bandits, kidnappers and terrorists in the areas	6.72	8.40	21.85	63.03
12	Mineral theft	16.81	15.13	23.53	44.54
13	Low quantity of sand in dry season	12.82	22.22	35.04	29.91
14	Blockage of mine sites by water during rainy season which disrupts mining activities	48.74	11.76	24.37	15.13
15	Child labour and violation of labour rights	23.53	17.65	16.81	42.02
16	Lack of land compensation and resettlement	21.19	11.02	27.12	40.68
	Financial				
17	Inaccessibility to credit facilities	68.07	10.08	14.29	7.56
18	Low income levels	44.54	41.18	12.61	1.68
19	Low wages in the artisanal mining sector	36.97	42.86	16.81	3.36
20	High cost of transport to the mining sites	41.18	17.65	26.89	14.29
21	Lack of capital to purchase mining equipment	78.15	13.45	6.72	1.68
22	Lack of organized market for minerals	31.09	21.85	30.25	16.81
	Infrastructure/Equipment				
23	Inadequate mining equipment and machinery	76.47	11.76	11.76	0.00
24	Poor communication network	22.88	22.88	33.05	21.19
25	Inaccessible mining sites	29.41	31.93	25.21	13.45
26	Lack of equipment and facilities for value addition	54.62	26.05	14.29	5.04
	Institutional				
27	Inadequate training and sensitization on the mining regulations and policies	48.51	34.75	11.02	5.93
28	Insecurity at the mining sites	21,85	19.33	40.34	18.49
29	Lack of knowledge on basic mining and	42.02	35.29	17.65	5.04

	geological skills				
30	Lack of skills and knowledge on value addition	42.02	42.02	14.29	1.68
31	Illegal collection of levies by government officials	32.77	10.08	26.69	30.25
32	Corruption in the issuing of mining permits, and licences and mineral titles	31.09	12.61	25.21	31.09
33	Low levels of enforcement of regulations and policies	24.37	32.77	30.25	12.61
34	Multiple taxation by government	32.20	11.02	20.34	36.44
35	Poor enforcement of mining regulations	23.53	30.25	31.09	15.13
36	Intimidation of workers by state government officials	24.37	9.24	27.73	38.66
	Health and Safety				
37	Disease outbreak such as malaria, diarrhoea and bilharzias in mining sites	22.69	15.13	19.33	42.86
38	Sexual harassment of women in mining sites	2.54	3.36	8.47	85.59
39	Use of explosives that affect hearing and cause collapse of mining sites	9.28	10.08	21.01	59.66
40	***Lack of protective equipment***	47.06	29.41	14.29	9.24
41	Lack of precautionary signage at mining sites	42.86	24.37	20.17	12.61
42	Spread of HIV/AIDS at mining communities due to influx of people and prostitution	3.39	3.39	26.27	66.95
43	Mineral contamination of food and body such as lead and mercury	8.40	14.29	18.49	58.82

Source: SESA Field data, 2019

The environmental and social challenges affecting mining which the majority or greater proportion of the miners rated as being high include stagnant water in quarries and mine pits (44.07percent), blockage of mine sites by water during rainy season which disrupts mining activities (48.74percent), poor or lack of shelter in mining sites (38.66percent), issue of discrimination against women particularly on land ownership, collateral for credit and cultural restraints. On the other hand, the majority and highest proportion of the miners indicated that some environmental and social issues did not affect mining at all. These include menace of armed bandits, kidnappers and terrorists (63.03percent), menace of wildlife (75.42percent), mineral theft (44.54percent), conflicts as a result of changes in mining rights (42.86percent), and conflicts as a result of land ownership of mining sites (41.53percent).

In addition, the financial challenges which the majority of the miners rated as high include lack of capital to purchase mining equipment (78.15percent), lack of access to credit facilities (68.07percent), and low-income levels (44.54percent). In terms of infrastructure and equipment challenges, the majority (76.47percent and 54.62percent) rated inadequate mining equipment and machinery and lack of equipment and facilities for value addition respectively as high. Furthermore, in terms of institutional challenges, the highest proportion (48.51percent, 42.02 percent and 42.02 percent) rated inadequate training and sensitization on the mining regulations and policies, lack of knowledge on basic mining and geological skills and lack of skills and knowledge on value addition respectively as high. Finally, in terms of health and

safety, the highest proportion (47.06 percent) rated a lack of personal protective equipment as high.

Furthermore, miners' opinion on strategies to address the challenges and issues observed at mine sites is presented in Table 3.12.

Table 3.12: Strategies for overcoming the challenges faced by miners

S/No	Strategies	Percentage (percent)
1	Provision of access roads to mining sites	97.48
2	Provision of mining equipment for example excavators and pale loaders	96.64
3	Provision of first aid facilities	98.32
4	Improved access to loan/credit facilities	97.48
5	Sensitization and enlightenment of miners on the negative effects of mining	95.80
6	Training of mine workers on best mining practices	98.31
7	Provision of security at mine sites	92.44
8	Curb incessant youth disturbances at mine sites	85.71
9	Stop illegal charges by youths and community leaders	89.08
10	Organize stakeholder consultations to discuss key issues that bother on mining	99.16
11	Provision of grants to support mining operators	99.14
12	Decentralization of mining permits and licenses (to zones and states)	84.75
13	Strengthen and encourage the Association of Women Miners and helping them to attract funding and other assistances	94.5percent
14	Provison of adequate funds for monitoring and enforcement to the technical departments of MMSD.	90.0percent

Source: SESA Field data, 2019

The result shows that the majority of the miners were of the opinion that all points listed in Table 3.31 constitute the strategies that should be applied to reduce the challenges miners faced at mine sites and thus enhance diversification of the sector. These include effective monitoring for compliance by investors on environmental rehabilitation and protection of mine sites, strengthening the association of Women in Mining and supporting them to attract credits, improved access to credit facilities, training of miners on the best practices in mining, provision of grants to support mining operation, sensitization and enlightenment of miners, provision and subsidization of mining equipment, among others.

CHAPTER FOUR: LEGAL, REGULATORY & INSTITUTIONAL FRAMEWORK

4.1 Governance in Nigeria

The Constitution provides for three levels of government; Local, State and Federal. The Federation consists of 774 local government areas, 36 States and a Federal Capital Territory.
The Federal Government of Nigeria is composed of three distinct arms: executive, legislative and judiciary with powers vested by the Constitution of the Government of the Federal Republic of Nigeria (1999 as amended) in the President, National Assembly, and Federal courts, including the Supreme Court, respectively. Executive powers are exercised by the president who is also the head of state and the head of government.

The framework for both mineral development and environmental management is highly centralised with the Federal and State governments primarily responsible for developing and applying the legislative framework, including the provision of supervisory and regulatory functions. The primary responsibility for economic planning and development resides with the Local Governments.

The Constitution of the Federal Republic of Nigeria (1999) places total ownership and control of all minerals in the Federal Government. In addition, the legislative powers are vested in a National Assembly which is solely responsible for making, amending and repealing legislation relating to the Exclusive Legislative list contained in Part 1 of the Second Schedule. This includes mines and minerals. Therefore, mining and minerals are in the Exclusive Legislative list of the 1999 Constitution, hence only the Federal Government has the authority to grant mining permits or licenses. Thus, the full responsibility for mineral rights rests with the Federal Government and none of the States have any direct control over the exploration and exploitation of minerals. However, a number of States have established mineral related Ministries. For example, Plateau State has a Ministry of Environment and Mineral Development with the mandate of promoting exploration, mineral investment and public awareness. Also, Cross River State has a Ministry for Solid Minerals Development with the mandate to regulate and coordinate all forms of mining activities in the State with a view to boosting the internal revenue base of the State from such activities. The local government council's functions include, but are not limited to making recommendations to the State on economic planning and development and ensuring that the interests and traditional values of the community are taken into consideration. They are not empowered to enact, repeal or revise any legislation apart from local by-laws.

Table 4.1 below asseses key MDAs and partners in the regulation and enforcement of environmental and social compliance in the Mining Sector in Nigeria.

Table 4.1: Assessment of Key MDAs and Partners in the Regulation and Enforcement of Environmental and Social Compliance in the Mining Sector in Nigeria.

#	MDAs	Mandates related to the Mining Sector	Functional Capacity	Areas of overlap	Suggestion to close Gaps
A	FMEnv	• Has overall responsibility for coordination of environmental protection • Reviews and approves EIAs • Raise public awareness and public disclosures of instruments prepared towards environmental management • Monitoring of Compliance	Fairly functional. Has offices in all states of the federation; FMEnv is faced with capacity challenges such as poor funding, inadequate staffing, inadequate operational vehicles and welfare for staff	Mandate is a duplication of the functions of the state ministry of environment in terms of monitoring of compliance	There is need for a joint committee in the like of MIREMCO to coordinate the regulators and their mandates to eliminate wastage of resources and limit unnecessary visits to sites and multiple requirements from operators which are disincentive to investment in the sector
B	SMEnv	• Ensures the compliance of environmental laws for the overall protection of the environment • Ensures environmental sanitation and carryout solid waste evacuation	Same as in above	Same as in A .	Same as in above
C	State Ministries of Solid Mineral/Mineral Resources	• Works to ensure compliance to regulations by the operators in the sector • Create and maintain a data bank of solid minerals development activities in both private and public sectors	Substantively functional. Active in monitoring, regulating and collecting royalties from mine operators	Mandate overlaps with that of the Mining cadastral office, ASM and MEC departments of MMSD	Same as in above
D	Mine Cadastral Office	• Administration of mining title and maintenance of cadastral register of reconnaissance permit and exploration license	Substantively functional	Mandate overlaps with that of State Ministries of Solid Mineral Development and Natural resources	

E	MEC Department	• Ensures that Environmental laws and standards are complied with by miners/operators • Review plans, studies and reports required to be prepared by holders of mineral title, monitoring and enforcement of compliance • Carry out auditing of environmental requirement	Fairly functional. MEC is faced with capacity challenges such as poor funding, inadequate staffing, inadequate operational vehicles and welfare for staff	Mandate overlaps with that of NESREA and often also overlaps with that of State Ministries of Solid Mineral Development and Natural resources	There is need for MEC to be strengthened to undertake its mandate as a sector regulator. NESREA or any other regulator with similar or same mandate should be advised to concentrate in sectors with no sector regulator in order not to involve in overlap of functions and waste of resources.
F	Mine Inspectorate Department	• Regulates mining activities such as purchase and use of explosives as well as safe storage of magazines/explosives	Same as in above	Mandate overlaps with that of State Ministries of Solid Mineral Development and Natural resources	
G	ASM Department	• Ensures that only licensed and registered miners operate within the mining space	Same as in above	Mandate overlaps with that of State Ministries of Solid Mineral Development and Natural resources	
H	NESREA	• Has responsibility to enforce environmental standards, laws and regulations in deterring people, industries and organization from polluting and degrading the environment anywhere in Nigeria • Enforce compliance with policies, standards, legislations and guidelines on water quality, environmental health and sanitation including pollution abatement • Has the power to prohibit processes and use of equipment or technology that undermine environmental quality	Fairly functional. NESREA is faced with capacity challenges such as poor funding, inadequate staffing, inadequate operational vehicles and welfare for staff	Mandate overlaps with that of MEC	NESREA can focus on areas or sectors where there are no environmental sector regulator

I	MIREMCO	• Plays advisory role to MMSD on matters affecting pollution, land degradation and social issues • Involves in coordinating stakeholders (miners, host community and government) for effective resolution of disputes	• Fairly functional • They are yet to be present in some of the mining states • Suffers insufficient funding	No overlap	MIREMCO should be strengthened and funded to perform effectively in the discharge of its mandate.
J	CSOs/NGOs	• Plays advocacy role • Ensures that the rights of stakeholders, especially the weak and vulnerable are protected	Substantively functional	No overlap	

4.2 Legal and Regulatory Frameworks Guiding Mining & Quarry Licensing & Monitoring

The key legal and regulatory framework guiding solid mineral exploration and exploitation in Nigeria are the Federal Ministry of Environment regulations and guidelines, the Nigeria Minerals and Mining Act 2007, the Minerals and Mining Regulations 2011 (which was made in pursuant of the Mining Act), and the National Mineral and Metals Policy, 2008.

4.2.1 Federal Ministry of Environment regulations and Guidelines

The following are the applicable regulations, guidelines and standards of the FMEnv that affects the mining sector.

- National guidelines for EIA Act 86 of 1992: Sectoral Guideline for Mining 2013
- National Environmental (Mining and Processing of Coal, Ores and Industrial Minerals) Regulations, 2009.
- National Environmental (Quarrying and Blasting Operations) Regulations, 2013.
- National Environmental (Sanitation and Wastes Control) Regulations, 2009
- National Environmental (Noise Standards and Control) Regulations, 2009
- National Environmental (Ozone Layer Protection) Regulations, 2009
- National Environmental (Soil Erosion and Flood Control) regulations 2011
- National Environmental (Surface water and Groundwater Quality Control) Regulations 2011

4.2.2 Nigeria Minerals and Mining Act, 2007

4.2.2.1 Some Provisions of Minerals and Mining Act, 2007

The Minerals and Mining Act LFN 2007 is the principal law on the mining sector in Nigeria. The Act repealed the Minerals and Mining Act, No. 34 of 1999. The act vests the entire property in and control of all mineral resources in the Government of the Federation for and on behalf of the Nigerian people. The Act gives superior rights to use land for mining purposes over the statutory right of occupancy or customary ownership of such land. It provides that the use of land for mining operations shall have priority over other uses of land, as it constitutes an overriding public interest within the meaning of the Land Use Act. In fact, the Act indicates that all lands which mineral have been found in commercial quantities shall from the commencement of the Act be acquired by the Federal Government in accordance with the Land Use Act. It provides in section 1(3) that property in mineral resources shall pass from the Government to the person by whom the mineral resources are lawfully won, upon their recovery in accordance with the provisions of the Act. However, there are lands excluded from mineral exploration and exploitation as indicated in the Act. These include land:

- set apart for, or used for or appropriated or dedicated to any military purpose except with the prior approval of the President of the Federation;
- that is within fifty meters of an oil pipeline licence area which is granted under the Oil Pipeline Act;
- occupied by any town, village, market, burial ground or cemetery, ancestral, sacred or archaeological site, appropriated for a railway or situated within fifty meters of a railway, or which is the site of, or within fifty meters of, any government or public building, reservoir, dam or public road;

- that is subject to the provisions of the National Commission for Museums and Monuments Act, Cap N19, laws of the Federation of Nigeria, 2004 and the National Parks Service Act, Cap N65, laws of the Federation of Nigeria, 2004; or
- over which a mineral title has previously been granted by the mining cadastre office and where such mineral title is subsisting.

It also indicates that reconnaissance activity will not be allowed or mineral title granted for any land area that is designated as closed to mining operations.

The Act equally stipulated the conditions that guarantee a transparent and fair licensing process which include competitiveness and prioritization on the basis of time of application and fulfillment of conditions for issuance. The Act also eliminated the potential for discretionary award of mining licenses as it set boundary on the powers of the Minister. Mineral titles/types of licence under the Act include Reconnaissance Permit (RP), Exploration Licence (EL), Small Scale Mining Lease (SSML), Mining Lease (ML), Quarry Lease (QLS) and Water Use Permit.

Other provisions of the Act include the establishment of the Mining Cadastre Office with the responsibility of administration of the mining titles and maintenance of cadastral register of reconnaissance permits, exploration licenses, mining leases, small scale mining leases, water use permits and quarry leases. The Act also authorized the Minister to establish the Mines Inspectorate Department and Mines Environment Compliance Department. The Mines Inspectorate Department as provided in the Act is responsible for general supervision of all reconnaissance, exploration and mining operations to ensure their compliance with the Act; supervise and enforce compliance by mineral title holders with all mine health and safety regulations prescribed under the Act and any other law in force, among others.

The Mines Environment Compliance (MEC) Department as provided in the Act is responsible for reviewing all plans, studies and reports required to be prepared by holders of mineral title in respect of their environmental obligations under the Act; monitoring and enforcement of compliance by holders of mineral title with all environmental requirements and obligations established pursuant to the Act, its regulations and any other law in force; auditing of the environmental requirements and obligations established pursuant to the Act, its regulations and by any other law enforced periodically and make recommendations to the Minister; and liaising with relevant government MDAs with respect to social and environmental issues involved in mining operations, mine closure and reclamation of land.

The Act also established the Mineral Resources and Environmental Management Committee (MIREMCO) in each State of the Federation which its major functions include to discuss, consider and advice the Minister on the matters affecting pollution and degradation of any land on which any mineral is being extracted; advice the departments established in accordance with the provisions of the Act for the supervision of mineral exploitation and the implementation of social and environmental protection measures, among others. The committee members include a representative of the MEC department who is the chairman, a representative of the Ministry responsible for land matters or mineral related matters in the state, the mines officer responsible for the state, a representative of the Ministry of agriculture or forestry in the State, a representative of the Surveyor-General of the state, a representative of local government council when matters relating to the local government is being considered by the committee, a representative of the state environment department or agency, and a representative of the Federal Ministry of Environment in the State. It is important to note that private sector/miners, major stakeholders in the sector, are not represented in the committee.

To facilitate investment in the sector, the Act provided some incentives and benefits to companies and enterprises involved in mining operations. The incentives are as follows:

- In determining total profits, a license holder is entitled to deduct from his assessable profits capital allowance of 95percent of qualifying expenditure incurred in the year in which the investment was made on all certified exploration, development and processing expenditure including feasibility studies; sample assay costs; and infrastructure costs;
- The amount of any loss incurred by a license holder shall be deducted as far as is possible from the assessable profits of the first year of assessment and thereafter in the year which the loss was incurred and in so far as it cannot be so made, then from such amounts of such assessable profits of the next year of assessment and so on up to a limit of four (4) years after which the period any unregistered loss shall lapse;
- Exemption from customs and import duties on approved plants and machinery, equipment and accessories imported specifically and exclusively for mining operations;
- Tax holiday for the first 3 years of operation which period may be extended for another 2 years. The Tax relief begins to accrue on the commencement of operations. This is at odds with CITA which only grants tax holiday of 3 years without any option of extension;
- Expatriate Quota and resident permit in respect of expatriate quota personnel;
- Personal remittance quota to expatriate personnel for the transfer of foreign currency out of Nigeria;
- Free transferability of dividends or profits; payments in respect of servicing a certified foreign loan; and foreign capital in the event of sale or liquidation of mining operations in any convertible currency;
- The Central Bank of Nigeria(CBN) may permit a title holder who earns foreign exchange from the sale of its minerals to retain in a foreign exchange domiciliary account a portion of his earnings for use in acquiring spare parts and other inputs required for mining operations which would otherwise not be readily available without use of such earnings;
- Grant of investment allowance of 10percent on qualifying plant and machinery;
- Tax deductible for environmental cost;
- Tax deductible for pension funds for employees of mining companies;
- Annual Capital Cost Indexation-unclaimed balance of capital cost shall be increased yearly by 5percent for mines that start production within 5 years from the date of enactment of the Act;
- Deferment of royalty payments on any minerals for a specific period on the approval of the Federal Executive Council; and
- The investor may also be entitled to claim an additional rural investment allowance on its infrastructure cost. This is however dependent on the location of the company and the type of infrastructure provided.

4.2.2.2 Environmental Protection Provision in the Minerals and Mining Act, 2007

Besides the establishment of MEC Department and the prohibition of solid mineral exploration and exploitation operations in National Parks, the Act made some provision to ensure the protection of the environment from mining operations. Some of the provisions are as follows:

- prohibition of exploration in any area held to be sacred or injury and destruction of any tree or other thing which is the object of veneration thus, ensures the protection of sacred groves which are repositories of biodiversity;
- that mineral title holders have regard to the effect of mining operations on the environment and take such steps as may be necessary to prevent pollution of the environment resulting from mining operation;
- restoration and reclamation of lands where mining operation was carried out or covered with tailings due to mining operation to its natural state or state specified by law in force and in line with best practices;
- requires that any mineral title holder submits an environmental impact assessment statement approved by the Federal Ministry of Environment in respect of the exploration and mining operations to be conducted in mineral title area before commencement of mining operations, application for extension of terms or application for conversion of mineral title;
- requires that title holders submit an environmental protection and rehabilitation plan containing details as provided by environmental regulations issued pursuant to the Act. The MEC is responsible for approval or rejection and monitoring of environmental protection and rehabilitation program;
- prohibits pollution of water or watercourses in an area within mining lease and beyond the area; and
- establishment of environmental protection fund in order to guarantee environmental obligations of mineral title holders.

The summary of environmental obligations of mineral title holders is presented in Table 4.2.

4.2.3 Nigeria Minerals and Mining Regulations, 2011

The Nigeria Mineral and Mining Regulations were issued by the Ministry in pursuant of the Mineral and Mining Act, 2007. The main objective of the Regulations is to "establish a more coordinated and viable solid minerals sector in the country and to stamp out the discretionary grant of mineral titles" (MMSD, 2016 p. 27)[34]. Following the provisions of the Mineral and Mining Act, the Regulation defined the procedures, rules and processes for granting mineral licenses and thus streamlined and removed any ambiguity in granting license to both local and foreign investors in the sector.

The regulations also set out the full details regarding environmental management especially as it relates to environmental impact assessment, environmental protection and rehabilitation, environment audit, community development agreement and inspection of the mining environment. The regulation stipulates that full details of environmental impact assessment report and statement is required in the exploration license, only when mineral exploration involves trenching, pitting and drilling. It also stipulates that audit report of the impact on the environment of any exploration, quarrying or mining operation shall be prepared by an independent and accredited consultant, and the report would contain information as to whether the environmental impact assessment was being implemented and complied with. Also, to ensure that monitoring and periodic environmental auditing are done in compliance with environmental management plan in the Environmental Impact Assessment Statement, mineral

[34]MMSD (2016) Mining Environmental Regulatory Compliance Handbook in Nigeria. Abuja: MMSD.

title holders are required to employ a qualified environmental officer. The regulation equally stipulates that the first environmental audit on impact of any exploration, quarrying and mining operation on the environment shall be conducted within fifteen months of commencement of such operation while subsequent environmental audit shall be carried out every six months and throughout the lifecycle of the operation.

Table 4.2 Summary of Environmental Obligations of Mineral Title Holders

Mineral title	Environmental Requirements	Timeline
Reconnaissance permit	-	-
Exploration license	EIA Statement, EPRP, Mine Design (including tailings dump plan) to mines environmental compliance department as well as contribution	Before commencement of any form of trenching burrowing and pitting. Contribution into EPRF not later than one year after approval of EPRP
Small scale mining lease	Approved CDA, EIA statement, EPRP, mine design (including Tailings Dump Plan) to mines environmental compliance department as well as contribution into EPRF, Annual Reclamation Statement, Fuel Storage plan, Reclamation and Restoration of mine lands. Conduct of mining operation in environmentally safe manner, employment of a qualified environmental officer, compensation to land owners and other social issues.	Before commencement of any form of trenching, burrowing and pitting. Contribution into EPRF not later than one year after approval of EPRP
Mining lease	Approved CDA, EIA statement, EPRP, mine design (including tailings dump plan) to mines environmental compliance department as well as contribution into EPRF, annual reclamation statement, fuel storage plan, reclamation and restoration of mine lands. Conduct of mining operation in environmentally safe manner, employment of a qualified environmental officer, compensation to land owners and other social issues.	Before commencement of any form of trenching burrowing and pitting. Contribution into EPRF not later than one year after approval of EPRP
Quarry lease	Approved CDA, EIA statement, EPRP, mine design (including tailings dump plan) to mines environmental compliance department as well as contribution into EPRF, annual reclamation statement, fuel storage plan, reclamation and restoration of mine lands. Conduct of mining operation in environmentally safe manner, employment of a qualified environmental officer, compensation to land owners and other social issues.	Before commencement of any form of trenching burrowing and pitting. Contribution into EPRF not later than one year after approval of EPRP
Water use permit	As applicable to the mineral title for which the water use permits are granted	-

Note: The MEC Department, as provided by the mining Act is responsible for coordination of all environmental issues regarding mining.

4.2.4 National Minerals and Metals Policy, 2008

The policy sets out broad economic and social objectives of government in relation to solid minerals exploration and exploitation in the country. It takes the mining sector as being critical to the realization of government's economic policy objectives especially economic diversification, job creation and poverty reduction. The main purpose of the policy was to take full advantage of the increase in international commodity prices and the global resurgence of exploration activities. The objectives of the policy are to:

- achieve a substantial increase in GDP contribution by the minerals sector;
- generate quality geosciences data;
- establish a transparent licensing regime;
- formalize artisanal and smallscale mining operators;
- facilitate poverty eradication through ASM operations;
- facilitate employment generation;
- enhance wealth creation through value addition;
- increase the capacity of mineral based industries; and
- attract private investment capital.

4.2.5 Other Laws and Regulations Relating to Mining Sector and for Environmental Protection and Management in Nigeria

1999 Constitution of the Federal Republic of Nigeria (as amended)

In the 1999 Constitution of the Federal Republic of Nigeria (as amended), mines and minerals are on the Exclusive Legislative List thus, the Federal Government has exclusive legislative powers and jurisdiction on all matters relating to mines and minerals. Also, all taxes and royalties derived from mining go to the Federal treasury rather than the individual state from whose territory mining occurred. In the constitution, Section 43 indicates that every citizen has a right to acquire and own immovable property anywhere in Nigeria. However, this is a qualified right as further explained in Section 44 which prohibits compulsory acquisition of property except for manner and purposes prescribed by law. It also states, in Section 44(3) that the entire property in and control of all minerals, mineral oils and natural gas under or upon any land in Nigeria or in, under or upon the territorial waters and the Exclusive Economic Zone of Nigeria is vested in the Government of the Federation. This exclusive right given to the Government of the Federation regarding control of minerals implies that, any land previously owned by a citizen may be revoked if any mineral is found under or upon the land. In addition, Section 251 of the constitution provides that in civil cases and matters connected to mines and minerals, the Federal High Court shall have and exercise jurisdiction to the exclusion of any other court.

Whilst issues relating to minerals are exclusively vested in the Federal Government, it is instructive to note that Section 20 of the constitution empowers states to protect and safeguard the environment within their jurisdiction. Consequently, both the Federal Government and states have roles to play in environmental protection.

Land Use Act 1978 (as Amended By Land Use Act Cap202 LFN 1990).

The Land Use Act, Cap 202, 1990 Laws of the Federation of Nigeria is the applicable law regarding ownership, transfer, acquisition and all such dealings on Land. The provisions of the

Act vest every Parcel of Land in every State of the Federation in the Governor of the State. The Governor holds such parcel of land in trust for the people and government of the State. The Act categorized the land in a state to urban and non-urban or local areas. The administration of the urban land is vested in the Governor, while the latter is vested in the Local Government Councils. At any rate, all lands irrespective of the category belongs to the State while individuals only enjoy a right of occupancy as contained in the certificate of occupancy, or where the grants are "deemed.''

It regulates access to land for mining by virtue of Section 28(1) (c) which provides that the governor of a state could revoke a right of occupancy for any overriding public interests. This implies that the governor can revoke a certificate of occupancy for overriding public interest for any land where a mineral deposit is found to be in commercial quantity.

Environmental Impact Assessment Act, 1992 (as Amended By EIA Act CAP E12 LFN 2004).

The environmental impact assessment act makes the conduct of an environmental impact assessment (EIA) mandatory for all proposed major development projects and activities. More specifically, the Act places a restriction on commencing any public or private project without prior consideration of the likely environmental effects. Consequently, projects on the mandatory study list, which include mining, are expressly prohibited from being carried out without an approved EIA by the Federal Ministry of Environment (FMEnv). The Act categorized projects to indicate the level of analysis required. Category 1 projects indicate an expectation of significant environmental impacts and need to undertake a full EIA with a comprehensive report. These are project in environmentally sensitive areas, for example, coral reefs, mangrove swamps, tropical rainforests, areas with erosion soils, natural conservation areas etc. Category 2 indicates that a proposal may have impacts of a lesser magnitude that can be more readily mitigated. Here, some level of analysis is necessary depending on the type of impacts. This involves projects in agriculture and rural development, industry and infrastructure etc. Category 3 indicates that no adverse impacts are expected and that no EIA is needed, for example, nutrition programmes, education programmes etc. The EIA procedural guideline in Nigeria involves project proposal, initial environmental examination, screening, scoping, EIA study, review, decision making, monitoring and audit.

The Nigerian Investment Promotion Commission Act 1995

This Nigerian investment promotion commission Act (the 'NIPC Act') established the Nigerian investment promotion commission, for the purpose of encouraging and promoting investment in the Nigerian economy and for matters connected therewith. The Nigeria Minerals and Mining Act of 2007 provides in Section 29 (2) that the specifications of the NIPC Act shall apply to any foreign investment made in respect of any mineral title granted pursuant to the act. Thus, the provisions of NIPC act that apply to foreign investors, shall also apply to same who have made investments in respect of any mineral titles.

The NIPC Act is particularly useful in the area of dispute resolution as regards solid minerals mining. The NMMA provides in section 141 that where a dispute is not settled amicably, the provisions of NIPC Act should be applied.

The Companies and Allied Matters Act, 2004.

The Companies and Allied Matters Act ('CAMA') 2004 regulates company formation and operation in Nigeria and provide that no foreign company may carry on business in Nigeria unless it incorporates a local subsidiary in the country. The NMMA 2007 incorporates this by a corporate body duly incorporated under CAMA 2004.

Companies Income Tax Act (CITA)

The following taxes are required to be paid by a mining company: corporate income tax; education tax; personal income tax of its staff; value-added tax; capital gains tax; and withholding tax. Companies involved in mining activities are assessed and taxed under the Companies Income Tax Act (CITA). However, individuals and partnerships engaged in mining activities are liable to tax under the Personal Income Tax Act (PITA). Part V of CITA [1996 No. 31. Cap. N107] provides that a new company going into the mining of solid minerals shall be exempt from tax for the first three yearsof its operation.

National Environmental (Mining and Processing of Coal, Ores and Industrial Minerals) Regulations, 2009 S.I. No. 31

The purpose of the regulations is to minimize pollution from mining and processing of coal, ores and industrial minerals. The regulation encourages the application of up-to-date, efficient cleaner production to minimize pollution to the highest degree practicable in new development in the mining and processing techniques.

Part 1 of the regulations specifies key environmental obligations to include the following:

- Environmental impact assessment (EIA) study shall be conducted for new development in the sector and approval obtained from the Federal Ministry of Environment while comprehensive Environmental Evaluation Study (EES) shall be carried out on facilities without EIA at the commencement of operations and reports submitted to the Agency.
- Every existing facility shall conduct and submit a three (3) yearly environmental audit report to the Agency for review.
- Every facility shall adopt cleaner production process and pollution prevention measures that would yield both economic and environmental benefits.
- Every facility shall provide base for ancillary equipment and bund wall in the event of any unanticipated discharge or spillage.

For mines using old operating methods, the regulations specify that such mines shall take necessary measures to limit risks. Such measures may include the installing leachate collection tanks. Also, for mines using new designs, to evaluate their installations and ensure that control routines are sufficient to prevent risks of pollution or accident.

National Environmental (Quarrying and Blasting Operations) Regulations, 2013 S.I No 33

The objective of this regulation is to control and regulate quarrying and blasting operations and their adverse effects on the environment and human health. Specifically, the regulations aims to prevent environmental degradation; ensure the use of environment-friendly technologies in quarrying operations; sustain the carrying capacity of the Nigerian land in particular and the environment in general; prevent the contamination of both surface and ground water; encourage the wise use and exploitation of natural resources and the protection of the ecosystem; prevent air and noise pollution; ensure control and safe use of commercial (blasting)

explosive; avoid any interference or obstruction of the natural drainage channel and ensure safety of workers in the quarry and the public in general. Other provisions listed in Part 1 of the Regulation include Environmental Impact Assessment (EIA) study to be conducted for all new quarries before the commencement of operations as required by the EIA act of 1992 and environmental impact statement (EIS) submitted to the agency. It also requires that environmental audit (EA) to be conducted on all existing quarries every three (3) years.

National Environmental Protection (Pollution Abatement in Industries and Facilities Generating Wastes) Regulation, 1991 S. 1. No 9.

The regulation imposes restrictions on the release of toxic substance to the environment. It also indicates that the collection, treatment, transportation and final disposal of waste shall be the responsibility of the industry or facility generating the waste. The regulations require industries and facilities including mining sector to monitor pollution to ensure control. Other provisions of the regulation include permit by industries for storage and transportation of harmful toxic wastes; strategies for waste reduction; disposal of solid wastes in environmentally safe manner; and protection of workers. Penalties for contravention are also spelt out in the regulation.

National Environmental Protection (Management of Solid and Hazardous Wastes) Regulations, 1991 S. I. No. 15.

The regulations make provisions for the handling and management of solid hazardous waste as well as define the objectives of hazardous waste management, the functions of appropriate government agencies and the obligations of industries. The regulations highlighted dangerous waste lists and guidance on the management of spills and discharges into the environment. The regulations also define the requirements of ground water protection, surface impoundment, land treatment, waste piles, etc. the hazardous substance tracking programme with a comprehensive list of acutely hazardous chemical products and dangerous waste constituent are also provided in the regulations as well as the requirements and procedure for inspection, enforcement and penalty.

National Environmental Protection (Effluent Limitation) Regulations, 1991 S.I. No8.

These regulations make it mandatory for every industry to install anti-pollution equipment for the detoxification of industrial effluent chemicals discharge and also make provision for further effluent treatment. The regulations also prescribe maximum limit of effluent parameters allowed for discharged and spell out penalties for contravention.

National Policy on the Environment, 2016

The goal of the National Policy on the Environment is to 'ensure environmental protection and the conservation of natural resources for sustainable development.' The strategic objective of the National Policy on the Environment is to coordinate environmental protection and natural resources conservation for sustainable development. This goal is meant to be achieved by the following strategic objectives:

- securing a quality of environment adequate for good health and wellbeing;
- promoting sustainable use of natural resources and the restoration and maintenance of the biological diversity of ecosystems;

- promoting an understanding of the essential linkages between the environment, social and economic development issues;
- encouraging individual and community participation in environmental improvement initiatives;
- raising public awareness and engendering a national culture of environmental preservation; and
- building partnership among all stakeholders, including government at all levels, international institutions and governments, non-governmental agencies and communities on environmental matters.

The summary of existing regulations applicable to environmrntal protection in Nigeria is presented in Tbale 4.3.

Table 4.3: Summary of the Existing Regulations Applicable to Environmental Protection.

S/N	Regulations	Year	Provisions
1	Workmen Compensation Act	1987	Occupational health and safety
2	Harmful Wastes (Special Criminal Provisions etc.) Decree No. 42	1988	Provides the legal framework for the effective control of the disposal of toxic and hazardous waste into any environment within the confines of Nigeria
3	National Environnemental Protection (Effluent Limitation) Régulation	1991	The regulation makes it mandatory for industrial facilities to install anti-pollution equipment, makes provision for effluent treatment and prescribes a maximum limit of effluent parameters allowed.
4	National Environmental Protection (Pollution and Abatement in Industries in Facilities Producing Waste) Regulations	1991	Imposes restrictions on the release of toxic substances and stipulates requirements for monitoring of pollution. It also makes it mandatory for existing industries and facilities to conduct periodic environmental audits.
5	National Environmental Protection (Management of Solid and Hazardous Wastes) Regulations.	1991	Regulates the collections, treatment and disposal of solid and hazardous wastes from municipal and industrial sources.
6	National Guideline and Standard for Environmental Pollution Control	1991	The regulations provide guidelines for management of pollution control measures.
7	Environmental Impact Assessment Act (Decree No. 86).	1992	The decree makes it mandatory for an EIA to be carried out prior to any industrial project development
8	Urban and Regional Planning Decree No 88	1992	Planned development of urban areas (to include and manage waste sites)
9	Environmental Sanitation Edicts, Laws and Enforcement Agencies		General environmental health and sanitation. Enforcing necessary laws
12	National Environmental (Soil Erosion and Flood Control) Regulations(S. I. No. 12 of 2011)	2011	The overall objective of this regulation is to regulate all earth-disturbing activities, practices or developments for non-agricultural, commercial, industrial and residential purposes.

Source: Compiled by the authors

Other provisions are:

- Environmental Impact Assessment Procedural Guidelines 1995; Guidelines and Standards for Environmental Pollution Control in Nigeria 1991;
- Environmental Impact Assessment (Amendments) Act 1999;
- National Guidelines and Standards for Water Quality 1999
- National Guidelines on Environmental Management Systems (EMS) 1999
- National Guidelines on Environmental Audit in Nigeria 1999

4.3 Institutional Frameworks

4.3.1 Federal Ministry of Mines and Steel Development

The Ministry of Mines and Steel Development (http://www.mmsd.gov.ng/) was established in 1985 to facilitate the development of the Nigeria's solid mineral resources. It is the focal ministry with respect to information, policy, and regulatory oversight of the countrys' solid minerals sector. The ministry is responsible for policy formulation; knowledge and information provision in order to spur investment in the sector; regulating operations; and revenue generation for the government. The Ministry administers the 2007 Minerals and Mining Act and the 2011 Minerals and Mining Regulations and equally ensures the implementation of the National Minerals and Metals Policy. As shown in the Figure 4.1 below, the ministry has three primary technical departments and other agencies: (1) the Mines Inspectorate Department (MID); (2) the Mines Environmental Compliance Department (MECD) and (3) the Artisanal and Small-Scale Mining Department (ASMD). These departments and agencies are as shown in the organogram below:

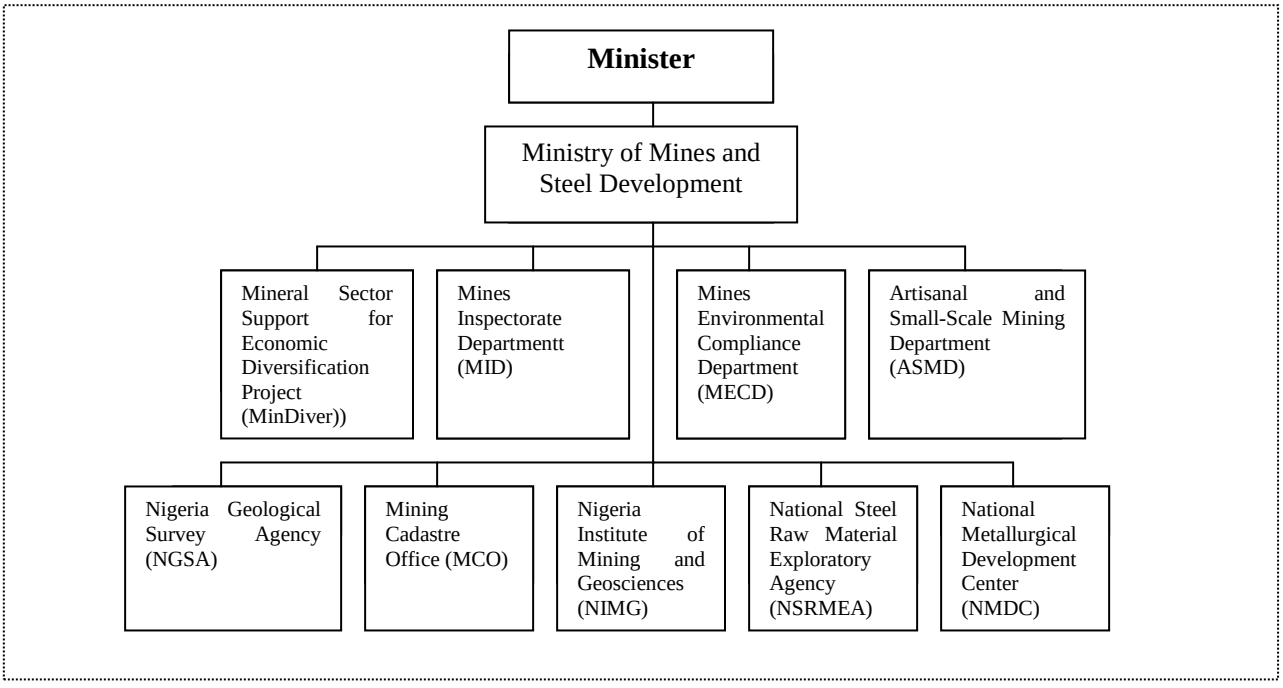


Figure 4.1: Structure of the Ministry of Mines and Steel Development

4.3.2 Federal Ministry of Environment

This FMEnv was created in 1999 and replaced the Federal Environmental Protection Agency. At the time it also incorporated nine Departments from other Ministries. The mandate of the new Ministry is to co-ordinate environmental protection and natural resources conservation for sustainable development and specifically to:

1 Secure a quality of environment adequate for good health and well-being;
2 Promote the sustainable use of natural resources;
3 Restore and maintain the ecosystem and ecological processes and preserve biodiversity;
4 Raise public awareness and promote understanding of linkages of environment; and
5 Co-operate with government bodies and other countries and international organisations on environmental matters.

The organisational structure of FMEnv is shown in Figure 4.2 below. Although the mining sector is not mentioned specifically in the mandates there are 2 technical Departments that are directly relevant to mineral exploitation; the Department of Environmental Assessment and the Department of Pollution Control and Environmental Health, with the Department of Conservation marginally involved. FMEnv does have one industry sector-based department, dealing with oil and gas. This provides an integrated interface with the sector, which could potentially be extended to include mining.

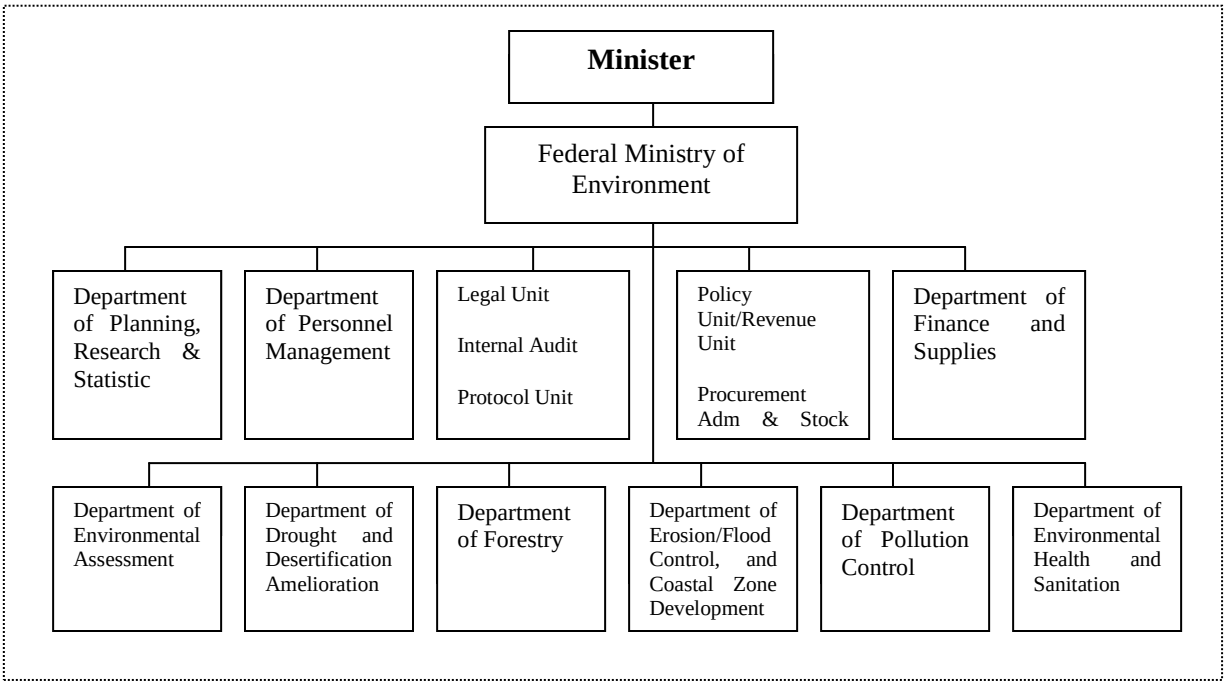


Figure 4.2 Organisational Structure of FMEnv

4.3.3 The National Environmental Standards and Regulations Enforcement Agency (NESREA)

NESREA is an Agency of the Ministry of Environment and is charged with the responsibility of enforcing environmental laws, regulations and standard in deterring people, industries and organization from polluting and degrading the environment. NESREA has the

responsibility for the protection and development of the environment, biodiversity conservation and sustainable development of Nigeria's natural resources in general and environmental technology including coordination, and liaison with, relevant stakeholders within and outside Nigeria on matters of enforcement of environmental standards, regulations, rules, laws, policies and guidelines.

Some functions of the Agency, amongst others include to:

- enforce compliance with laws, guidelines, policies and standards on environmental matters;
- coordinate and liaise with, stakeholders, within and outside Nigeria on matters of environmental standards, regulations and enforcement;
- enforce compliance with the provisions of international agreements, protocols, conventions and treaties on the environment including climate change, biodiversity conservation, desertification, forestry, oil and gas, chemicals, hazardous wastes, ozone depletion, marine and wild life, pollution, sanitation and such other environmental agreements as may from time to time come into force;
- enforce compliance with policies, standards, legislation and guidelines on water quality, Environmental Health and Sanitation, including pollution abatement;
- enforce compliance with guidelines, and legislation on sustainable management of the ecosystem, biodiversity conservation and the development of Nigeria's natural resources;
- enforce compliance with any legislation on sound chemical management, safe use of pesticides and disposal of spent packages thereof;
- enforce compliance with regulations on the importation, exportation, production, distribution, storage, sale, use, handling and disposal of hazardous chemicals and waste, other than in the oil and gas sector;
- enforce through compliance monitoring, the environmental regulations and standards on noise, air, land, seas, oceans and other water bodies other than in the oil and gas sector;
- ensure that environmental projects funded by donor organizations and external support agencies adhere to regulations in environmental safety and protection;
- conduct environmental audit and establish data bank on regulatory and enforcement mechanisms of environmental standards other than in the oil and gas sector;
- create public awareness and provide environmental education on sustainable environmental management, promote private sector compliance with environmental regulations other than in the oil and gas sector and publish general scientific or other data resulting from the performance of its functions; and
- carry out such activities as are necessary or expedient for the performance of its functions.

The Agency has powers to:

- prohibit processes and use of equipment or technology that undermine environmental quality;
- conduct field follow-up of compliance with set standards and take procedures prescribed by law against any violator;
- subject to the provision of the Constitution of the Federal Republic of Nigeria, 1999, and in collaboration with relevant judicial authorities establish mobile courts to expeditiously dispense cases of violation of environmental regulation.

4.3.4 State Level Ministries, Departments and Agencies

Within each State there are usually three levels of organization dealing with the environment:

a) An office of the FMEnv often domiciled in the Federal Secretariat in each State.

b) A State Ministry of Environment established by the State government; in some States thisoffice is combined with another function such as Ministry of Environment and Natural Resources in Kaduna State, and Ministry of Environment and Mineral Resources in Enugu State. Also, some states have Ministry of Solid Mineral, for example, Ministry of Solid Mineral Development in Cross River and Ebonyi States and Niger State Ministry of Mineral Resources.

c) A State Environmental Protection Agency, for example, Kaduna Environment Protection Authorityis the enforcement arm ofthe State Ministry responsible for environment, waste disposal, etc. Most of the States also have a number of other departments, in some form, that are indirectlyrelated to mining. These can include Departments of Lands and Survey, Agriculture and WaterResources.

4.4 Labour Commerce and Socioeconomic Regulation

Nigeria's constitution provides a detailed legal framework for the protection of labour and communities. In practice, individuals often cannot claim these rights either because they lack the human, financial or social capital necessary to do so or because the Federal institutions lack the capacity to deliver.

4.4.1 Laws & Regulations

4.4.1.1 Land Tenure and Access to Land

The Federal Land Use Decree of 1978 was designed to regulate ownership of land, theprinciple of land tenure, rents and rights of occupancy. The motivation behind the establishmentof the decree was fourfold: to make land more easily available for development, to reduce thecost of acquiring land and development, to facilitate planned development of settlements, and toeliminate land speculation-especially in urban and peri-urban areas. Essentially, the decreeallowed for the transfer of land tenure from traditional rulers, village heads, heads of family, etc,to the State, and according to the decree, overall responsibility for the control and management of land in urban areas falls under the States, while land allocation in rural areas was to fall to local government. In practice, however, the decree has failed to supersede customary law for communal ownership of land resources and has never been fully enforced.

In reality land tenure and land use in Nigeria are governed by a combination of statutory and customary laws. Land tenure rules provide for the right to own or possess land, while land use rules provide for the right to use land in a certain way: There are three basic, *de facto,* tenure systems in force in Nigeria. They are shown in the Box 5 below.

4.5 The Mining & Quarrying Industry

4.5.1 Capacity of the Industry

Most mining operations in Nigeria are artisanal or small scale and are typically unlicensed.While they have no capacity to initiate social or environmental protection measures they have to negotiate with the local government to operate and can thus be controlled to a very limited extent. Companies in the sector are typically small and thus have very limited capacity to

undertake or commission EIA's and other regulatory requirements. They would not have a community liaison officer although they would have the capacity to follow clear guidelines. These companies have limited incentives to do any more than necessary to initiate production especially as environmental and social impacts are costs borne by the community rather than the company. Shareholder pressure for corporate social responsibility is very limited in the small mining and quarrying companies. The key issue is the capacity of local government to ensure likely environmentaland social costs are internalised by the company as far as possible.There are a few large companies in the quarrying sector, with corresponding large quarries, sometimes linked to a construction company. Of those visited, few operated with any level of environmental and social management at all. No new structures to resolve disputes (such as local mining committees) were seen, and communities rely on the established local government structures to resolve problems. Thus, MinDiver established grievance redress mechanism is expected to compliment existing local government structures for dispute resolution.

Box 5: Land Tenure and Land Use

Land tenure and land use in Nigeria are governed by a combination of statutory and customary laws.Land tenure rules provide for the right to own or possess land, while land use rules provide for the right to use land in a certain way; land tenure rights normally include use rights, and are therefore more comprehensive in scope (Gunding, 2000).

The *Federal Land Use Act of 1978* was designed to regulate ownership of land, the principles of land tenure, rents and rights of occupancy (Federal Land Use Act, Sec.1). The motivation behind the establishment of the decree was fourfold: to make land more easily available for development, to reduce the cost of acquiring land for development, to facilitate planned development of settlements, and to eliminate land speculation especially in urban and peri-urban areas. Essentially, the act allowed for the transfer of land tenure from traditional rulers, village heads, heads of family, etc. to the state, and according to the Act, overall responsibility for the control and management of land in urban areas, including land allocation, was to become the responsibility of the Governor of each State. Responsibility for land allocation in rural areas was to fall to the Local Government. In practice, however, the Act has failed to supersede customary law for communal ownership of land resources and has never been fully enforced.

There are three basic, *de facto*, tenural systems in force in Nigeria. These are:

• State Tenure – Under this system, land estates are put under the management of the State (either Federal or State Government; e.g., National Parks, State Forest Reserves, etc.), to be held in trust and administered for the use and benefit of the local and larger Nigerian population.

• Communal Tenure – Here, members of a community hold customary rights to land within the area controlled by that community. Within this system families, special interest groups and individuals may be granted rights over certain parcels of land and associated resources. Traditional rulers or village heads are generally responsible for exercising control over the management of unallocated community holdings. Generally, communal lands are not alienable.

• Private Tenure – In this case, property acquired through purchase, inheritance, gift or exchange, is held exclusively by an individual or a corporate entity. While in many parts of Nigeria land tenure continues to be a contentious point and a source of conflict between communities and the State; among communities; and among individuals environmental degradation seems to be less directly tied to any one land tenure system, and more directly to:conflict between land tenure systems (especially between state and communal systems), and resource management practices associated with certain land use systems.

Currently no land use policy exists in Nigeria. Instead, States are encouraged to derive their legislation from the Federal legislative framework. While some States have taken steps to develop legislation to improve (from an environmental perspective) resource management through decrees against bush burning, agricultural expansion into forest lands, etc., major impediments to sustainable environmental management still exist. Two key land tenure and land use issues that require future consideration include how to mediate/resolve problems that arise between tenure systems; and how, within the various tenure systems, to support policy/institutional frameworks that are capable of promoting the sustainable use of natural resources

4.5.2 Social and Community Contributions by the Industry

In the Nigerian situation, where large mining is absent and where the small scale informal mining does not have the capacity or infrastructure to engage significantly in social development strategies, contributions to the community are small.Some benefits to the community were noted from the field studies. In order to obtain a licence,companies have to reach agreement with local community leaders on any compensation for loss of farm land. According to the legal definition this is limited to loss of productive trees but in practice this tends to be interpreted more generally. Such compensation has tended to be a mixture of one-off payment to the traditional leadership (for occupation of farming land) and sometimes included infrastructure for the community. Payment of compensation to traditional ruler for economic trees on community land is guided by the Land Use Act (as earlier cited) which allows for the traditional ruler to receive such compensation on behalf of the community. However, the MMSD should in the implementation of this project stipulate a policy requiring direct compensation to all affected land owners in line with World Bank OP 4.12 or ESS5 as it relates to payment of compensation. In addition, there's need for adequate training for ASM and local communities on the impact of ASM on the miners, the environment and social lives of the community.

4.6 Training and Institutions

Currently, there are many universities and institutions in Nigeria that offer courses relevant to the mining industry and in environment and social management. Some of them include: the Federal University of Technology Akure that offers Mining Engineering; the University of Nigeria Nsukka that offers Geology and Geophysics; Ebonyi State University that offers Geology and Exploration Geophysics; the Federal University of Technology Owerri that offers Environmental Engineering Technology; Ahmadu Bello University Zaria that offers Water Resources and Environmental Engineering;and the University of Maidugri that offers Environmental Biology, among others. Also, the World Bank in collaboration with the National Universities Commission (NUC) is also on the verge of setting up Centres of Excellence in Procurement, Environment and Social Standards in six universities across the six geopolitical zones (NUC, 2019)

Furthermore, the National Mining Institute/School of Mines in Jos which is part of the MMSD Department of Mines runs a 2-year Diploma in Mining programme. The MMSD already has a direct interest in these tertiary institutions to produce theprofessionals and technicians of the sector. The performance of these professionals has a greatrelevance to the quality and quantity of out put from the Ministry.In addition to formal training, the professional body COMEG (Council of Mining Engineers and Geoscientists) is fundamental in ensuring this consistency occurs. COMEG provides aprofessional qualification in the mining sector and regulates professional standards in theindustry.

4.7 Analysis and Comment

4.7.1 Legislation and Regulatory Regime

Although the Nigeria Mineral and Mining Act, 2007 and the Nigeria Mining Regulation

provide a comprehensive legal framework for managing solid mineral mining activities in Nigeria, there are still a number of shortcomings. Some of these are elucidated here. Some issues were also raised during stakeholder consultation and they are included in the chapter on stakeholder consultation.

a) Nigeria Mineral and Mining Act, 2007

In the Act, there was no role for State and Local governments concerning the issue of community development agreement which always become a problem with mining companies and communities. It will be important for State and Local Governments to be involved in developing and signing community development agreements so that prospective investors will not deceive the communities who have little knowledge on the subject matter. Although the Act and the regulations stipulate clearly the procedure and content of community development agreement, this is not often followed especially as the State and Local Government which can provide some guidance to the communities are not involved. It will also help to avert conflicts that often arise during implementation. Also, although MIREMCO is often involved in cases where there are issues, it is more economical to involve the state at the beginning to prevent conflict and its attendant costs.

In addition, the law did not include miners in MIREMCO. Evidence shows that the involvement of all stakeholders in such a committee will help facilitate the achievement of its objectives. Considering that the miners are involved in many of the cases treated by MIREMCO, it will be important and will help reduce challenges faced in the activities of MIREMCO if the miners are represented in the committee. It will also help boost the confidence of mining companies and thus facilitate investment in the sector.

Furthermore, although the Act prohibits solid mineral exploration and mining in National Parks and sacred grooves, the Act is silent on the exploration and exploitation of minerals and mining within forest reserves and other ecologically sensitive areas or critical ecosystems which are under the control and management of the state government. This may result in the destruction of the forest reserves and biodiversity.

Although the Act provides that no holder of a mining title shall pollute the water or watercourses in an area within mining lease and beyond the area, at thesame time the Minister may (by Regulations) prescribe the quantity and nature of tailings that maybe deposited in a natural watercourse. This somehow negates the provision that no mining title shall pollute water or watercourses as the tailings may cause pollutions even though the regulation stipulates the condition tailing to be deposited. In fact, the Act provides that a mineral title holder can apply and obtain permit to deposit more quantity of tiling than recommended in the regulation when it is based on a "good cause" without specifying what a "good cause" implies thus giving room for manipulation. Besides, there was no indication of the need to check the heavy metal composition of the deposits even as the analysis of sediment samples as part of this SESA shows that the sediments in mining areas are polluted with heavy metals that are injurious to health. The Act only covers mineral extraction. Primary and secondary processing of minerals,such as crushing, milling, sorting and/or beneficiation, which are usually integral parts ofa mining operation, are not included. These have to be licensed separately as industrialoperations.

Furthermore, although the Act provides that applicants to mine title shall provide an environmental impact statement approved by the Federal Ministry of Environment (FMEnv), it did not provide for the framework for effective coordination regarding EIA and environmental

issues between MEC and FMEnv given the fact that FMEnv is the focal ministry for environmental issues in Nigeria. This condition can lead to conflicts between the FMEnv and its agencies on one hand and MMSD especially the MEC Department on the other hand. Although MMSD through the MEC Department has an MOU with FMEnv regarding EIA approval, this is not in the Act or the regulation and the practice can still generate some conflicts. Also, an environmental document, Environment Protection and Rehabilitation Programme, which must be provided by holders of mine title is solely approved by MEC Department of MMSD, as provided in the Mining Act despite the fact that there is need for input from FMEnv which is the focal point for all environmental issues in Nigeria.

In addition, the Act provides for the establishment of an Environmental Protection and Rehabilitation Fund; however, it did not provide a time frame for setting up of the fund or form the means of monitoring and ensuring compliance by mineral title holders. Thus, the fund exists only in the Act but has never been implemented.

4.7.2 Perception of Miners about Challenges they encounter Regarding the Legislations and Regulatory Regimes

First the miners in the mine sites indicated if they had knowledge of mining law and regulations in Nigeria. The result shows that the majority (51.85percent) indicated that they did not know about the mining laws and regulations while 48.15percent of them indicated they have knowledge of the laws and regulations. Furthermore, the miners that have knowledge of the law and regulation were then asked to indicate the challenges limiting compliance with the laws and regulations. The miners rated the challenges in terms of high, medium, low and not at all. The result is presented in Table 4.4.

Table 4.4: Opinion of Miners with knowledge about Mining Laws and Regulations/Standards Regarding Challenges to Compliance to Mining Standards

S/No	Challenges to compliance	High (%)	Medium (%)	Low (%)	Not at all (%)
1	Lack of expertise in the mining sector	23.08	36.92	29.23	10.77
2	Lack of knowledge of laws, regulations and their requirements	15.38	43.08	29.23	12.31
3	Charges and fees for environmental registration/compliance	47.69	35.38	9.23	7.69
4	Bottlenecks in approval and compliance process	32.31	27.69	29.23	10.77
5	Lack of nearby health facilities or first aid facilities	43.08	18.46	24.62	13.85
6	Lack of emergency response by the government from the mining sites	36.92	7.69	32.31	23.08
7	Lack of good road network in the mining sites	56.92	10.77	13.85	18.46
8	Threat of contaminants and diseases	20.00	23.08	13.85	43.08
9	Human conflicts	3.08	30.77	26.15	40.00
10	Lack of occupational health and safety equipment	35.38	26.15	32.31	6.15
11	Lack of knowledge of mining standards and regulation	29.23	41.54	18.46	10.77
12	High cost of prospecting and mining ventures	66.15	10.77	16.92	6.15

13	Inadequate communications network	20.00	44.62	10.77	24.62
14	Corruption in licensing and renewal of mining rights	26.56	10.94	20.31	42.19
15	Inadequate water in mining sites	29.69	28.13	17.19	25.00
16	Untrained mines workers	33.85	44.62	16.92	4.62

Source: Field data, 2019

The challenges rated as high by the majority and largest proportion of the miners include high cost of prospecting and mining ventures (66.15percent), lack of good road network in the mining sites (56.92percent), charges and fees for environmental registration/compliance by MEC and FMEnv (47.69percent) and lack of nearby health facilities or first aid facilities (43.08percent). The issues the highest proportion of the miners indicated did not pose any challenge to compliance to mining regulations are as follows: corruption in licensing and renewal of mining rights (42.19percent), threat of contaminants and diseases (43.08percent) and human conflicts (40.00percent). On regulation and environmental requirements, they considered high and difficult to comply with, the result is in Figure 4. 4.

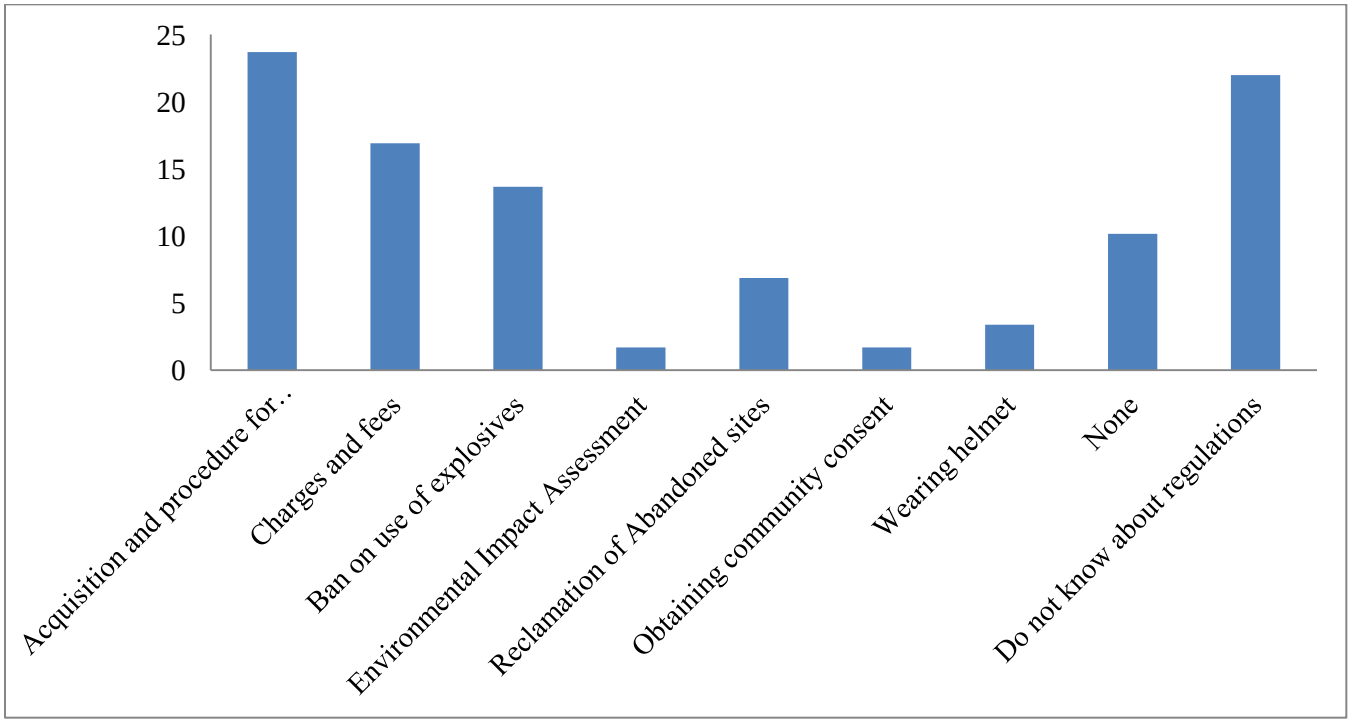


Figure 4.3: Result of the Opinion of the Miners on Regulation and Environmental Requirements They Considered High and Difficult to Comply with.

The result shows that the highest proportion (23.6 percent) of the miners considered acquisition and procedure for licensing as the regulation that is difficult to comply with, while a high proportion (21.98 percent) did not have knowledge of laws about regulations. The result

also shows that 16.9 percent of the miners considered charges and fees to be the most difficult, while 10.16 percent of them did not find any legislation difficult to comply with.

On charges and fees, the miners would want government to amend, the result is presented in Figure 4.4.

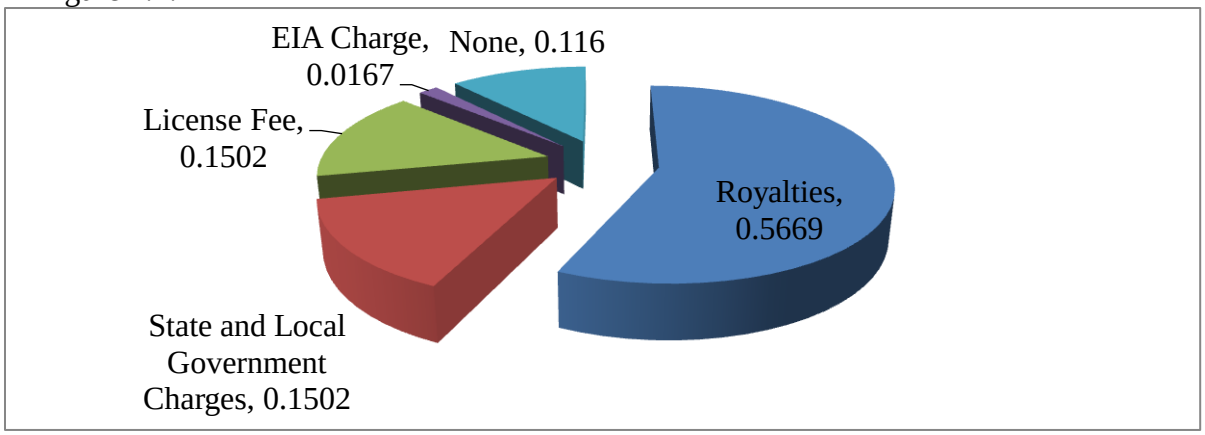


Figure 4.4: Result of Opinion of the Miners on Charges and Fees They Would Want Government to Amend

The result shows that the majority (56.69 percent) of the miners were of the view that the percentage and amount paid as royalties should be amended.

4.8 World Bank Guidelines and Safeguard Policies

The World Bank requires all projects supported under its financial programmes to be undertaken in accordance with its environmental and social safeguard policies, many of which are directly applicable to mineral sector developments as follows:

World Bank Operational Policies

4.01	Environmental Assessment
4.04	Natural Habitats
4.09	Pest Management
4.11	Cultural Property
4.20	Indigenous peoples
4.12	Involuntary Resettlement
4.36	Forestry
4.37	Safety of dams

World Bank Environment, Health & Safety Guidelines

Mining & Milling – Open Pit
Mining & Milling – Underground
IFC Environmental Health & Safety Guidelines
Construction Materials Plants
Occupational Health & Safety
Hazardous Materials Management

IFC Policy Statement on Forced Labour and Harmful Child Labour

OP 4.01 Environmental Assessment requires environmental assessment of all projects proposed for Bank funding to ensure that they are environmentally and socially sound and sustainable. In this instance, this SESA is what is described as a Sectoral Assessment, which is: an instrument that examines environmental issues and impacts associated with a particular strategy, policy, plan or programme, or with a series of projects for a specific sector. It evaluates and compares the impacts against those of alternative options, assesses the legal and institutional aspects relevant to the issues and impacts, and recommends broad measures to strengthen environmental management in the sector.
In addition to these stated policies and guidelines, the WBG *Extractive Industries Review* (January 2004) contains a wide range of proposed policies and actions that will improve the environmental and social sustainability of the minerals sector.

It should also be noted that under the MinDiver Project, an Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework (RPF) have been prepared with full cognisance of the relevant WBG policies and guidelines which will be reviewed along with this SESA document as conditions fulfilling the request for Bank financing.

CHAPTER FIVE: INTERNATIONAL COMPARISONS

This chapter documents international standards on mining and experiences of some developing countries in managing their mining sector and how they handle institutional and governance weaknesses in the sector. Nigeria can learn from these countries and ensure that these international standards are maintained in mining in Nigeria.

5.1 International Standard

There are some international standards that guide mining and which are seen as good practice in the sector. These can also serve as a guide for MMSD and which the ministry should encourage in its working to reform the sector to facilitate its diversification. This is because most international investors would want the sector to be aligned to international standards although the standards are also relevant to local investors. Some of the international standards are described below.

5.1.1 IFC Performance Standards

The International Finance Corporation (IFC) is a member of the World Bank Group. The IFC provides finance for the private sector. The IFC performance standards (eight in number) which was updated and came into effect on January 1, 2012 is recognized internationally as the most elaborate standards that are available to finance institutions working with the private sector. It is a requirement that most lending institutions expect their clients to fulfil and maintain throughout the life of a project and it is taken as the best practice guide for the borrowers. The eight performance standards are as follows:

- PS 1 Assessment and Management of Environmental and Social Risks and Impacts;
- PS 2 Labour and Working Conditions;
- PS 3 Resource Efficiency and Pollution Prevention;
- PS 4 Community Health, Safety and Security;
- PS 5 Land Acquisition and Involuntary Resettlement;
- PS 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- PS 7 Indigenous Peoples; and
- PS 8 Cultural Heritage

The performance standards have guidance notes which are updated regularly. There are also environmental health and safety (EHS) guidelines for different industrial clusters. Some of EHS guidelines applicable to the extractive industry include:

- General EHS Guidelines;
- Coal Processing;
- Base Metal Smelting and Refining;
- Mining;
- Petrochemical industry; and

- Ports, Harbours and Terminals, 2007 (applicable to commercial ports, harbours, and terminals for cargo and passenger transfer).

5.1.2: International Council of Mining and Metals' (ICMM) Sustainable Development Framework and Position Statements

The ICMM Sustainable Development Framework which was first applied in 2003 is part of the International Council of Mining and Metals' stated commitment to seek continual improvement in their performance and contribution to sustainable development so as to enhance shareholder value. The ten principles which members of ICMM pledged to include:

- Implement and maintain ethical business practices and sound systems of corporate governance;
- Integrate sustainable development considerations within the corporate decision-making process;
- Uphold fundamental human rights and respect cultures, customs and values in dealings with employees and others who are affected by our activities;
- Implement risk management strategies based on valid data and sound science;
- Seek continual improvement of our health and safety performance. 6. Seek continual improvement of our environmental performance;
- Contribute to conservation of biodiversity and integrated approaches to land use planning;
- Facilitate and encourage responsible product design, use, re-use, recycling and disposal of our products;
- Contribute to the social, economic and institutional development of the communities in which we operate; and
- Implement effective and transparent engagement, communication and independently verified reporting arrangements with our stakeholders.

In addition, to support the principle, the Council also adopted six 'position statements' which include further commitments on some issues, for example, water stewardship, transparency for mineral revenues, mercury risk management, indigenous peoples, and protected areas. Also, ICMM members in 2008 also committed to publicly report on their sustainable development performance on an annual basis, in line with standards set by the Global Reporting Initiative (GRI). ICCM member companies also reaffirmed, in 2013, the support by committing to prepare their sustainability reporting in accordance with the core option of GRI's G4 Guidelines. Furthermore, as described in ICCM's Assurance Procedure, members are expected to demonstrate in their annual report, their commitment to the principles and position statements.

5.1.3 Global Reporting Initiative (GRI)

GRI is an independent international organization that has pioneered sustainability reporting since 1997. GRI helps businesses and governments worldwide understand and communicate their impact on critical sustainability issues such as climate change, human rights, governance and social well-being. This enables real action to create social, environmental and economic benefits for everyone. The GRI Sustainability Reporting Standards are developed with true multi-stakeholder contributions and rooted in the public interest.

The GRI standard report requirements and procedure is voluntary but some industry bodies (such as the ICMM) require their members to carry out their reporting based on GRI

standards. It is now standard procedure for the majority of large industrial mining companies to produce a sustainability report and most will use the GRI as a framework for consistent reporting. Although many large mining companies report based on GRI standards the reporting standards are accepted by third party accredited auditors, it is important to note that given that reporting organization decide on the scope of reporting and the assurance engagement, weak reporting and the use of biased or incomplete data may occur.

5.1.4 Africa Mining Vision

The Africa Mining Vision (AMV) is a policy framework that was created by the African Union in 2009 to ensure that Africa utilizes its mineral resources strategically for broad-based, inclusive development. Beside the aim to ensure that tax revenues from mining are optimized and well spent, the visionlooks at much more broadly at how mining can be effectively integrated with development policies at local, national and regional levels, delivering benefits to workers and local communities while protecting their environment. The AMV recognizes the contribution of artisanal and small-scale mining (ASM) to local economic development, and promotes women's rights and gender justice.The vision alsois to ensure that resource-rich countries can negotiate fair and equitable contracts with mining multinationals that include local content requirements. Finally, the Vision seeks to encourage value addition so as to remove the narrative that Africa only exports raw minerals. "However, ten years after its inception, implementation has been slow and there is a low level of awareness of the framework among key stakeholders in the mineral sector" (OXFAM, 2017 pg 1)[35].

Other international standards that are applicable to mining include: ISO standards, Voluntary Principles on Security and Human Rights (VPs), International Labour Organization's Core Labour Standards; Extractive Industries Transparency Initiative; UN Global Impact; and Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development[28] Mining Policy Framework.

5.2 Country Specific Examples

5.2.1 Ghana

Ghana, previously referred to as Gold Coast, is Africa's second largest gold producer after South Africa. The country has a rich history and a long tradition of gold mining producing an estimated 2,488 metric tons (80 million ounces) of gold between 1493 and 1997 (Ghana Chamber of Mines, 1998[36]). Although there was decreased production in the late 50's, the country remained active in the production of gold and other minerals with production increasing in recent times.

Ghana's performance in the mining sector received a boost through some reforms implemented in the country especially the economic recovery program (ERP) of 1983. Under the program, some reforms were carried out with the aim to boost investor interest and confidence in the sector. In fact, the country created a strong institutional and regulatory framework to strengthen the operations of the sector. Some of these include the establishment of the Minerals Commission in 1984; the promulgation of the minerals and mining code in 1986; the promulgation of the smallscale mining law in 1989 and the establishment of the Environmental

[35]OXFAM (2017) From Aspiration to Reality: Unpacking the Africa Mining Vision. Oxfam Briefing Paper
[36] Ghana Chamber of Mines, (1998). Annual chamber of mines report: Accra, Ghana.

Protection Agency in 1994 (Amponsah-Tawiah and Dartey-Baah, 2011[37]). Besides the reform of the institutional and regulatory framework, foreign investors were offered some incentives to further boost foreign direct investment in the sector. For example, corporate income tax on mineral production of private companies in Ghana decreased from 50-55 percent in 1975 to 45 percent in 1986 and 35 percent in 1994 (Campbell, 2003[38]; Akabzaa, & Darimani, 2001[39]). Companies received breaks on import duties on equipment and accessories necessary for mining production. In addition, mining companies were allowed to keep a minimum of 25 percent of foreign exchange in an external account for various purposes including acquiring physical capital requirements necessary for production and dividend payments as well as for expatriate labour. These incentives led to a rapid growth of the sector such that between 1983 and 1998, the mining industry brought approximately US$ 4 billion in FDI to Ghana, representing more than 60 percent of all such investment in the country (Ghana Minerals Commission, 2000). Available record shows that production of gold grew from 63 tons in 2004 to 80.5 tons in 2008.

To date, the Minerals and Mining Act of 2006 (revised in 2010) formally governs all aspects of mining regulations in Ghana, and is considered by the World Bank to follow international best practice in the mining industry. Under the new Act, private holders of mineral extraction licenses in Ghana are compulsorily required to pay a royalty of 5 per cent of their gross revenues. Currently the sector's performance has been satisfactory. For example, Ghana gold export increased from 3.84 million ounces in 2016 to 4.61 million ounces in 2017 (Bank of Ghana, 2018[40]). The key determinants of the 20 per cent growth in exports was a combination of modest increase in gold price and an upturn in the output of large-scale producers as well as the volume of gold exported by Licensed Gold Exporting Companies. In addition, data from Bank of Ghana shows that exports of manganese grew from 2 million tonnes in 2016 to 3 million tonnes in 2017 while there was also expansion in the shipments of bauxite also 1.14 million tonnes to 1.47 million tonnes over the same period (Minerals Commission, 2018).

5.2.2 Tanzania

Tanzania is one of the rich mineral countries in Africa. The country is the 4th largest producer of gold after South Africa, Ghana and Mali. Leading minerals include gold, iron ore, nickel, copper, cobalt, silver, diamond, tanzanite, ruby, garnet, limestone, soda ash, gypsum, salt, phosphate, coal, uranium, gravel, graphite, sand and dimension stones. Mining in Tanzania especially in the 1970s and 1980s was controlled by government. However, in the 90's mining was opened up to individuals which sparked the smallscale mining industry of Tanzania. Also, in the same period, the sector was liberalized and this encouraged companies' especially international mining companies to invest in mining and export minerals from the country. This opened up large scale mining in the country and resulted in a boom. According to Phillips *et al.*

[37] Amponsah-Tawiah, K and Dartey-Baah, K (2011) The mining industry in Ghana: a blessing or a curse. International Journal of Business and Social Science, Vol. 2 No. 12.

[38] Campbell, B. (2003). "The challenges of development, mining codes in Africa, and corporate responsibility." International and Comparative Mineral Law and Policy Trends and Prospects, 4-6.

[39] Akabzaa, T., & Darimani, A. (2001). „Impact of Mining Sector Investment in Ghana: A Study of the Tarkwa Mining Region", Draft Report Prepared for SAPRI.

[40] Bank of Ghana. (2018). Monetary Policy Summary. Accra: Bank of Ghana.

(2001, p.5)[41], a key policy decision that set off the boom was the dismantlement of the state-owned mineral monopoly, State Mining Company (STAMICO), which allowed any Tanzanian individual to register claims and sell minerals. Notable legislation for the mining industry includes the 1997 Mineral Policy, the 1998 Mineral Act and the 2010 Mineral Act.

Since the onset of the boom, Tanzania has risen to a position of importance in African mineral production. In 2007, it was the third largest gold exporter in sub-Saharan Africa, behind Ghana and Mali. It is also the 32nd largest diamond exporter in the world by volume. The foreign direct investment that the mineral sector has brought in has also been substantial, as it helped the country to become the second largest non-oil recipient of foreign direct investment in Africa in 2007, when it received US%$5.94 billion (UNCTAD, 2008)[42]. Since the liberalization of the sector, it has facilitated economic expansion in Tanzania.

In 2017, the Tanzania government introduced reforms in the sector to increase government revenue. First in March 2017, the government through the Ministry of Energy and Minerals banned export of unprocessed ores from the country. The aim was to ensure value addition of minerals produced in the country**.** Next, effective July 1, 2017, Tanzania enacted the Finance Act, which imposed a one percent clearing fee on all minerals exported from Tanzania. The largest changes was initiated a few days later, when President Magufuli signed three bills into law that dramatically changed the landscape for current and future natural resources investments in the country. The three key laws in the sector are as follows:

- The Natural Wealth and Contracts (Review and Re-negotiation of Unconscionable Terms) Act of 2017 (the "Natural Wealth Act");
- The Natural Wealth and Resources (Permanent Sovereignty) Act 2017 (the "Natural Resources Act");
- The Tanzania Extractive Industries (Transparency and Accountability) Act of 2015.

Among other things, the new laws require the government to own at least a 16 percent stake in mining projects, increase royalty taxes on gold and other minerals, provide the government with the right to dissolve or renegotiate contracts for natural resources, and reject international arbitration for natural resource disputes. Analysts predicted that the legislative changes may, unfortunately, slow economic growth in Tanzania, which had been steadily growing despite diminishing growth in subsaharan Africa generally. This is because some of the companies mining in the country may close down due to dwindling revenue. For example, since the issuance of the export ban in March 2017, Acacia mining's (one of the major companies) share prices and revenue have dropped dramatically, and the company may have to close its primary mine in Tanzania unless the ban is lifted[43]. However, the figures regarding the

Liberalization of the sector, openness and removal of bottlenecks are gains of countries experience that could take the Nigerian Mining Sector to greater heights

[41] PHILLIPS, C., SEMBOJA, H., SHUKLA, G. P., SWINGA, R., MUTAGWABA, W. and MCHWAMPAKA, B., 2001: "Tanzania's Precious Minerals Boom: Issues in Mining and Marketing", Research paper, funded by United States Agency for International Development Bureau for Africa Office of Sustainable Development Washington, DC 20523-4600.

[42] UNCTAD, 2008: Trade and Development Report. United Nations publications, New York and Geneva. http://www.unctad.org/en/docs/tdr2008notes_en.pdf.

[43] Jones Day Commentary, March August, 2017.

increased revenue and contribution of mining to Tanzania's GDP prove otherwise. For example, the sector's contribution to GDP in 2018/19 increased to 5 percent, up from 4.8 percent the previous year.

Table 5 is a summary of key positive environmenta and social specific issues in the countries pertinent to the objectives of this SESA.

Table 5.1: Summary of key environment and social specific issues in the countries reviewed pertinent to the objectives of SESA in Nigeria

Sector	**Specific Issues**
Environment	Creation of Strong institutional and regulatory framework.
Social	Incentives to further boost foreign direct investment in the sector, for example tax incentives
	Liberalization of mining sector
	Ban of export of unprocessed ores
	Creation of Strong institutional and regulatory framework

CHAPTER SIX: ENVIRONMENTAL & SOCIAL IMPACTS OF MINING

6.1 Potential environmental effects of mining in Nigeria

6.1.1 Potential adverse impacts of mining.

Mineral extraction and processing are associated with a wide range of environmental and social impacts, which can be of various types. This section discusses the subject matter under climate change impacts, environmental and social impacts, while other sub-thematic impacts are shown in Table 6.1 and in Box 6.

6.1.2 Climate Change Impacts on Mining

The fact that the global temperature is growing up after the increase of the greenhouse gases emissions is already known. Information obtained from field visits of the mining sites corroborated Intergovernmental Panel on Climate Change (IPCC 2018) reports that there is a general weather variability.

Climate change links to the mining industry in the sense that hazards associated with it such as high precipitation levels, flooding, windstorms, erosion, and extremes in temperature will adversely affect different areas of the mining sector, namely, the inputs of water and energy, people, supply chains, markets, exploration, construction, operation, closure, and post-closure (International Council of Mining and Metals, 2013, p. 14), and arguably undermine economic growth. Studies have shown that greater intensity and/or frequency of storms associated with flooding and changes in waterbeds are linked to closure of mining activities (Locke *et al.* 2011) and that Climate change will affect exploration, extraction of mining and quarrying (Arent *et al.*, 2014).

Going forward, it is important for mining operation in Nigeria to mainstream climate change adaptation and climate smart mining[44]. This is presently not emphasized in the Nigerian EIA guideline for mining. There is the need for proponents to develop climate change adaptation plan during the preparation of ESIA. Similarly, the mine operators/investors should obtain climate data annually to help it in infrastructure design during construction phase and in the planning and implementation of mining operations.

6.1.3 Environmental Impacts of Mining in Nigeria

Environmental impacts associated with mining activities are discussed in this section while Table 6.1 gives the summary. Environmental degradation is the most visible aspect of mining in Nigeria. However, as with many other African countries, lack of awareness, particularly of the less visible or long-term environmental impacts of mining activities, combined with lack of information about affordable methods to reduce impacts and lack of obvious incentives to change, all contribute to the significant environmental and social problems within the mining sector of Nigeria.

[44]Climate smart mining refers to the sustainable extraction and processing of minerals and metals to secure supply for clean energy technologies while also minimizing the environmental and climate foot prints throughout the value chain

Each type of mineral deposit requires specific working and refining systems which present particular concerns or threats to the local environment. The main type of mineral deposits and threats to the environment are:

1 River alluviums contain heavy minerals such as gold. Removal of river alluvium during the dry season can cause river course changes, undermining of river banks, abutments, embankments and dwellings, as well as increasing water turbidity which could lead to the blockage of town river water abstraction systems during wet season floods.
2 Marine alluviums include beaches, sandbanks and reef limestone deposits, the exploitation of minerals in these areas could change the coastal currents resulting in coastal erosion and changes in local ecological environments that result in the removal of marine species.
3 Sedimentary rocks include stratiform deposits such as coal, the mining of which causes land surface subsidence with structural failure of roads, bridges and buildings. Groundwater drainage in underground workings increases causing water level decline. Open pit mining can remove large volumes of sedimentary rock scarring landscapes with waste tips. Farmland is lost and surface waters are contaminated by toxic mine water discharges affecting fish and other aquatic life forms. The depth of pit excavation is limited by the dry season water table. Excavation below that level requires dewatering by pumping water to waste. Abandoned open pits become sources of pollution when used as landfill sites.
4 Veins in basement and sedimentary rocks are narrow linear deposits accessed by underground mines and open pits. Usually, open pit mining is adopted where deposits are at shallow depth. Deep mine working is developed if the deposit is rich enough and quantities of groundwater present are small.
5 Weathered Precambrian Basement rock can contain broad deposits initially developed by surface pitting that are combined as a single open pit excavation if the deposit is large enough.
6 Hard Precambrian Basement rocks are worked in rock quarries as source of aggregate for major road projects.

Table 6.1: Potential Environmental Impacts, Pollution Sources, Occupational Health Issues and Social, Economic and Cultural Impacts associated with Mining Activities

Environmental Impacts
Destruction of natural habitat at the mining site and at waste disposal sites
Destruction of adjacent habitats as a result of emissions and discharges
Destruction of adjacent habitats arising from an influx of settlers and mine encroachments
Adverse changes in river regime and ecology due to pollution, siltation and flow modification
Alteration of water tables
Soil contamination form treatment residues and spillage of chemicals
Change in landform
Land degradation due to inadequate rehabilitation after closure
Land instability
Danger from failure of structures and dams
Abandoned equipment and buildings
Destruction of biodiversity due to clearing of vegetation
Destruction landscape and aesthetics due to abandoned mines
Pollution Sources
Drainage from mining sites, including acid mine drainage and discharged mine water

Sediment runoff from mining sites
Pollution resulting from mining operations in river beds
Effluents from minerals processing operations
Sewage effluent from the site
Oil and fuel spills
Leaching of pollutants from tailings residues, disposal areas and contaminated soils
Air emissions from minerals processing activities
Dust emissions from sites close to residential areas and habitats
Release of methane from mines

Occupational Health Issues

Handling of chemicals
Dust inhalation
Fugitive emissions within the plant
Air emissions within confined spaces from transport, blasting and combustion
Exposure to asbestos, cyanide, mercury or other toxic materials used on-site
Exposure to heat, noise and vibration
Physical risks at plant sites
Unsanitary living conditions
Unsafe work practices and conditions

Social, Economic and Cultural Impacts

Dislocation of local populations
Effects on ethnic groups
Effects on historic and religious sites
Land acquisition/tenure
Conflicts regarding use of land, wildlife and water resources
Welfare and participation of women and indigenous groups
Changes in social, cultural and economic patterns within the local community
Need for learning new skills
Influx of workforce and families.
Child labour and children dropping out from school
Increase in gender based violence

Since most of the operations in Nigeria are artisanal and consist of subsistence activities and given that they struggle to survive from day to day, miners are forced to focus more on immediate concerns than the long-term consequences of their activities. Although the environmental impacts summaried in Table 6.1 also apply to ASM, the particular environmental problems associated with ASM sector and the pollution sources are summarised in Box 6 below.

It must also be remembered that poverty alleviation is intimately linked with environmental management. In Nigeria these links include the burden of disease that affects the rural populace through pollution of water and air and their dependence on natural resources and ecosystem services which when degraded can undermine their livelihoods.

One consolation is that majority of environmental impacts although intensive, appear to be confined to the close proximity of the ASM activities where impacts of individual operations are of a limited scale. Nevertheless, the cumulative effects of these mining activities may be less apparent, and should be borne in mind. The regenerative capability of the natural vegetation of the environs where the ASM operations occur has been identified by the ministry through the line Department i.e. ASM, MEC and MI. Based on these preliminary assessments, there is a difference in the environmental impact of the (theoretically) regulated licensed workings and the unregulated ASM aspects in Nigeria. It is therefore, strongly recommended that further in-depth

study on cumulative impact of ASM on the environment and the community be investigated during preparation of any mining investment site specific instrument such as ESIA/ESMP.

Box 6: Environmental problems associated with ASM

Nigerian ASM specific Environmental Impacts	**Nigerian ASM Pollution Sources**
• Destruction of natural habitat at ASM sites and at waste disposal sites • Destruction of adjacent habitats through emissions and discharges • Destruction of adjacent habitats from influx of migrant workers and encroachments • Adverse changes in river regime and ecology due topollution, salination, sedimentation and flowmodification • Alteration of water table • Soil contamination from treatment residues and chemical spillage • Deforestation, destruction of landforms and soil erosion • Land degradation and ground subsidence due to digging of mine pits.	• Drainage from mining sites, including acid mine drainage and discharged mine water • Direct dumping of mine waste • Sediment runoff from ASM sites • Pollution resulting from ASM operations in river beds • Effluents from mineral processing operations • Sewage effluent from the ASM site • Oil and fuel spills • Leaching of pollutants from tailings residues, disposal areas and contaminated soils • Air emissions from minerals processing diesel • equipment and blasting activities • Dust emissions from sites close to villages and habitats

6.1.3.1 Potential Releases & Effects

The record of potential effects and releases of the mining industry specific to Nigeria are limited. The report of the inventory of abandoned mines and quarries commissioned by the Ministry of Mines and Steel Development (MMSD) evaluated the potential for environmental impacts in Nigeria. Currently information and database are available on abandoned mines and quarries and their environmental and social impacts.

The basic framework as obtained from the Inventory of abandoned mines and quarries of the Risk Assessment approach is using the *source-pathway-receptor* concept as follows:

- Sources: potential for environmental effects such as contaminant emission (pollution flows), either from operations or pollution stocks, other releases, such as gasses, solid wastes, noise, and effects such as visual intrusion.
- Pathways / migration: the possibilities and nature of transport of the releases or effects away from the source.
- Receptors / targets: human receptors, vulnerable interests or material assets that could be affected.

The sources applicable to mining operations can be related to the mining *objects* and *activities* that comprise a mining operation. These can be considered under the following main categories:

- Mineral extraction

- Mineral processing
- Disposal of wastes (solid, fluid)
- Other operations and infrastructure

For each object/activity, it is possible to identify potential pollution *stocks* and *flows*, which comprise the releases and effects (i.e. Sources). Table 6.2 gives a listing of the potential releases and effects associated with mining operations; these are based on a wide generic mining sector and reflect the typical concerns and impacts associated with the mining sector. The specific nature of the releases and effects, the circumstances that give rise to them and the associated risks are very dependent on the type of mine and the mineral extracted and processed.

Table 6.2: Releases and Effects (Stocks and Flows) Associated with Mining Activities

Objects	Activities	Parameters	Release Effects Stocks	Flows
Mineral Extraction				
Open pits (quarries)	Existence	Area (total, operational) Depth Mineral content	Land consumption Visual intrusion, obstruction Hazardous – pit slopes Unstable ground – pit slopes	Mine wastes and overburden Radon?
	Excavator &truck (mineral and waste)	Material moved within and out of pit (m3/week) Vehicle movements xdistance (v.km/day or m3.km/day)		Dust Noise Deposits on soil Hydrocarbons (fuel/oil spillage)
	Draglines	Material moved (m^3/week)		Dust Noise
	Dewatering	Depth to groundwater (natural level) Volume pumped (m^3/week) Quality (pH, salinity, metals, TSS)	Water body	Seepage to groundwater Discharge to surface water Lowering regional water tables
	Hydraulic mining (high pressure water – pits or waste dumps)	Description and production Water usage		Seepage to groundwater Discharge to surface waters Water supply
	Conveyor (mineral and waste)	Distance Material moved		Dust Noise Deposits on soil
	Drilling and	Frequency		Dust from drilling

	blasting	Volume blasted Explosive type		Vibration Nitrates in groundwater
Underground	Extraction, voids	Area (total, active) Depth Rock type	Unstable ground	Waste rock Subsidence Methane emissions
	Winding, access – shafts	Number (operational, disused) Headgear height	Open shafts - hazard Visual intrusion of headgear	
	Adits or incline	Number (operational, disused)	Access to hazardous workings	
	Ventilation	Air volume Methane content		Noise Dust Methane emissions Radon
Solution mining or insituleaching	De-watering	Volume pumped (m^3/week) Quality (pH, salinity, metals, TSS) Cone of depression.	Underground waters after groundwater rebound – mineralisation of rock (AMD)	Discharge to surface waters. Seepage to groundwater. Groundwater depression. New water issues after groundwater rebound.
	Injection & extraction of solutions	Nature and quantity of solution		Seepage of solutions to groundwater
	Creation of cavities	Void volume and depth	Subsidence	
Mineral Processing				
Sizing, mineral handling, preparation, loading	Mineral/ROM stockpiles		Material (esp. metal contents) Volumes Throughput	Unused or low grade stockpiles
Concentration	Crushing, screening, loading hoppers Gravity separation and/or flotation		Reagents (type and amount) Concentrate production	
	Washing		Water volumes Reagents added	
Processing and refining	Depends on mineral		Process description Reagents used Water use Product	
High temperature, calcination, etc (e.g. refining, cement manufacture, lime burning)	Gas, oil or coal fired kiln or furnace		Process description Throughput	
Heap leach	Heap leach pad, solution ponds and		Area, height and	Spent heaps –

	related leaching processes		volume Leach solutions	residual contaminants, etc. Land consumption
Plant buildings	Existence		Area, height	Land consumption Visual intrusion of structures
	Chemical, reagent, fuel, etc delivery and storage.		Materials and quantities	Residual hazardous chemicals
Disposal of wastes				
Overburden and waste rock (open pit or underground)	Removal and backfilling into workings (in-pit) – *see also mineral extraction*	Volumes transported and distance Material description, mineral content, S/Ca & metal content	Oxidation of exposed strata	Dust and noise from transport Leaching to groundwater
	Removal and tipping in dumps, out of pit	Area, height & volume of tips/dumps Volumes transported and distance from pit Material description, mineral, S/Ca & metal content	Contaminated spoil material in dumps - oxidation of exposed strata Dump structures – visual intrusion	Dust and noise from transport Runoff, leachate & sediment to surface waters Leaching to groundwater Dust from wind erosion Deposits on soil Visual intrusion of dump
Process wastes	Dry wastes from sizing, precipitators, etc	Volumes transported and distance from source Material description, mineral, S/Ca & metal content	Contaminated spoil material in dumps	Runoff, leachate & sediment to surface waters Leaching to groundwater Dust from wind erosion Deposits on soils Visual intrusion of impoundment
	Slimes, tailings, washing and slurry wastes	Volumes produced and disposal facilities; distance Area and height of impoundment Containment or lining Material description, mineral, S/Ca &	Contaminated spoil material in dumps Impoundment structures – visual intrusion	Runoff, leachate & sediment to surface waters Leaching to groundwater Discharge of surplus water Dust from wind erosion Visual intrusion of impoundment Deposits on soils

		metal content		
Other operations and infrastructure				
Mine facilities and Support	Maintenance of fixed and mobile plant; workshops	Disposal of waste oil, etc.	Waste oils and other workshop wastes	Leakage of hydrocarbons
	Fuel storage and re-fuelling	Capacity and arrangements for fuel storage	Fuel storage tanks and residual hydrocarbons	
	Office, administration, canteen, washing and social facilities	Number of miners		Wastewater
Rail depot	Rail loading and transport of mineral products	Throughput	Buildings - Visual intrusion	Dust, noise from loading
Road access	Truck loading	Throughput		Dust, noise from loading Increased traffic on highway – safety, noise, dust, vibration
Power supply	Power lines and transformer station	Electricity consumption	Structures	Visual intrusion PCB leakage from transformers
	Power generation (main source and backup)	Fuel use and generation capacity	Structures	Combustion emissions
Water supply	Groundwater abstraction Surface water abstraction	Volumes	Groundwater reduction	Depletion of surface water

6.1.3.2: Potential Environmental and Occupational Impacts by Commodity

For each mineral commodity, it is possible to anticipate the likely mining and processing routes, the potential wastes and typical environmental issues that are associated with it. Under this section, this SESA classified the mineral commodities into types, namely: metallic minerals, gem stones, industrial minerals, construction materials, bitumen and coal &lignite. The typical waste types and environmental issues associated with each category have been aptly documented. See details in Appendix 5.

6.1.3.3: Mitigation of Environmental Impacts

Best practice for mitigation is based on an overall approach encompassing a hierarchy of:

- Prevention and avoidance of impacts;
- reduction of impacts; and
- compensation or offsetting the impacts.

This will involve all or a combination of:

Source control – such as avoidance (using different technology) or reduction (process modification) to remove, reduce or mitigate the cause of an impact. This entails consideration of

the sources of releases and effects, as stocks and flows (see Section 5.1.2), which can be modified.

Pathway modification – This involves the prevention or reduction of the movement or dispersion of a flow, such as containment, screening or interception.

Receptor protection– This is to prevent or mitigate effects on a receptor, or provide compensation.

The order of priority between source-pathway and receptor modification is always highest at the source. Preventative measures are always favoured above curative, reactionary measures.

6.1.4 Potential Social Impacts of Mining in Nigeria

6.1.4.1 Generic Issues

There are a number of potential social and local economic impacts from mining that are generic to LSM/MSM and ASM. The impacts due to ASM and LSM/MSM are presented in Table 6.4 below. Most of these impacts are negative, indicating the range of challenges but some of the largest potential impacts are positive and these are identified (by a "+") in the Table.

Table 6.4: Potential Socio-economic Impacts from Mining

S/No	Issue	Impact Due to Artisanal and Small Scale Mining	Impact Due to Large Scale Mining
1	Mine close to settlement Community – miners interaction	Influx of migrants resulting in: • Damage to community (farm) land • Loss/damage to graves/sacred places • Conflict over: compensation for damage; access to natural resources (water/fuel wood) and facilities; mining benefits being limited to a section of the community (i.e. chief – council – local miners); access to the mineral deposits; and role of women in the mining activity • Increase in cultural and ethnic clashes • Increase in crime (theft by miners) • Increase in prostitution and STD's /HIV and potentially GBV/SEA • Increase in alcohol abuse • Excess burden on existing infrastructure(health services, sanitation)	Influx of migrants resulting in : • Loss of homesteads and livelihoods • Loss/damage of community (farm) land • Loss/damage to graves/sacred places • Loss of natural resources • Conflict over:compensation; access to natural resources (water/fuel wood); mining benefits being limited to a section ofthe community (i.e. chief – council - employees) or verylimited shares of national revenues being returned locally**;** role of women in the mining activity • Increase in cultural and ethnic clashes • Increase in crime (theft by miners) • Increase in prostitution and STD's /HIV and potentially GBV/SEA • Increase in alcohol abuse • Changing social relations e.g. empowering youthemployed in the mine Vs elders • Changes in livelihood and standard of living of the community - Increased influx of cash (from miners) in the community - Procurement of local goods – creating localincome although may

		• Changes in livelihood and standard of living ofthecommunity- - Increased influx of cash (from miners) in thecommunity; - procurement of local goods – creating local income although may disadvantage some due to price rises (+) - Increased employmentopportunities (mining, processing, serviceprovision) (+)	disadvantage some due to price rises (+) - Increased employment opportunities (mining,processing, service provision) (+) • Increased skills development (+) • Changes in livelihood strategies from farming tomining – may endanger food security- especially after mineclosure. • Enclave development & dependency of the localcommunity
	Health	Of the Miner- • increased risk of disease due to inadequate logisticand sanitary conditions in miners camp • exposure to noxious chemicals • effect of noise and vibration • effects of poor ventilation • over-exertion Of the Community • effects of water/soil pollution on community • increased risk of malaria - dams and filled pitsduring rainy season	Of the Miner • increased risk of disease due to inadequate logisticand sanitary conditions in miners camp (miners andcommunity) • exposure to noxious chemicals • effect of noise and vibration • effects of poor ventilation Of the Community • effects of water/soil pollution on community • increased vulnerability to malaria dams and filled pitsduring rainy season
	Safety	• risk of occupational accidents due to: - rock falls - collapse of pits - obsolete and poorly maintained equipment - misuse of explosives - lack of protective clothing (PPEs) • risk for safety of community: - community members (children) may fall in the open pits (need for securing mining area) - transport of minerals through the community may increase road accidents • illegal practices	• risk of occupational accidents: - failure to employ health and safety regulations for large scale mining re -use of tools and equipment, protective clothing, working environment • risk for safety of community: - community members (children) may fall in the open pits (need for securing mining area) - transport of minerals through the community may increase road accidents

		• child labour • unlicensed mining and selling	
2	Mine distant from settlement Community-miners interaction	Influx of migrants resulting in: • Increased cultural and ethnic clashes amongst miners • Increase in prostitution and STD's/HIV in the mining camp and potentially GBV/SEA • Increase in alcohol abuse and violence in mining camp • Competition and conflict over mineral deposits Changes in livelihood strategy • Changes in livelihood strategy: from farming to mining -may endanger food security – especially after mine closure **Health of Miners** • Increased risk of disease due to inadequate logistic and sanitary conditions in miners camp • Exposure to noxious chemicals • Effect of noise and vibration • Effects of poor ventilation • Over exertion **Safety of Miners** Risk for occupational accidents due to: • Rock falls • Collapse of pits • Obsolete and poorly maintained equipment • Misuse of explosives • Lack of protective clothing (PPEs) **Illegal practices**	Influx of migrants resulting in : • Increased cultural and ethnic clashes amongst miners in prostitution and STD's /HIV in the mining camp and potentially GBV/SEA • Increase in alcohol abuse and violence in mining camp Changes in livelihood strategy • Changing from farming to mining -may endanger food security – especially after mine closure **Health of miners** • Increased risk of disease due to inadequate logistic and sanitary conditions in miners camp • Exposure to noxious chemicals • Effect of noise and vibration • Effects of poor ventilation **Safety** Risk for occupational accidents due to: • Collapse of pits. • Failure to employ health and safety regulations for large scale mining re -use of tools and equipment, protective clothing, working environment

		• Child labour • Unlicensed illegal mining • Use of illegal drugs	

Some of these impacts are more likely to be associated with particular minerals and these are highlighted in the Table 6.5. Here we note the generic impacts for LSM/MSM and ASM according to whether mining or quarrying takes place close to or distant from established communities.

Table 6.5: Impacts Specific to Certain Minerals and Type of Mining

Mineral/type of mining	**Impact (Health and Social)**
Minerals that require blasting/ specific equipment	Increased occupational hazards
Minerals which produce toxic pollution/ waste? Air-water-soil	Increased health hazards (not sure about nature of these) Small scale and artisanal mining have a higher risk for pollution , less effort invested in safe waste disposal
Minerals mined by small scale local operations, which are readily locally marketable (i.e. gypsum)	Higher chance of make substantial contribution to local standards of living
Migrant mining (mining done by migrant rather than local people)	• Higher risk for ethnic clashes • Higher risk for spending sprees and decreased potential for enhancement of sustainable livelihoods • Higher risk for breakdown in family structure
Small scale mining	• Increased risk of migration ('gold rush'), ethnic clashes, violence and theft with the mining of precious stones and gold • Increased risk health hazards due to lack of enforcement of occupational health and safety provisions (i.e. tools, protective clothing) • Increased risk of fatalities due to a lack of first aid infrastructure • Increased risk for community –miners' conflict due to absence of organised public participation mechanism • Increased risk of illegal activities

6.2 Potential Impacts of the MinDiver Project

As indicated in Chapter One, the project does not engage in any direct or even indirect mining and quarrying activity, which might have major environmental and social impacts. However, the project will bring about significant and substantial increase in the activities of the solid minerals sector, especially in the artisanal and smallscale mining being a Technical Assistance (TA) project.

The resulting mining and quarrying activity have had and will continue to have major implications for environmental and social consequences in the country. These impacts will be specific to each project and will need to be assessed on a case by case basis as they arise. The nature and scale of potential impacts generally associated with different types of mining and mineral commodities are described in Table 6.4 and 6.5 above. However, these are only the typical ones, and most likely will not occur if proper assessment and mitigation is provided.

This Project and the SESA in particular will provide the regulatory and institutional framework for environmental and social management within which these future projects will operate. Thus, the efficacy and rigour with which the environmental and social impacts of the future mining is assessed, monitored and mitigated. Table 6.6 below gives a summary of the activities under this Project, and indicates the direct environmental and social implications and threats of each component. As a result of the specific objectives of the Project, as set out in the PAD, these implications are mainly positive. An increase in the number and scale of mining activities throughout Nigeria might mean much greater potential environmental and social impacts. However, with the measures recommended by the Project, the actual impacts should be largely positive or neutral.

Table: 6.6: Environmental and Social Implications of the Project

Component & sub-component	**Description of activities**	**Environmental & social implications and risks**
A. Establishing a Strong Foundation for Mining Sector Development		
A1: Strengthening Mining Governance, Transparency, Accountability, andAdministration	Preparation and implementation of an institutional functional analysis of workflows, processes, and information flows; updating the institutional dimensions of the policy, legal, and regulatory framework to reflect the finding and recommendations of the functionalanalysis; defining a road map and implementing institutional reforms; and designing andimplementing an integrated Mining Management Information System (MMIS) based on the functional analysis.	The sub-component will help enhance the capacity of government staff from MMSD to monitor mining activities and ensure that mining companies and individuals adhere to the sound environmental practices in the sector. It will enhance stakeholder participation and increase transparency in the sector. It will also enable them to understand their duties as regards sound environmental management in mining activities.
A2: Strengthening Geological Knowledge and Information Infrastructure	The objective is to strengthen geological knowledge of the Nigeria's mineral wealth, prepare for the identification of prospective areas (under Component A), and facilitate bidding rounds (under Component B) to attract investors.	The activities of this sub-component will help build enough data base of mineral deposits in Nigeria and equally build the capacity of ministry staff in geological survey and mapping. Attraction of more investors into the sector will also help generate employment for the citizens and revenue for government.
A3: Skills Building and Education Support for Mining Sector Development	The main objective is to address skill gaps in the industry and support the education andpractical training of the next generation of sector specialists.	The activities of this sub-component will help in closing the skill gap in the mining sector and generate enough manpower to facilitate mineral exploration in Nigeria. This will help in employment generation and poverty reduction. On the flip side, there will be negative consequences for the environment as there will be enhanced mining activities in Nigeria especially in the ASM sector which is renowned for generating negative environmental and social impacts, for example, conflicts, especially due to illegal activities in the sector.

A4: Environmental, Health, and Social Performance	The objective of this project activity will be to assist the Government to improve environmental and socialsustainability of the mining sector and improve its regulatory enforcement capability.	The activities of this sub-component will substantially reduce the environmental, social and health consequences of mining in Nigeria. It will also help address the issue of conflicts that are inherent in the sector.
B. Facilitating Downstream Sector Development and EnhancingCompetitiveness		
B1: Developing Measures for Formalizing, Regulating, and Inventorying ASM	The objective of this project activity will be to enhance the economic opportunities ofartisanal miners, reduce smuggling practices, and create incentives for their inclusion in the formaleconomy, thus increasing revenue collection, poverty alleviation, and job creation.	The activities of this sub-component will help reduce the negative environmental impacts associated with ASM in Nigeria. It will also help generate employment and income for the miners. There will also be some negative environmental and social consequences especially if formalizing, regulating and inventorying ASM is poorly carried out.
B2: Catalyzing the Mineral Sector for Regional Development	The objective of this project activity is to leverage the mining sector to enhance regional development inseveral strategic resource-rich regions identified as priorities for the Government	The activities of this component will lead the expansion of the sector with attendant negative and positive consequences. Expansion will result in increased operation in the sector which will result in negative environmental and social consequences especially air and water pollution and conflicts as a result poor property rights regime. Development of minor infrastructure will lead to potential negative environmental and social consequences especially if the recommendations of the ESIA and RAP of the infrastructure project are ignored.
B3: Implementing Steps to Enhance Value Addition and Some UpstreamActivities	The objective of this project activity is to enhance the value of mineralproducts including some aspects of upstream development of the industrial minerals and dimensionstones domain (linked to B5-1) and downstream processing and refining across the range of mineralcategories (excluding energy minerals) found in the country	Creation of industries for value addition to solid mineral will enhance job creation, poverty reduction and increased foreign exchange earnings for government. However, the industries will generate negative externalities in terms of environmental degradation, for example, pollution and also negative social issues for example, through influx of factory workers into communities where they are located. However, this will be project specific and will be taken care of using already existing environmental and social frameworks, prior assessments and audits.
B4: Addressing Access to Finance and Mineral Sector Investment ClimateConstraints	The objective of this project activity is to develop and implement reforms,in collaboration with the Trade and Competitiveness Global Practice (GP) to address access to finance and investment policy constraints to encourage greater competitiveness of Nigeria in the global mineral market	The activities of this sub-component will help build/enhance the activities of ASM which will be formalized and properly regulated. However, given the potential of ASM activities to result in environmental degradation and negative social issues, there could be negative environmental consequences as a result of this sub-component.
B5: Advancing 'Proof of Concept' Investments	The objective of this subcomponent is to provide support to the Government aimed at attracting private	The activities of this sub-component will enhance private sector investment in the sector and thus enhance job creation, poverty reduction and increased income for the country. However, large scale projects have some

	sectorinvestment into targeted exploration areas and mineral production at specific sites including work onindustrial minerals and dimension stones.	environmental consequences but this will be project specific and will be taken care of based on robust environmental framework available in the country and detailed in this SESA.

6.3 Perception of Miners on Environment and Social Consequences of Mining in their Community

The study revealed the perception of artisanal and small-scale miners and non-miners on environmental and social consequences of mining in their communities. The result is presented in Table 6.7.

Table 6.7: Perceptions and Consequences of Mining Activities in Sampled Communities

S/No	Consequences and Effects in Communities	Miners -Yes (%)	Non-Miners – Yes (%)
1	Deposition of harmful material into rivers and streams	31.11	38.71
2	Collapse of mining tunnels due to use of explosives	28.15	30.65
3	Clearing of vegetation during prospecting and mining without rehabilitation	34.07	44.35
4	Abandoned mining sites, pits and tunnels	57.78	56.91
5	Long working hours at mine sites	39.26	34.68
6	Sexual harassment of women by male counterparts at the mining sites	4.44	9.68
7	Outbreak of disease in the mining areas such as malaria, diarrhoea and bilharzias	37.04	37.10
8	Sexual vices and other related cases	20.00	19.35
9	Conflicts as a result of mining activities	34.07	26.61
10	Armed robbery, kidnapping and terrorism as a result of mining activities	18.52	16.24
11	Influx of people especially strangers into communities as a result of mining activities	57.78	61.29
12	Spread of HIV/AIDS	8.15	8.06
13	Drinking water contamination	30.60	41.13
14	Mineral contamination of food and body such as lead and mercury contamination	21.48	29.84
15	Noise from heavy equipment such as bulldozers, excavators, dredging and drilling equipment	44.44	38.71
16	Participation of children in mining activities	45.19	51.61
17	Cracking of walls and destruction of houses due to explosives	28.89	32.26
18	Youth restiveness	23.53	17.74
19	Large number of school dropouts due to engagement in mining activities	45.13	41.13
20	Soil contamination which affects crop yield	23.88	24.19
22	There is discrimination of women as regards mining activity in my community	10.53	17.74

Source: SESA Field Data 2019

The result shows that the miners and non-miners have similar opinion regarding the consequences of mining in their respective communities. Specifically, the result shows that the majority (57.78percent and 56.91percent) of the miners and non-miners respectively indicated that the issues of abandoned mining sites, pits and tunnels is a major consequence of mining in their community. The majority (57.78percent and 61.29percent) of miners and non-miners respectively also indicated that influx of people especially strangers into their communities as a result of mining activities is a major consequence of mining. In addition, while the majority (51.61percent) of non-miners were of the opinion that participation of children in mining activities was a major consequence of mining in their communities, a high proportion (45.19percent) of the miners had the same opinion. On the other hand, the lowest proportion (4.44percent and 9.68percent) of miner and non-miners indicated that sexual harassment of women by male counterparts at the mining sites is a consequence of mining in their community. Likewise, only 8.15percent and 8.06percent of the miners and non-miners indicated that spread of HIV/AIDS is a consequence of mining in their communities.

CHAPTER SEVEN: ASSESSMENT OF ALTERNATIVES

7.0 Introduction

As noted in the introduction (Chapter 1), the project development objective (PDO) of the Mineral Sector Support for Economic Diversification (MinDiver) project is to enhance the mining sector's contribution to the economy by strengthening key government institutions, improving information infrastructure and knowledge, and fostering domestic investment in the sector. Thus, the project will not engage in any direct or indirect mining and quarrying activity. In the context of normal project impact assessment, the analysis and assessment of alternatives involves a more strategic approach. This is considered under two headings: alternative forms of intervention in the mining sector through the MinDiver project; and alternative approaches and technologies to mining that might be supported or discouraged.

7.1 Alternative interventions under MinDiver project

The project alternatives that are identified, with their environmental and social consequences, are considered in Table 7.1 below. This supports the selection of Option 1, being the Mindiver project.

Table 7.1 Alternative interventions under the SMMR Project

		Environmental and social consequences	
		Benefits	***Threats***
1.	The MinDiver project as Proposed- the three components and sub-components of the project incorporating environmental and social management issues.	A significant improvement in the mining and quarrying sector in Nigeria, including enhanced private sector involvement and investment in mining, a well-developed and regulated ASM and a sector operating within a sustainable environmental and social regulatory regime that recognises international standards, expectations and practices; and enhanced economic development.	Without mitigation and institutional capacity especially of key ministry departments, for example, the MEC, a rapid increase in the mining sector could outstrip the ability of government agencies to effectively monitor and enforce environmental and social requirements.
2.	Avoid facilitating or supporting any reform of the mineral sector, so the FGN implements its own reform measures in accordance with the current	The mining sector and related environmental and social management regime will evolve in parallel.	A slower and more disjointed development of the mineral sector would mean that local economic benefits would be slower to accrue. The diversification of the economy specially through the sector will be a mirage. The potential for short-term damage

	policy regime.		is high.
3.	To support and develop only medium and large-scale mining, and constrain the ASM sector.	This alternative will reduce the threat of increased environmental, health and social damage associated with ASM activity, in favour of larger scale operations that can invest in proper environmental and social protection.	The ASM sector would continue informally and the operations will not be controlled. Economic and local benefits would not accrue, missing out on the potential for poverty alleviation, such as in areas where larger scale mining is not practical or economic. Besides, the informal ASM sector will pose huge environmental threat as the operations will not be controlled or monitored. This may wipe out the environmental benefits that may accrue through a well-developed medium and large scale mining.
4	To support, develop and formalize only ASM sector and undermine medium and large scale mining development	This will equally reduce the environmental consequences associated with the ASM sector. Also, the environmental consequences that may arise from small and large scale mining with weak environmental management procedures will be avoided	The aim of economic diversification will not be achieved as ASM sector does not have the capacity for large scale investment in the sector that can drive economic diversification.
5	Support development of ASM, medium and large scale mining and ignore downstream sector development	Environmental consequences will be very minimal as the ASM, small large scale mining will be well developed following a good environmental and social regulatory regime.	Ignoring the downstream sector will limit the attractiveness of the sector to private investors and will thus, limit competitiveness. This will in turn limit growth and the development of the sector and objective of enhancing economic diversification and growth will rarely be achieved.
6	Continue and increase public sector involvement in mining by supporting, enlarging and developing the Parastatals.	Perceived benefits of centralised long term planning in the industry, government investment, public ownership, profit sharing and direct responsibility for environmental and social management.	Experience shows that public ownership and state involvement does not achieve economic, environmental and social objectives. There is a continuing conflict of interest between running and regulating the minerals sector, which results in weak environmental and social enforcement.

7.2 Approaches and technologies

The technological options and alternatives for mining projects are very project-specific, depending on the mineral commodity, nature and location, geochemistry and geological occurrence. Alternative mining methods, processing technologies, siting of facilities, waste disposal methods, transportation, etc., will be considered on a case by case basis, taking account of economic, technological, environmental and social factors. The MinDiver project has ensured that general overview of this was incorporated in the ESM and will equally ensure that project

specific consideration of these alternatives is part of the ESIA process. It is feasible to consider all the potential alternatives and options, combinations and permutations in this SESA report. These are summarised below for MinDiver project.

Table 7.2 Alternative approaches and technologies

		Environmental and social consequences	
		Benefits	***Threats***
1.	Should artisanal miners be required to work in co-operatives as a perquisite for operation in the sector, or be permitted to work independently if they so desire? ***Some form of co-operative or collective working has proved to be a sustainable approach.***	Co-operatives give the means to benefit from collective action, support, resources, training, etc. It makes Monitoring and regulation; and administration of financial and support services to ASM easier.	Artisanal miners can be very independent and enforcing collective or co-operative working may limit their operation. The increase in bureaucracy and overt regulation may be counterproductive.
2.	Should artisanal or small-scale miners be exempted from EIAs? ***No, the MMSD has developed a screening checklist for sustainable ASM operations. Also, ASM operators who mine the same mineral and operate in the same location are permitted to conduct joint EIA***	Environmental and social impacts are not dependent on the nature of the miner but on the nature of the mining operation. The ASM sector should be subject to the same requirements as the rest of the mining sector, though some help can be offered to small scale operators to enable them conduct EIA.	Collectively and cumulatively, a group of individual artisanal or small-scale miners can have a devastating impact on the environment.
3.	Should mercury and/or cyanide be permitted for use in gold mining, particularly in the ASM sector? ***Yes, though only mercury should be allowed, under controlled conditions, in artisanal operations in the interim because Nigeria is working towards abolishing or prohibiting its use being a signatory to Minamata Convention.***	For ASM, mercury is the most feasible option. There are simple technologies for working safely with mercury. Cyanide for gold extraction should only be used in larger scale operations where it can be closely controlled.	Whilst these are the only feasible technologies for gold extraction, they are both very hazardous. Banning the use of mercury in ASM without providing alternative technology would result in more widespread use of cyanide with much greater consequences. Banning both mercury and cyanide would severely curtail one of the most promising options for benefiting from a thriving ASM sector.
4.	Should a coordination framework among MMSD, Federal Ministry of	This would reduce the conflicts between different government agencies regarding	The process of approval of EIA and other environmental requirements may be slow there

	Environment and other relevant agencies regarding EIA and other environmental requirements for mining projects be enshrined within the mining act? ***Yes, given the existing drawbacks regarding approvals and implementation of environmental requirements required for mining.***	implementation of environmental procedures regarding mining and equally remove the confusion experienced by miners in complying with environmental procedures.	by limiting the flow of investment to the sector.
5.	Should the federal government work with state governments to constrain or prevent the exploitation of minerals in game reserves and and other ecologically sensitive areas or critical ecosystems under the control and management of the state government as currently done in and national parks? ***Yes, given the high loss of biodiversity in the country of which mining is a major culprit.***	This will limit the high loss of forest resources and biodiversity in Nigeria which the mining sector has been implicated as a major culprit.	Mineral deposits exiting in these areas will not be exploited leading to loss of revenue for the country. Potential means of providing local income and economic activity in rural areas with little other means of poverty alleviation will not be available.

CHAPTER EIGHT: PUBLIC CONSULTATION

8.1 Overview

This SESA is an outcome of numerous consultations and workshops that were held across the mining sites, states and the six (6) geopolitical zones in Nigeria. Consultation involved multivariate instruments of data gathering and approaches tailored to suit each category of stakeholder. Consultation and stakeholder engagement are considered a continuum throughout the life cycle of MinDiver project, and therefore, current consultation efforts and results are not an end but will be sustained. MinDiver will continue to consult with stakeholders at different stages of the project life cycle. It is currently preparing a stakeholder management plan as a stand-alone document for profiling its stakeholders wide network and providing a clear-cut engagement schedule and procedures.

Figure 8.1: Cross section of participants during stakeholder consultaions at different zones and minig locations in the country.

8.2 Stakeholder Analysis

The stakeholder analysis focused on the identification of stakeholders and the roles and influence they wield in decision making and implementation of SESA and the Mineral sector development in general. This is germane for determining the capacities, concerns and influence on policy formulation and implementation.

For example, this SESA acknowledges that it is possible for an organization or a group to have the dominant influence over formulation of a policy but at the same time have less practical

impact than a large number of groups who have no knowledge of the regulations but nevertheless control day to day events in the sector. By plotting the relative influence and impacts of different stakeholders on a graph, valuable insights can be gained in terms of the actions that need to be taken to make policies more effective.

Through meetings with MinDiver PIU and from extensive literature review, a list of stakeholders was drawn. These stakeholders were contacted via letters, visits and emails. Meetings, interviews and FGD with stakeholders while others were invited to participate in the zonal stakeholder's workshops. Categories of stakeholders identified and consulted are as follows:

- Community level: Traditional council, women in mining, informal and illegal miners
- Miners: artisanal miners, registered cooperatives, licensed miners
- Ministries, Departments and Agencies (MDAs): This includes departments within MMSD such as Mines Inspectorate, ASM and MEC; Relevant agencies with mandates, interest and influences on mining activities, and MDAs with mandates on environmental protection and health such as NESREA, Ministry of Health at Federal and State levels, Ministry of Health, Ministry of Water Resources
- Volunteer Groups: CBOs and NGOs
- Advisory Group: MIREMCO

These stakeholders will have varying range of influence on SESA implementation and the success of MinDiver based on their respective powers and interests as captured below.

Table 8.1: Categorization of Stakeholders Influence and interest

Categorization of Influence and Interest	List of Stakeholders
High Power, Interested Group	Federal Government of Nigeria, MMSD, State Governments, World Bank, Federal Ministry of Environment, MIREMCO, NESREA; Traditional Council
High Power, Less Interested/Participating	Federal Ministry of Water Resources, Federal Ministry of Health, Ministry of Women Affairs and Social Development
Low Power, Interested Group	Miners Association of Nigeria, ASM, Industrial Miners, Women in Mining, CBOs, NGOs and Host communities

8.3 Summary of Proceedings and Major concerns from Stakeholder Workshops

This section (Table 8.2) provides a summary of information passed to the stakeholders and concerns elicited from them including how major concerns were resolved. Detailed account of minutes of public consultations and record of attendance are documented in annex 2.

Table 8.2: Summary of Proceedings and Major Concerns from Stakeholder Workshops

Date of workshops	16th July 2019 (South West Zone); 19th July 2019 (South- South Zone); 24th July 2019 (South East Zone; 19th August 2019 (North East Zone); 23rd August 2019 (North West Zone) and 27th August 2019 (North Central Zone).	
Locations	Abeokuta, Calabar, Enugu, Bauchi, Kaduna and Abuja	
Participant Profiles	Mining communities, ASM operators, Licensed Mining companies, Women, MIREMCO, NGOs, MMSD, Nigerian Geological Survey Agency, Ministry of Health, Ministry of Environment, NESREA	
The Story Board of the consultations	The participants at each forum were informed that MMSD through the MinDiver Project is desirous of developing the mining sector to play a leading role in the economic diversification, growth and employment in Nigeria. They were told that the purpose of this current exercise is to update the existing SESA which was conducted in 2005 to support legal and policy reforms and to assist economic development of the Nigerian mining sector; and to create an avenue for participation and dialogue for all mining stakeholders. Participants were told about the project components and asked to make inputs and raise concerns that will help to develop a new SESA that will assist government in the implementation of environmental sustainability and socially acceptable and inclusive participation in the mineral sector of Nigerian economy. Areas of discussion includes Mining Laws and Policies, regulation and enforcement of environmental Laws, Charge Fees, Capacity gaps, EIA process, Compliance Monitoring and logistics, Inter-agency collaborations and overlapping functions and Institutional weakness and environmental reforms.	
Stakeholder Group	**Concerns**	**How concerns were addressed**
Women	Concerns include issue of exclusion from mining arising from gender-based vulnerability, lack of capital and equipment and unfair competition Desciminating against women from prospective mining sites is considered as a GBV against women	The women were encouraged to organize and form cooperative groups for government to recognize them and extend support to them while MinDiver will assist with organizational logistics There should be strict adherence to safety regulations as women and children are mostly affected They were also informed of the opportunity the TA project (MinDiver) is providing for the women by designing and implementing a framework to restructure and reposition the women in mining and steel sector Also, MinDiver is making efforts to see that women miners receive priority in the Solid Mineral Development Fund (SMDF) under way.
ASM	Concerns of the ASM operators are: • lack of modern mining equipment like excavator, tipper, etc; • Payment of multiple levies and royalties to federal, State, Local Government and Communities	This will be addressed within this SESA recommendation.

	• EIA is approached as a consultancy business and avenue for making money than an instrument to manage the environment. The process and cost of an EIA is considered as very cumbersome and expensive.	EIA requirement should be made flexible and friendly for small scale miners. Clustered companies should be made to have a single EIA MMSD and FMEnv should collaborate and regulate the cost of EIA in such a way that ASM and other companies pay according to their grade and level.
Host communities	Host communities do not have sufficient information about the mining law. Investors do not comply with payment of compensation and community development to community especially when community land is acquired.	Awareness would be created for the host communities Communities should be sensitized on guidelines in preparing CDAs.
MDAs	MIREMCO decries insufficient funding and inadequate logistics as factors that makes it ineffective in the discharge of their mandate; Regulators such as MMSD, FMEnv and NESREA have challenges of capacity and operational cost including inadequate vehicles to carry out their functions effectively. Issue of overlapping functions and multiple government agencies engagement in enforcement is a concern for regulators and investors. Similarly, the interference of state government in mining regulation and enforcement is a key concern that need to be addressed	There should be clear cut funding provision for MIREMCO Provide adequate funding for regulators Synegies are encouraged among MDAs
	Ministry of health wondered why the existing regulation in the EIA process does not recognize their roles or participation in the EIA process despite various public health problems arising from lead poisoning and radioactivity of some minerals.	The EIA process under review is addressing the issue of inclusions of both social and health impact assessment and institutional responsibilities
Recommendations	Participants were assured that their views were recorded and will be mainstreamed into the SESA report for improved policy design. Given that there is no institutional or regulatory provision for assisting women miners in Nigeria, MinDiver Project should take the organizational responsibility and funding, including providing women miners with enabling capacity training, skills and information that will help for sustainable competitive mining, and for accessing fund from government or partnership fund owners. A robust Gender Impact Assessment (GIA) of the Nigeria mining and steel sector should be carried out. Also, participants were informed about the grievance redress mechanism being put in place by	

	MinDiver and grievance uptake process for conciliations.

8.4 Highlight and Key Outcomes of Consultations

This section discussed the major outcomes of the various consultations held with stakeholders at the different levels. The presentation of these key outcomes is imperative because they are integral part of the policy formulation and recommendations of this SESA. Full presentation of proceedings of public consultation is contained in Appendix 7.

8.4.1 Women Involvement in Mining:

i. In most part of Nigeria, women do not participate directly in mining activities due to cultural, religious and gender-based restrictions. For example, in **Galadima K'ogo, Niger State** women do not dig mining tunnels essentially due to strength and cultural limitations. Even though they are acclaimed to have a knack for mineral (gold) prospecting as they identify most of the gold-veins in the mining areas, once they do, the men usually pursue them away from the site and then proceed with the actual mining leaving the women with the only option of scavenging the earth-discards from the mining pits for any remains of gold particles they may find.
ii. The outcome of our wide stakeholder consultation shows that the story regarding the low participation of women is not significantly different in other parts of the country as sand dredging and other mining activities in the southern Nigeria are completely dominated by men.
iii. An issue limiting women participation in mining is that they are financially handicapped. Women stated that the inability to access loans and grants to meet the capital intensiveness of mining poses a capital constraint to them.
iv. Most of the Mining Associations operations and procedures are at variance with gender inclusiveness. This hostility and non-conducive environment according to the women stakeholders, makes it difficult for women to grow in mining.
v. Women however, participate in mineral sector value chain through marketing and distribution of products. They are equally involved in reclamation of land after mining via planting and re-vegetation of mine land.
vi. Through consultation, it was noted that women are indirectly affected especially when mining regulations are not adhered to, as it leads to accidents that results in these women being widows and put in a position of vulnerability.

8.4.2 Child Labour and Regulation

i. There are currently underage children (14 years and below) illegally employed in the mines.
ii. Stakeholders stated that the Mining Act 2007 is not explicit on age limit of mine workers, although 18 years is stated as the minimum age for employment in hazardous work (Nigerian Labour Act, CAP L1 LFN, 2004). The outcome of the consultation is that the Mining Act should expressly state the age considered illegal for mining employment or adopt in explicit term the stand of the Labour Act.

8.4.3 Challenge of Obtaining Credit from Banks for Mining Business

The reason banks do not lend to miners was discussed by stakeholders in all the zonal stakeholder workshops. Key outcomes are as stated below:

i. Unreliable geophysical survey data and dearth of data on mine reserve constraint miners from accessing funds. It was suggested that policy should be put in place to make it easier for miners to access loan. Suggestion is that a policy should be put in place to have Smelting Plant (beneficiate) which will enable miners to separate the different minerals;
ii. Participants from Geological Survey Agency corroborated the cause of difficulty of miners in loan assessment describing lack of bankable data as the reason.
iii. The conclusion is that geological data (large scale maps) should be able to delineate into: geophysical and reserve.
iv. Although it was indicated by participants from MMSD in one of the zonal workshops that Bank of Industry (BOI) has made it easier by reducing the condition for miners to obtain loan to 2 guarantors of the rank of at least level 12 and above in the Nigerian civil service and evidence of mining title or a memorandum of understanding with first party; miners still complained that these criteria are met yet did not have access to BOI loan facility.

8.4.4 Challenge of Adherence to Mining Laws by ASM Operators and Licensed Mining Companies*:*

i. ASM Operators are in two categories: Licensed mining cooperatives and unlicensed individuals. The latter is dominant in the mining industry in Nigeria.
ii. The ASM operators have limited knowledge of mining laws. They are only aware of the regulations that have to do with being registered before one can mine minerals as well as payment of royalties.
iii. The miners (both cadres) said they needed to have the mining laws and regulations to enable them familiarize themselves with all the relevant laws.
iv. They also pointed out that the issue of environmental protection, child labour and other relevant regulations may be contained in the law document but because they do not have information of the laws or laid their hands on the mining law documents, they lack deep knowledge of every aspect of the law.
v. It was also admitted that ASM operators in many locations do not adhere to operational safety rule, and often do not engage signage in their sites.
vi. One of the challenges faced by both categories of miners is cost. The cost of conducting an Environmental Impact Assessment (as charged by the Federal Ministry of Environment) is too high and had no consideration for the small scale of mining. It was the opinion of miners that the cost of EIA should be reduced or regulated in such a way that investors and companies should pay EIA levies based on categories and levels;
vii. The miners want MinDiver to undertake training programs that are subsidized or rendered free to them (especially for the labourers) to improve their knowledge on mining
viii. Miners complained of multiple regulatory visits (by FMEnv, MMSD, NESREA, State Ministry of Environment, Ministry of Commerce and Industry (Now Trade and Investment) with request for different compliance reports and fees.

ix. They complained that taxation and royalties are collected by different agencies of the Federal and State governments which crowd out investment in the mineral sector, especially for the ASM.
x. There is a convergence that the position of State government and involvement in the mineral sector or mining activities should be carefully spelt out in regulations.
xi. Issue of overlapping functions and multiple government agencies engaged in enforcement was not left out. Many states are said to have delved into imposition of taxes on miners. A typical example was that of Ebonyi State that uses state apparatus to intimidate miners (even though they have mining permits), imposing different kinds of taxes, summoning companies for meetings and closing down companies for weeks.

8.4.5 Regulators Capacity and Challenges to Enforcement:

i. The consultations revealed that regulators such as MMSD, FMEnv and NESREA have challenges of capacity and operational cost in carrying out their functions effectively.
ii. Mine sites are not mainly on smooth roads and a lot of these regulators have limited access to operational vehicles to cover the mine sites. Where the vehicles do exist, they sometimes have to depend on the miners to fund their monitoring and enforcement operations. This may induce compromise and make compliance monitoring ineffective.
xii. Stakeholders advocated for the restructuring of the departments in the Ministry of Mines and Steel Development to enable smooth flow of information and extension services.

8.4.6 Host Communities Rights and Knowledge of Mining Laws and Risks

i. Generally, host communities do not have sufficient information about the mining law and their rights;
ii. They believe that they are not commensurably compensated by investors for their land and adverse impacts of mining to their livelihoods;
iii. The communities claimed that they are not well informed about CDAs (preparation, signing and enforcement).
iv. Host communities seek involvement in policy designs that affect them in relation to mining and preparation of CDAs. They were of the opinion that CDAs should be development driven and mitigation measures should be provided for major adverse impacts on the community.
v. Majority of the stakeholders agreed that there is the need for CDAs to be properly regulated by Government through the mining offices in each state to protect the communities from the adverse impacts of mining.
vi. The community needs information and awareness programs to be anchored by the Ministry of Mines and Steels Development in conjunction with the mining company prior to exploitation or operation.

8.4.7 How Reforms/Legislation Can Be Used to Check Illegal Mining and Environmental Compliance:

i. Stakeholders were of the opinion that Illegal mining can be checked by forming cooperatives for the local miners to help them formalize their operations. They should be granted some form of recognition by the government and also be encouraged to be formed into cooperatives.

ii. Stakeholders resolved that registration of all small-scale miners in the country as well as enlightenment campaigns on safe mining techniques will help to reduce illegal mining.
iii. They believe that enlightenment campaigns can also help illegal and artisanal miners to understand the opportunities embedded in formalizing their mining activities.
iv. The outcome of the various dialogues is that there should be provision in the law, making it possible for small scale miners in common clusters to be covered by a common EIA especially in clusters where the same mineral is being mined.

8.4.8 Enforcement of Mining Laws:

i. Stakeholders stated that there are no regulations to enforce regeneration of land after mining especially with foreign companies**.**
ii. A policy paradigm was canvassed by stakeholders in which many want mining companies to be pre-billed to enforce regeneration of land after they have stopped mining, given that many mining companies flaunt the land rehabilitation obligation after mining operations.
iii. The majority of the stakeholders agreed that the problem with Mining in Nigeria is not lack of sufficient laws, but enforcement of those laws. According to the stakeholders, foreign investors/companies violate the law and Government do not hold them accountable so long as they pay their royalties.
v. **Local Content in Mining Companies Owned by Foreigners**: it was a popular opinion that to improve the mining sector in Nigeria, there should be regulations requiring a laid down percentage of partnership between foreigners and Nigerian Citizens.

8.4.9 Gender Based Violence (GBV) and Other Social Issues

It was noted that GBV issues are hardly reported or talked about by victims due to stigmatization and psychological trauma associated with them. However, stakeholders agreed on the need to train and scale up the skills of staff of MinDiver PIU, MMSD and the partner MDAs on management of **GBV/SEA, labour influx, child labour, grievance redress** and other social safeguards concerns that might be associated with the MinDiver Project and mining in particular.

MinDiver will incorporate in the TOR of the specific instruments such as ESIA/ESMP, the need to carryout mapping of GBV response facilities and services providers in any sub-project/investment location. This will be for the purpose of preparing a GBV action plan for specific investments. The action plan will also include measures that will discourage GBV/SEA occurences and how victims could be rehabilitated. The GBV management plan will be mainstreamed in any contract for implementation under MinDiver and MMSD in general.

8.5 Grievance Redress Mechanism

Grievance Redress Mechanism (GRM) is anchored on the need to provide a platform within the purview of the project to receive, hear and resolve disputes arising from the activities of mining or the implementation of SESA. This is desirable to ensure that the rights of the aggrieved persons are respected and protected and to forestall the lengthy process of litigation,

which could affect the progress of project. Grievances may arise from any of the following: (1) involuntary resettlement and compensation issues (2) gender-based violence/SEA issues (3) exclusion from project benefits and non-compliance of the contractor to the agreement reached with MinDiver or the community. MinDiver has prepared a stand-alone GRM to address all project related grievances.

CHAPTER NINE: RECOMMENDATION FOR STRATEGIC ENVIRONMENTAL AND SOCIAL ISSUES FOR MINING SECTOR IN NIGERIA

9.1 Introduction

This chapter brings out the recommendations to the strategic environmental and social issues that are needed to facilitate the investment and expansion of the sector in Nigeria. From the studies and consultations and the findings thereof, the recommendations are organized along some critical issues, namely, strengthening legal and regulatory regime and environmental governance, removing bottlenecks regarding the operation of licensed and artisanal miners, limiting gender-based violence and enhancing women participation in mining in Nigeria; enhancing benefits to communities, enhancing the knowledge of legal and regulatory requirements by operators in the industry and reducing the effect of mining on the environment.

9.2 Strengthening Legal and Regulatory Regime and Environmental Governance

Although the legal and institution framework for mining in Nigeria is robust, there are areas that need to be fine-tuned and improved following the assessment of the Mining Act, Regulations and Institutions responsible for regulating different aspects of mining activity and also concerns raised by stakeholders during the stakeholder workshop. The exclusion of the state government in mining administration in Nigeria although enshrined in the constitution of Federal Republic of Nigeria (as amended) and the Mining Act has some limitations as observed by stakeholders. For example, state governments were of the opinion that they feel the impact of mining activities on the environment and thus would not sit idly and watch miners devastate the environment especially given the fact that the Federal Government lacks the capacity to effectively monitor the miners. Although the MIREMCO is one of the institutional frameworks for involving the State in ensuring mining environmental compliance, the body has not been established in most states. Besides, body complained of poor funding, inadequate staffing and poor logistics hamper their operation. Also, Stakeholders believed that involving state governments in the development of community development agreements will ensure compliance by investors. Furthermore, there is need for the miners to be represented in MIREMCO in order to have an effective platform to register and resolve complaints.

Although the EIA Act has robust provisions regarding environmental assessment and is also well alluded in the Mining Act. Stakeholders indicated that EIA practice in Nigeria is weak especially regarding social and health concerns. The cost of conducting EIA study is usually not affordable for small and medium scale miners. Miners suggested that the cost of EIA should be regulated in such a way that companies pay according to their economics of scale; and most communities are not aware of EIA contents and their environmental obligations.

Also, most artisanal miners and communities lack knowledge of policy and legal framework regarding mining in Nigeria. In fact, most communities are not aware of the requirements of community development agreements and some investor in the sector capitalizes on this to short change the communities.

Although the ministry commissioned 50 operation vehicles for use by the special mines surveillance task force (MSTF) to strengthen the task force and facilitate the monitoring of mining activities. Findings from various stakeholder consultations indicate that the task is focused on revenue generation and little or nothing is done regarding environmental monitoring. Even the mine police are focused on curbing illegal mining activities and not on environmental monitoring.

Furthermore, the Mining Act prohibits solid mineral exploration and mining in National Parks and sacred grooves, the Act is silent on the exploration and exploitation of minerals and mining within forest reserves and other ecologically sensitive areas or critical ecosystems which are under the control and management of the state government. Mining in forest reserve may result in the destruction of the forest and biodiversity.

Moreover, the issue of abandoned mine sites has continued to be a major problem in Nigeria despite the legal requirements regarding remediation of mine sites and the development of Environment Protection and Rehabilitation Program. Many of the abandoned mine sites, as seen from the pictures included in this SESA have defaced many landscapes, leading to soil erosion, water pollution and health risks by becoming breeding grounds for mosquitoes and other disease causing organisms. In some cases like in Okpara Mine and Ogbete CPS Enugu, the abandoned mine sites have become criminal hideouts.

Recommendation I: Thus, to reduce the environmental foot print of mining in Nigeria, there is the need to provide some role for the state especially regarding the monitoring of compliance to environmental and social commitments of the miners. Presently, involvement of the state in monitoring is only felt during EIA preparation as coordinated by the Federal Ministry of Environment. This takes place only in the areas of site inspection and stakeholder review meetings. Therefore, we recommend that the mining regulations be updated to assign roles to the state and local governments especially regarding the development and implementation of community development agreements and monitoring of environmental compliance.

Recommendation II: To facilitate compliance with the EIA process and to encourage investment in the sector, MMSD in collaboration with the Federal Ministry of Environment, should enhance the coverage of social and health issue in EIA, ensure that communities where mineral exploitation will take place have access to the EIA report during disclosure and standardize EIA fee a consultant can charge a prospective client.

Recommendation III: The MMSD should propose some amendments in the Mining Act to include some of the issues already identified in this SESA and not captured in the Mining Act, for example, the prohibition of mining within forest reserves and other ecologically sensitive areas or critical ecosystems which are under the control and management of the state government, the inclusion of miners in MIREMCO, among others.

Recommendation IV: To facilitate miners compliance with environmental standards presented and analysed in chapter 4 of this SESA, government through MMSD should enhance the capacity of the Mine Environment and Compliance Department (MEC) especially through adequate staffing and provision of monitoring vehicles to ensure environmental compliance and monitoring.

Recommendation V: The MMSD should develop an action plan to recover all abandoned mine sites. Also, the ministry should ensure that the license of miners that fail to recover the sites where they mined is not renewed. Government should also, after due warning and with a specific time frame of non compliance, for example after one year, revoke the license of miners that failed to reclaim abandoned sites.

Recommendation VI: To facilitate the management and compliance with environmental requirements for mining title holders, a framework for coordination between MDAs involved in environmental issues and MMSD should be put in place beyond signing an MOU. This framework can be incorporated into the Mining Act. Also, to facilitate the institution of Environment Protection and Rehabilitation Fund, there is need to include time line of implementation and enforcement modalities in the Mining Act.

Recommendation VII: MMSD in coordination with FMEnv should mainstream climate change adaptation requirements or co -benefits in the sector operation. This is presently not emphasized in the Nigerian EIA guideline for mining. There is the need for proponents to develop climate change adaptation plan during the preparation of ESIA. Similarly, the mine operators/investors should obtain climate data annually to help in infrastructure design during planning, construction, and implementation phases of mining operations.

Recommendation VIII: The Nigerian EIA process under review is addressing the issue of inclusions of both social and health impact assessment and institutional responsibilities. There is need for MMSD to ensure that the review is reflected in the revised Mineral Act for the sector.

9.3 Removing Bottlenecks Regarding the Operation of Licensed and Artisanal Miners

One of the key obstacles impeding the operation of ASM and licensed miners is the lack of credit facilities to increase their investment in the sector. Many miners do not have access to credit to purchase required equipment for mining. Mining companies complained that deposit money banks rarely offer credit services to them. One of the major bottlenecks limiting the access of miners to credit from commercial banks is the lack of bankable and reliable geophysical survey and mine reserve data.

Another major issue confronting the sector and acting as a disincentive to investment in the sector is the issue of Land Use Act. The Act as indicated earlier vests every parcel of land in every State of the Federation in the Governor of the State. Based on this, the State Governments, not withstanding the provisions of the Mining Act, considers it their right to also regulate on issues of mining on land. Thus, this has given rise to multiplicity of taxes. Miners are always at the mercy of Federal, State and Local Government authorities who impose different levies and taxes on miners even when they pay royalty to government. The MMSD should through the MIREMCO collaborate with State and Local Government councils to curb this menace.

Illegal mining is another major issue confronting the sector. During visits to mine sites, it was discovered that illegal miners can occupy a licensed mine site and refuse to move especially when they claim that the land belongs to them while accusing the cadastral office for refusing to grant them license. Stakeholders during the zonal workshops agreed that the best way to handle illegal miners is to formalize them and bring them into mainstream mining.

Recommendation I: The MMSD should as a matter of urgency embark on geological survey of mineral deposits and mines in Nigeria. Production of a large scale and high-resolution maps to guide local and foreign investors in the mineral sector in Nigeria should be developed. This will also facilitate the issues of loans to investors by deposit money banks.

Recommendation II: Given the importance of forming cooperatives by artisanal miners to enable them access credit facilities from the Bank of Industry and Solid Mineral Development Fund; MinDiver should partner local government councils where mining is ongoing to mobilize, organize and register the miners into cooperatives.

Recommendation III: To facilitate the expansion of mining industry in Nigeria, the Central Bank working with commercial banks should provide a credit product specifically for miners

Recommendation IV: There is the need for the review of the Land Use Act so as to accommodate the different issues regarding land ownership in Nigeria.

Recommendation V: To eliminate the problem of multiplicity of taxes, MMSD should collaborate with State and local governments through MIREMCO to agree on specific environmental levies to collect. MMSD should also encourage the Federal Government to withhold derivation payments to any solid mineral producing state that refuses to cooperate in removing this scourge of multiplicity of taxes.

Recommendation VI: Government should formalize illegal miners. This can be done through inviting them to register voluntarily and support them with some incentives.

9.4 Child Labour/Limiting Gender-Based Violence and Enhancing Women Participation in Mining in Nigeria

In many parts of Nigeria, cultural, religious and gender-based restrictions prevent women from participating in mining activities. In addition, women are financially handicapped. It was observed that the inability to access loans and grants to meet the capital intensiveness of mining poses a capital constraint to them. Also, child labor has become a menace in the sector resulting in a lot of out-of-school children in Nigeria. Currently the Mining Act does not specify the age limit for mining in Nigeria. Therefore, to curb the menace there is need to capture the problem of child labour in mining legislation.

Recommendation I: As part of amending the Mineral and Mining Act 2007 and improving the mining regulation, government should incorporate age limit regarding employment in the mining sector. The Mining Act should expressly state the age considered illegal for mining employment or adopt in explicit term the stand of the Nigerian Labor Act, CAP L1 LFN, 2004.
Also, as an immediate measure, government should institute a policy to stop the operation of a mine site where children work as labourers.

Recommendation 2: MinDiver Project should provide women miners with enabling capacity training, skills and information that will help for sustainable competitive mining, and for

accessing fund from government or partnership fund owners. MMSD should use the platform of the current Solid Mineral Development Fund (SMDF) to prioritize financial grant to women in mining. In addition, the MMSD should, in collaboration with relevant ministries and NGOs, mount a sensitization program at mine sites to discourage discrimination against women.

Recommendation 3: MinDiver will incorporate in the TOR of the specific instruments such as ESIA/ESMP the need to carryout mapping of GBV response facilities and services providers in any sub-project/investment location. This will be for the purpose of preparing a GBV action plan for specific investments. The action plan will also include measures that will discourage GBV/SEA occurrences and how victims could be rehabilitated. The GBV management plan and GBV code of conduct will be mainstreamed in any contract for implementation under MinDiver and MMSD in general.

9.5 Enhancing the Knowledge of Legal and Regulatory Requirements of Operators in the Industry

Currently most artisanal miners and communities lack knowledge of policy and legal framework regarding mining in Nigeria.

Recommendation I: The MMSD should develop and implement a sensitization plan to effectively sensitize the different stakeholders in the sector on the mining act and the regulations especially on the environmental requirements. Miners and mining communities should be sensitized on community development agreement in order to ensure that the community is well protected.

Recommendation 2: There should be adequate training for ASM and local communities on the impact of ASM on the miners, the environment and social lives of the community. MMSD should collaborate with National Orientation Agency to mount a sensitization program round the mining sites and mining communities in Nigeria.

9.6 Reducing the Effect of Mining on the Environment

Mining activities in Nigeria which makes use of open pits has been a major cause of environmental degradation in the States. A study of mine sites was carried out as part of this SESA in order to ascertain the possible extent of pollution of the immediate environment in the selected states of the country where solid minerals are mined, hence providing a scientific evidence of any potential adverse effect of mining activities in the various States. Essentially, the study provided information not only on the potential pollution status of the biophysical environment due to mining activities but also potential health exposure risks.

Finding from the analysis of samples collected across 13 states and Abuja showed that virtually in all the states where mining is taking place, the surface water and mine pit water is polluted by mainly lead, chromium, nickel and cadmium. Exposure risks to the heavy metals are significant in the surface and pit water. Discharge of mine wastewater and run off into surface water bodies are most likely to be responsible for the contamination of the surface water.

Pollution of soil and sediments are not significant except in some states like Ebonyi State, Cross River State, Plateau State, Bauchi State, and Gombe State where lead and chromium contamination based on contamination factor (CF) values is significant. These evidences show that the regulation regarding the dumping of tailings is not adhered to.

Noise levels in most sites visited were low because at the time of study mining activities were not going on. For mining sites close to granite production facility, noise levels were approaching regulatory limits. Results of air quality measurements indicate that there are no concerns of deteriorating air quality arising from air pollutants such as CO, NO_2 and SO_2. It will not be possible to categorically state that there are no concerns with particulate matter as its dispersal is a function of moisture availability hence during rainy season, particulate matter will tend to be low but high during dry season. Results of particulate matter measurements were low but could change significantly during dry season.

Recommendation I: The MMSD through the MEC department should ensure that mine waste water from licensed and ASM operators is treated before discharge into the surface water at mining sites in line with the EIA regulation.Although, this solution may not provide complete panacea to the effect of water pollution and environment, due to the largely unregulated nature of the sector. However, it will be a good starting point and will go a long way in pollution abatement in the short and medium term.

Recommendation II: As part of compliance, MMSD through MEC department should ensure mining facilities and ASM should provide alternative source of water to discourage the use of run off mines for domestic purposes to prevent exposure to heavy metals contamination (Lead, Mercury and chromium) as witnessed in Ebonyi, Edo, and Plateau. Contaminated soils should undergo remediation to reduce or eliminate the contamination levels of these heavy metals.

Recommendation 111: It is strongly recommended that further in-depth study on cumulative impact of ASM on the environment and the community be investigated during preparation of any mining investment site specific instrument such as ESIA/ESMP.

9.7 Reducing the Effect of Mining Reforms on Livelihoods of Artisanal Miners

As noted earlier, most of the operations in Nigeria are artisanal and consist of subsistence activities. These miners struggle to survive from day to day and are forced to focus more on immediate concerns than the long-term consequences of their activities. Therefore, to ensure that they have a stable livelihood that can enable them to reduce their mining activities and pay more attention carrying out mining activities in a sustainable maner, there is need to provide alternative livelihood options for them.

Recommendation I: The MMSD in collaboration with the Central Bank of Nigeria (CBN) and Bank of Industry (BOI) should build the capacity of artisanal miners in different trade areas and provide them with credit facilities to enable them venture into different livelihood options and thus move away from the mining sector, and for those still in the mining sector, carry out mining activities in a sustainable manner.

9.8 Implementation Plan

The implementation plan for the recommendation is presented in Table 9.1 below. It comprises of concrete policy, institutional and governance recommendations (short-term, mid-term and long-term), action required, responsible parties, time frame, targeted outcome, budget and indicators.

.

Table 9.1: Implementation Plan indicating the policy issues, action required, responsibilities, outcome targets and indicators

Key Policy Issue		Action Required	Responsible parties	Time fram	Outcome target	Estimated budget	Indicators	Applicability
		Strengthening Legal and Regulatory Regime and Environmental Governance						
Provide role for state governments in the legal framework to facilitate environmental compliance and community participation through strengthening of MIREMCO		Revise the regulation to include roles for the state; • Strengthen MIREMCO to involve state and miners in its constitution • States should play a role in monitoring environmental and social compliance; • States should be involved in community development agreements	MEC MMSD	S-M	Regulations revised with specific roles assigned to State governments regarding mining	US$100,000	Revised regulation	Licensed and ASM
Incorporate social and health concerns in EIA practice and standardize EIA registration fees and associated cost		Revise the EIA procedural guideline to incorporate the coverage of social and health concerns in EIA: • Ministry of Women and social development and Ministry of health and/or department of health in the LGA should be given a role in EIA preparation process and monitoring • The EIA process, fees and cost should be standardized to categorize access fee and other related cost on the bases of grade of mining operators	MMSD, Ministry of Environment	M	Updated EIA procedural guideline, standardized fee chart for carrying out EIA	-	Updated EIA procedural guideline and fee chart for different categories of EIA for consultants use	Licensed and ASM
Establish or spread MIREMCO in all the mining states and strengthen its		• Propose inclusion of representative of miners in the constitution of MIREMCO,	MMSD; Miners	M	Amended Mining Act	US$200,000	Amended Mining Act	Licensed and ASM

governance and operations		• Give a time line for compliance action and implementation of Environmental Protection and Rehabilitation Fund by miners, • Provide for monitoring and compliance with Environment Protection Fund etc						
Strengthen MEC Department		Increase the staff of MEC department across states, procure vehicles for surveillance and monitoring for MEC officers	MinDiver; MMSD	S	Number of new staff with different capacities employed, number of vehicles procured	US$3,500,000	Number of new staff with different capacities employed, number of vehicles procured	MMSD
Capacity building for MEC and FMEnv monitoring department		Train and sensitize them on coordination roles, synergies and application of the WB safeguard instruments	MinDiver; MMSD	S	Improved enforcement and monitoring collaborations	US$10,000	Number of trained management and Technical staff of MEC and FMEnv	MMSD
Rehabilitate all high risk abandoned mine sites		Develop an action plan, revoke license of non-complying firms and cooperatives; Design/develop action plan for the rehabilitation of high risk abandoned mine sites	MMSD	L	Number of abandoned mine sites recovered, number of license revoked for non-compliance	US$500,000	Number of abandoned mine sites recovered, number of license revoked for non-compliance	ASM, Licensed

	Removing Bottlenecks Regarding the Operation of Licensed and Artisanal Miners							
Geological survey of mineral deposits in Nigeria		Conduct geological survey of mineral deposits and mines reserves in Nigeria and produce large scale and high resolution maps(1:1000)	MinDiver/MMSD	M	Large scale maps (1:1000) of mineral deposits and mine reserves in Nigeria	US$2,000,000	Large scale maps (1:1000) of mineral deposits and mine reserves in Nigeria	Licensed, LSM, ASM
Strengthen the coordination program on the mobilization and formalization of local and illegal miners to form cooperatives		Strengthen ASM efforts through funding logistics and sensitization of local miners to form cooperatives	MinDiver/MMSD; State Ministries of Commerce	S	Number of registered multipurpose cooperative society for mining; Record of monthly progress monitoring report on number of registered cooperatives	US$500,000	Number of registered multipurpose cooperative society for mining	ASM
Improve Credit access to ASM operators		Institution of a credit product target at ASM operators by setting aside a unit within ASM to coordinate credit process between miners and financiers	ASM/MinDiver; Central Bank of Nigeria, BOI	L	Number of miners with access to the credit product	US$200,000	Number of miners with access to the credit product	ASM, Licensed and LSM
Eliminate multiplicity of taxes		Agree on specific royalty and surface rent to pay to state/local councils and withhold derivation payments to erring states/local councils	MMSD, State Governments, Local Governments, MIREMCO	M	Amount of specific environmental fee charged, number of earring states with	US$100,000	Amount of specific environmental fee charged, number of earring states with derivation payments withheld	ASM, Licensed

					derivation payments withheld.			
	Limiting Gender Based Violence and Enhancing Women Participation in Mining in Nigeria							
Sensitization of miners and communities against women discrimination		Conduct sensitization programs, through the radio, at mine sites, at community gatherings to discourage gender discrimination. Institute a credit instrument targeted at women miners	MMSD, CBN. Federal Ministry of Finance	S-M	Number of sensitization programs conducted, amount set aside as start-up capital for the credit scheme	US$500,000	Number of sensitization programs conducted, amount set aside as start-up capital for the credit scheme	ASM, Licensed miners
Incorporating Age Limit Regarding Employment in the Mining Sector		Revise the Mineral and Mining Act 2007 to include age limit regarding employment in the mining sector; conduct sensitize programs at mine sites and at community gatherings to discourage employment of minors at mine sites.	MEC MMSD	S – M	Number of sensitization programs conducted, eliminate the presence of underage workers in mine sites	Ditto	Revised Regulation, absence of underage workers in mine sites	ASM, Licensed miners
	Enhancing the Knowledge of Legal and Regulatory Requirements of Operators in the Industry							
Sensitize miners on mining act and regulations		Conduct sensitization programs through circulation of fliers and pamphlets, radio, television, visit to mine sites etc, to sensitize miners on mining act and regulations.	MMSD, National Orientation Agency	S-M	Number of sensitization programs conducted, number of mine sites visited to carry out sensitization	US$500,000	Number of sensitization programs conducted, number of mine sites visited to carry out sensitization	ASM, Licensed, LSM
Sensitize mineral title holders (MTHs) on environmental and		Print and distribute pamphlets and fliers; Organize periodic workshops for the MTHs	MEC/MMSD	S-M	Number of periodic workshops organized	Ditto	Satisfactory record of environmental practices in mining operations	Miners

social obligations					Number of MTHs that have been trained or sensitized			
	Reducing the Effect of Mining on the Environment							
Support MEC department to carry out periodic environmental and social audit of mines and quarries		• Have in the annual work plan procurement of equipment and other logistics that will be needed for effective operation	MMSD	S-M	Evidence of procured equipment for MEC operation;	US$500,000	Improved and Functional MEC operations	MEC
Transform the existing instruments of environmental and social protection (such as EPRP, CDA, Annual Reclamation State, Fuel Storage Plan, Decommissioning Plan) into result oriented instruments		• Organize technical workshops for environmental consultants to improve the quality of environmental protection and rehabilitation plan (EPRP), CDA, FSP and decommissioning plan	MMSD FMEnv	S-M	Workshops organized	US$100,000	improved quality of reports/instruments	Consultants Proponents

Initiate actions to reduce the impact of mining on environment and health Discourage local people and mine workers from drinking and bathing with mine waste water		• Design appropriate waste managent plan for different levels of miners and sensitize them on the application, • Train community volunteers to complement MEC enforcement efforts in environmental compliance of mining sites • Ensure that sinking of borehole in mining community with no good drinking water is incorporated and implemented in the CDA	MinDiver; MMSD (MEC department) and Miners MMSD Miner/investor	S	Measurable improvement in treatment of waste water by miners Number of trained community volunteers Evidence of boreholes in mining communities	US$500,000	Number of miners with appropriate waste managent plan Number of trained community volunteers Number of boreholes in mining communities	ASM, Licensed. LSM
Institutionalization of Safer Mining programme for reduction of negative impact of mining on the environment and ecosystem		Establish pilot mineral and metal processing centers for reduction of negative impact of mining on the environment and ecosystem	MMSD	M-L	Established pilot mineral and metal processing centers	US$2,000,000	Established pilot mineral and metal processing centers	Miners, Communities
Institute grant programme as means of taking ASM from crude methods to adaptation of safer		Credit products targeted at miners	MMSD	S-M	Number of miners or cooperatives that received credit grants	US$10,000,000	Number of miners or cooperatives that received credit grants	ASM

mining								
Establish common facilities as a way to mainstream operators' access to centralized infrastructure and thus entrench best mining and processing methods.		Establish cluster program along each common mineral zone and within each value chain	MMSD	M-L	Established cluster program	-	Number of Established cluster programs	Cooperatives/small scale miners

Key: S= short term (0-1 year), M=medium term (1-3 years); L=long term (more than 3 years)

APPENDICES

Appendix 1: List of Identified Stakeholders

	Federal Level
S/No	**Stakeholders within the Ministry of Mines and Steel Development**
1.	Mines Environmental Compliance Dept.
2.	Mines Inspectorate Dept.
3.	Artisanal & Small Scale Dept.
4.	Mining Cadastral Office and Centre (MCO)
5.	National Steel Raw Material Exploration Agency (NSRMEA)
6.	Planning Research and Statistics (PRS) Dept.
7.	Nigerian Geological Survey Agency (NGSA)
8	Nigerian Institute of Mining and Geosciences (NIMG)
9	National Metallurgical Development Agency (NMDC)
	Stakeholders in other MDAs
1.	Federal Ministry of Environment
2.	Federal Ministry of Health
3.	National Environmental Standards and Regulatory Enforcement Agency (NESREA)
4.	National Metallurgical Development Corporation (NMDC)
5.	Federal Ministry of Water Resources
6.	Federal Ministry of Science and Technology
	State Level
1.	State Ministry of Environment
2.	State Ministry of Land and Survey
3.	Department of Forestry (State)
4.	State Ministry of Health
5.	State Mineral Resources and Environmental Management Committee (MIREMCO)
6.	State Ministry of Solid Mineral Development (where applicable)

7.	Local Government
	National Bodies, Associations and Institutes
1.	Nigerian Institutes of Mining and Geosciences (NIMGS)
2	Nigerian Mining and Geoscience Society (NMGS)
3.	Nigerian Society of Engineers (NSME)
4.	Nigerian Investment Promotion Council (NIPC)
5.	Council of Mining Engineers and Geosciences (COMEG)
6	Nigeria Extractrive Industry Transparency Initiative (NEITI)
	Multilateral Donors, NGOs, CSOs, and CBOs
1.	World Bank
2.	African Development Bank (AfDB)
3.	United Nation Industrial Development Organization (UNIDO)
4.	African Business & Human Right Organization (Global Rights)
5.	Connect Development (CODE)
	Other Group and Associations in Nigeria
1.	Licensed Mining Companies (Qls, SSML, EL, ML)
2.	Registered Corporative (Formalized Artisanal Mining Sites)
3.	Miners Association of Nigeria
4.	Women in Mining
5.	Mines Workers Associations
6.	Traditional Councils
7.	Affected Communities

Appendix 2: Methodology for Socio-Economic Studies

Study Design

The Study Applied Survey Design.

Coverage

The survey covered all the 12 States and FCT, two states per zone. In line with the previous SESA and following the consultation with the Min-Diver PIU during the pre-SESA meeting, the States that were covered are Ebonyi, Enugu, Ogun, Ondo, Edo, Cross River, Plateau, Niger, Kano, Kaduna, Bauchi and Gombe. Households in the mining communities and artisanal miners were covered in the survey.

Sampling and Sample Size

Simple random sampling was employed in the selection of households and miners in each community. A list of households and miners from each community was compiled with the help of community leaders and mining association in the community. Twenty (20) respondents, ten (10) non mining households and ten (10) mining households were selected from each community/mining site. A total of 260 respondents (130 non-mining households and 130 mining households) were selected from 13 mining communities where mining sites for ASM that will be visited are located.

Data Collection

A carefully designed semi-structured interview (SSI) questionnaire was used for primary data collection. The questionnaire was used to collect data relating to the socioeconomic attributes of the respondents, returns from mining and non-mining activities, women participation in mining activities, their perception about the environmental consequences of mining activity in their area, conflicts regarding mining in their communities, their perception of how to deal with the environmental and social problems as a result of mining, among others. Focus group discussion was held in each of the mining communitiesvisited in each of the States, one general and one specifically for women group. Key informants in communities and government were also interviewed.

Field Survey Implementation:

Questionnaire administration and Interview Methods:

The semi-structured questionnaire was administered by means of face-to-face interview. Trained assistants administered the questionnaire.

Pre-Test of Questionnaire:

In order to ensure the reliability of the questionnaire, a pre-test was conducted by taking a random sample of 10 representative respondents in two mining communities in two selected States. The pre-test revealed difficult, ambiguous and redundant questions which the

respondents may not provide required information. The results of the pre-test was utilized to revise the instruments to make them more amenable, efficient and reliable.

Field Interviewers/Enumerators:

Questionnaire administration was done with the help of trained enumerators and supervisors. Training covered discussions on the role of enumerators and supervisors. Techniques for training included reading exercises, demonstration interviews with trainers, demonstration interviews with real respondents, simulation of mock interviews, practice exercise, demonstrations and field practice.

Data Processing:

After data collection by the field enumerators, the supervisors checked and validateed the data in the field by randomly sampling 20 percent of the completed questionnaires. Thereafter, another team in the office went through the questionnaire for quality checks. The data was thereafter keyed into excel and then exported to SPSS and STATA software for analysis. Qualitative data from focus group discussion, key informant interviews and stakeholder consultation were compiled and used for content analysis.

Data Analysis:

The objectives of the study were realized using both descriptive and inferential statistics. Descriptive statistics used include means, frequency, and percentages, cross tabulations, t-test and chi-test. Content analysis was used in analysis qualitative data and was thereafter be used to support the findings from quantitative analysis.

Quality Assurance

It is essential to maintain high quality in questionnaire administration/interviews, data coding and entry, data processing and analysis and reporting. Quality was ensured through close supervision and constant monitoring of field interviews, cross-verification of responses from the field and validation review of outputs of data entry and data analysis.

Appendix 3: Methodology Used for the Study of Physical Parameters and Analysis of the Effect of Mining on Nigeria Environment

We investigated the effects of mining activities on the bio-physical environment of Nigeria. Essentially, the study provided information not only on the potential pollution status of the biophysical environment due to mining activities (that could serve as baseline) but also hitherto exposure risks to humans and in some cases exposure risks to live stocks such as cattle. All the States earlier mentioned were covered. Soil samples were collected using auger borer at a depth of 0-30 cm. Surface sediment samples at 0-10 cm were collected using stainless steel corer. Water samples were collected using 1 litre polyethylene cans.

Soil and sediment Sample Analysis

The soil and sediment samples were exposed to open air to dry and thereafter passed through a 2 mm mesh sieve to get rid of plant debris, stones, and coarse materials. The sieved soil and sediment samples were ground to powder using pestle and mortar and passed through a 3 mm

mesh sieve to collect fine sediment or soil samples required for analysis. The US EPA (2007) prescribed method was adopted in acid digestion of the sediment samples. Succinctly, this method consists using 65% HNO_3/ 37% HCl at a ratio of 3:1 v/v to digest the sediment samples in a Teflon vessel held in a microwave oven using the appropriate sediment/acid mix ratio. In this study, 15 mL of acid mix was used in digesting 0.3 g of sediment sample. The microwave digester (Milestone s.r.l, Italy) was operated in three sequences at 120, 150 and 200 ^{o}C for 5, 10 and 15 mins respectively. After microwave digestion, de-ionized water was added and the solution filtered using 0.45 µm filter membrane. Additional water was added to make up the volume to 50 mL and stored in the refrigerator below 4 ^{0}C until required for analysis. The heavy metals (Cu, Zn, Fe, Ni, Cr, Pb, Cd) were analyzed using SensAA GBC Flame Atomic absorption spectrometer.

Water Sample Analysis

The surface and groundwater samples collected were transferred to two separate sterilized 1 L sample bottles for physico-chemical and heavy metal analysis. For the heavy metals, it was ensured that the 1 L sample bottles were previously cleaned with nitric acid (HNO_3). The collected water samples were then acidified by means of 5 mL of 6M HNO_3 prior to laboratory analysis. Heavy metals such as Fe, Pb, Cu, Cr, Ni, Zn and Cd were determined using Atomic absorption spectrometry as prescribed by the standard method of APHA (1998). The physico-chemical parameters namely: Cl, SO_4, NO_3, pH, conductivity, total suspended solids (TSS) and total dissolved solids (TDS) were measured following the standard method of APHA (1998). For the heavy metals, the quality assurance include: determination of limit of detection (LOD), limit of quantification (LOQ) and recoveries. The LOD was determined as three times the standard deviation of 10 replicate blank measurements (Pekey et al., 2004). The LOQ was determined as three times the LOD value. The LOD varied from 0.0002-0.0005 mg/L; LOQ varied from 0.0005 – 0.0015 mg/L; recoveries varied from 82-93%.

Pollution Assessment and ecological risks due to heavy metals in soil and sediments

This study assessed pollution of the soils and sediments by heavy metals arising from mining activities using contamination factor, degree of contamination, geochemical accumulation index, pollution load index and potential ecological risk index. Contamination factor (CF) is a very useful tool in identifying the contamination level of soils and sediments by the individual heavy metals. Because the degree of contamination (CD) considers all the measured heavy metals, it is useful in estimating the cumulative level of contamination. The geochemical accumulation index (I_{geo}) provides a measure of the extent of the heavy metal contamination compared to background levels. It therefore provides evidence for anthropogenic releases of the heavy metals in the soils and sediments. Pollution load index (PLI) is a good tool used in estimating the extent of pollution of the soils and sediments. Hence, CF, CD, I_{geo} and PLI were used in the assessment of pollution of sediments and soils by heavy metals. The potential ecological risk index (PERI) estimates risks posed to biota inhabiting the sediments from the heavy metal pollution of the sediments. PERI was therefore evaluated and employed in assessing potential risks to the biota living in the contaminated sediments and soil.

Contamination Factor

Contamination factor (CF) is a very useful tool used in identifying the contamination level of sediments by heavy metals (Hakanson, 1980).

$CF = C_{sediment}/C_{background}$ ----------Eq. 1

Where: $C_{sediment}$ =heavy metal mean concentration in the sediment; $C_{background}$ = heavy metal concentration in the background

The background values used in this study are those reported by Hakanson (1980).

Degree of Contamination

The degree of contamination (DC) is estimated by adding the CF for all the heavy metals in the sample as described in equation 2.

$DC = CF_1 + CF_2 + CF_3 + \ldots\ldots\ldots\ldots\ldots CF_n$ ----------Eq. 2

Geochemical-accumulation index (I_{geo})

The geo-accumulation index (I_{geo}) is computed as follows:

$I_{geo} = \log_2 (C_n/1.5B_n)$ ----------Eq. 3

Where: C_n = concentration of heavy metals in the sediment; B_n = geochemical background value 1.5 is the matrix correction factor for minimizing lithogenic effects (Yi et al., 2016).

Pollution Load Index (PLI)

Pollution load index (PLI) is a veritable tool used in measuring the extent of pollution of the sediments and is expressed as (Tomlinson et al., 1980):

$PLI = (CF_1 * CF_2 * CF_3 * \ldots\ldots\ldots\ldots CF_n)^{1/n}$ ----------Eq. 4

Where: CF = contamination factor; n = number of heavy metals in the sediment sample

Potential Ecological Risk Index (PERI)

The potential ecological risk index PERI of the heavy metals in the sediments was derived from summing the potential ecological risk factor (PERF) of the individual heavy metals.

$PERF = CF * TRC$ ----------Eq. 5

Where: CF = contamination factor

TRC = toxic response coefficient for a given heavy metal. This study adopted the TRC reported in Hakanson (1980). TRC is actually an indication of a heavy metal's toxicity and ecological sensitivity, hence the higher the coefficient the more toxic and ecological sensitivity (Guo et al., 2010).

$PERI = PERF_1 + PARF_2 + PERF_3 + \ldots\ldots\ldots PERF_n$----------Eq. 6

Water Quality Assessment Using Water Quality Index

Water quality index was employed in the assessment of the water quality of the impacted water bodies so as to ascertain how the quality of such water bodies has been affected by the mining activities. This is extremely important considering the fact that the host communities use the water bodies for purposes of cooking and drinking.

The following steps were taken in evaluating the water quality index of the impacted water bodies and groundwater (Sahu and Sikdar 2008):

I. Weight (w_i) assignment based on the health effects of the parameters .

Assigned weight is between 1 and 5. The parameters that are of major importance are assigned highest weight whereas those that are of minor importance are assigned low weight. Hence,

cadmium, lead, nitrate and fluoride are assigned a weight of 5 each whereas copper and iron are assigned 2 and 3 respectively. See Table 1 for detailed weights as assigned.

II. Relative weight (W_i)

The relative weight ($W_{i)}$) is computed as follows:

$W_i = w_i/\Sigma w_i$ ……..Eq. 7

Where: w_i is the arbitrarily assigned weight based on the above described criterion.

III. Assignment of quality rating scale

$q_i = (C_I/S_i)*100$ ……..Eq. 8

q_i = quality rating scale; C_I = concentration in groundwater sample of the parameters

S_i = Standard organization of Nigeria (SON) standard for each chemical parameter.

IV. Computation of Water quality sub-index (SI)

The water quality sub-index is computed as follows:

$SI = W_i * q_i$ ……Eq. 9

V. Determination of water quality index (WQI)

$WQI = \Sigma SI$ ……Eq. 10

The weight and the relative weight of the parameters used in determining the WQI is as presented in Table 5.

Table 3.1: Weight and relative weight for determining WQI

Parameters	SON Standard	w_i	W_i
pH	6.5-8.5 (7.5)[a]	4	0.071
TDS mg/L	500	4	0.071
Cl mg/L	250	3	0.054
SO_4 mg/L	100	3	0.054
NO_3 mg/L	50	5	0.089
NO_2	0.2	5	0.089
Fe mg/L	0.3	4	0.071
Zn mg/L	3	1	0.018
Cr mg/L	0.05	5	0.089
Ni mg/L	0.02	5	0.089
Pb mg/L	0.01	5	0.089
Cu mg/L	1	2	0.036
Cd mg/L	0.003	5	0.089
EC µS/cm	1000	5	0.089
		Σ=56	Σ=1

[a] = mean value

The w_i values are adapted from Sahu and Sikdar (2008).

Water quality ranking using WQI is based on the following scheme: < 50 implies excellent water; 50-100 implies good water; 100-200 implies poor water; 200-300 implies very poor water; >300 implies water unsuitable for drinking (Sahu and Sikdar, 2008).

Assessment of human exposure to heavy metals in soils and sediments

The potential risk of exposure by humans to the heavy metals was evaluated looking at non-carcinogenic and carcinogenic risks.

Non-carcinogenic risks of exposure to heavy metals as a result of inadvertent ingestion of soils and sediments and dermal contact

Hazard quotient (HQ) and hazard index (HI) were used in estimating the non-carcinogenic risks of exposure to heavy metals in the sediments according to Equations 9 and 10.

$HQ = D/RfD$ ----------Eq. 11

$HI = HQ_1 + HQ_2 + \ldots\ldots HQ_n$……Eq. 12

Where:

D = exposure dose; RfD = reference dose for the heavy metals; HQ_1 to HQ_n are the hazard quotients for each of the heavy metals.

The equations for computing the chronic exposure dose of the sediments and soils via entry routes such as inadvertent oral ingestion and dermal contacts are:

$Di = C \times Ri \times EF \times ED \times CF/ BW \times AT$ ……Eq 13

$Dd = C \times SL \times SA \times ABS \times EF \times ED \times CF/ BW \times AT$…….Eq 14

Where:

Di is daily dosage by ingestion

C is average concentration (mg/Kg) of each of the metals

Ri is ingestion rate (200 mg/day for children and 100 mg/day for adults) (USEPA, 2001)

EF is exposure frequency (250 days/year) (Ferreira-Baptisa and De Miguel, 2005)

ED is exposure duration (6 years for children and 25 years for adult) (USEPA, 2001)

SA is exposed skin area (2800 cm^2 for children and 3300 cm^2) (US EPA, 2001)

SL is skin adherence factor (0.2 $mg/cm^2/h$ for both adult and children) (US EPA, 2011)

ABS is dermal absorption factor (0.001)

CF is correction factor = 10^{-6}

Carcinogenic Risks

Carcinogenic risks were estimated using Eq 15-17 given as:

$ELCR = CP \times Di$ ……Eq 15

$ELCR = CP \times Dd$ …… ..Eq 16

$RI = \Sigma ELCR$ ……..Eq 17

Where:

CP is cancer potency risk (slope factor). The cancer potency risk values of 15, 0.42, 0.0085 and 0.91 for cadmium, chromium, lead and nickel were adopted from Toxic Air Contaminant document, Office of Environmental Health Hazard

ELCR is excess life cancer risk computed for each heavy metal

RI = risk index as the sum of the excess life cancer risk for all the heavy metals

Assessment of human exposure to heavy metals in surface and groundwater

The exposure risks to heavy metals in surface water and groundwater were quantified using hazard quotient (HQ) and hazard index (HI) as defined in equations 11 and 12.

D = exposure dose and is calculated as given in equations 7 and 8.

$Di = (C \times IR \times EF \times ED)/(BW \times AT)$ ……...Eq. 18

$Dd = (C \times SA \times Kp \times ET \times EF \times ED \times CF)/(BW \times AT)$ …….....Eq. 19

Definitions of terms and values in Eq. 15 and 16 are as reported in Ugochukwu and Ochonogor (2018).

The dermal permeability coefficient of the heavy metals and their reference dose is as presented in Table 6.

Table 3.2: Dermal permeability coefficient of the heavy metals as adapted from (De Miguel et al. 2007; Naveedullah et al. 2014; US EPA, 2005; Wu et al. 2009).

Heavy metal	**Dermal permeability coefficient (cm/h)**	**Reference Dose (RfD) (mg/Kg-d)**	
		RfDi	RfDd
Pb	0.004	0.0035	0.00052
Cu	0.001	0.04	0.012
Ni	0.001	0.02	
Cr	0.002	0.003	0.00006
Fe	0.001	0.3	0.045
Zn	0.0006	0.3	0.06
Cd	0.001	0.0005	0.000005

The carcinogenic and non-carcinogenic health risks as a result of human exposure to the heavy metals are as described in equations 11, 12 and 15-17.

Appendix 4: Interview Schedule for Household Heads for Mindiver SESA

. This study will help to find out your opinion about the socioeconomic environmental and health effects of mining activities in your area and your opinion on how the negatives effects can be reduced and the positive effects enhanced. All information to be supplied will be treated with absolute confidence and be used for the purpose of the study only.
We look forward to receiving your unalloyed support and assistance.

Section A: Background Information

Name of Enumerator: ……..

Name of Supervisor: …….

State: ……

LGA ……

Name Mining Site…….……

Category of Mining Site (ASM or licensed) ……

Name of Community ……..

GPS – Longitude ---------- Latitude ----------

SECTION B: Personal and Household Information

Personal Information

1. Person Responding to the Interview: ☐ Household Head ☐ Representative of the Household Head
2. Sex of household head: Male: ☐ Female: ☐
3. Age of household head:……..

4. Level of education: None……..Primary…… Secondary …….Teacher training/Technical ……. Higher education……
5. Number of years spent in school: ----------
6. Qualification obtained:
   i) First School Leaving Certificate ---------- (ii) WASC/GCE ---------- (iii) TCII/OND --------
   (iv) Degree/HND ---------- (v) MSC/PHD ----------(vi) None ---

7. Primary Occupation (single response) (1) Farming ---------- (2) Trading ---------- (3) Mining ----------(4) Civil service ---------- (5) Teaching ---------- (6) Lecturing ---------- (7) Artisan ---------- (8) Business other than trading ---------- (9) Lawyer ---------- (10) Medical Doctor ---------- (11) Other Professionals ---------- (12) Student ---------- (13) House wife ---------- (14) Applicant ---------- (15) Unemployed ---------- (16) others ----------

8. Please what is your monthly income (in naira, over the last 12 months) from your Primary occupation? ----------
9. Do you have other sources of income? Yes ---------- No ----------
10. If yes how much in total have you earned from your other sources of income in the last one month ----------
10. What is your Religion? (i) None ---------- (ii) Christian ---------- (iii) Islam----------
   (iv) African Traditional Religion ---------- Other, (v) Specify ----------
11. What is your marital status? (i) Married monogamous ---------- (ii) Married polygamous ---------- (iii) Never married ---------- (iv) Separated ---------- (v) Widowed ---------- (vi) ---------- (vii) Divorced ---------- (viii) Informal/loose union ----------

12. Do you know how to read and write in English? (i) Yes, read and write ---------- (ii) Yes, read only ---------- (iii) No ----------

13. Do you know how to read and write in your native language? (i) Yes, read and write ---------- (ii) Yes, read only ---------- (iii) No ----------
14. Do you own a mobile phone? Yes ---------- No ----------
15. Do you use the internet? Yes ----------No ---------- ---------
16. Do you have access to at least a plot of land that you can use anytime you need it? Yes ---------- No ---------- ---------
17. Do you own at least a plot of land? Yes ---------- No ---------- -----
18. Do you belong to any social group? Yes ---------- No ---------- -----
19. If yes what is the name? ----------

Household Information

A household consists of a person or group of people, irrespective of whether they are related or not, who usually sleep in the same dwelling and share their meals. Household members include

only those people who currently live in the household. All persons that have left the household for more than six months are not considered to be household members except for the head of household and students/seasonal workers).

20. How many people live in your household including yourself? ----------
21. What is your status in the house in which you live? (i) Member of my family owns the house ---------- (ii) My spouse family owns the house ---------- (iii) Owner ---------- (iv) Tenant ---------- (v) Borrower ---------- (vi) Employee ---------- (vii) Other, specify ----------

22. Does your household have access to light/electricity? (i) Yes, public ---------- (ii) Yes, private (in/around your accommodation) ---------- (ii) Yes, public and private ---------- (iv) No----------
23. Does your household have access to Piped water? (i) Yes, public ---------- (ii) Yes, private (in/around your accommodation) ---------- (ii) Yes, public and private ---------- (iv) No----------
24. Does your household have access to other water sources? (i) Yes, public ---------- (ii) Yes, private (in/around your accommodation) ---------- (iii) Yes, public and private ---------- (iv) Yes (stream) ---------- (v) Yes (rain water ---------- (vi) No ----------
25. Does your household have access to sanitation? (i) Yes, public ---------- (ii) Yes, private (in/around your accommodation) ---------- (ii) Yes, public and private ---------- (iv) No----------
26. Does the household own any of the following and number owned?

S/N0	Item	Yes	No	Quantity/Number
1	Refrigerator			
2	Freezer			
3	Gas cooker			
4	Microwave oven			
5	Hot plate/electric cooker			
6	Mobile phone			
7	Computer			
8	Generator			
9	Motor car			
10	Motor bike			
11	Television			
12	Mattress/bed			
13	Radio			
14	Sewing machine			
15	Modern stove			
16	Bicycle			
17	Electric iron			
18	Fan			
19	Sofa			
20	Land (in plots)			
21	Landed property (building)			

26. List other items that your household own? ----------
---

27. How much does your household spend (household expenses) on average in naira per month on each of the following (leave blank if nothing is spent on an item)?

S/No	Item	Amount
1	Clothing	
2	Electricity	
3	Fuel (car, motor bike, generator)	
4	Public transport	
5	Medicine and medical expenses	
6	School fees	
7	Communication (phone, internet etc)	
8	Rent	
9	Cooking fuel	
10	Repairs (household and personal; items e.g watch)	
11	Recreational activities (e.g. cinema)	
12	Personal care items (razor, pomade etc)	
13	Entertainment of guests	
14	Other, specify	

28. Has your household experienced food shortages over the last one year? Yes ------ No ---------
29. What was the main reason for the food shortage? (**Mention only one reason**) (i) We did not have enough money to buy food ---------- (ii) There was flood/draught in our area that destroyed our food items ---------- (iii) There was crop failure ---------- (iv) There was conflict in our community that prevented us from going out to get food items ---------- (v) Other (specify) ----------
---
30. Have you taken any type of insurance? Yes ---------- No ----------
31. Do you set aside money in case of any harm in your household? Yes ---------- No ----------
-
32. If yes to question 31, what is the amount you set aside for this every month? ----------
---
33. Have you borrowed any money (loan) in the last one year? Yes ---------- No ----------
(Enumerator, if the answer is No go to question 41)

34. If yes, how much did you borrow (Total amount borrowed)? ----------
35. Which establishment/ institution/person did you borrow from (indicate the amount from each source if from more than one source)?

(i) Relatives Yes ---------- No ---------- Amount in naira ----------
(ii) Friends/neighbours Yes ---------- No ---------- Amount in naira ----------
(iii)Esusu/cooperative group Yes ---------- No ---------- Amount in naira ------
(iv)Microfinance bank Yes ---------- No ---------- Amount in naira ----------
(v) Commercial banks Yes ---------- No ---------- Amount in naira ----------

(vi) Employer Yes ---------- No ---------- Amount in naira ----------

(vii) Money lenders Yes ---------- No ---------- Amount in naira ------

(viii) Others (specify) ---------- Yes ---------- No----------

Amount in naira ----------

36. State the main reason for the loan ----------

37. Have you repaid the loan/s? Yes ---------- No ----------

38. If you have not repaid the loan, how much is outstanding? ----------

39. Are there any bottlenecks in getting a loan? Yes ---------- No ---------- Don't know ----------

40. What is the main bottleneck? (i) Too much paper work ---------- (ii) Collateral requirements ---------- (iii) Lack of guarantors ---------- (iv) Indirect/hidden costs of loan ---------- (v) Too high interest rate ---------- (vi) Distance to the loan sources ---------- (vii) Other (please specify) ----------

41. Do you save money? (i) Yes ---------- (ii) No, I don't have enough money ---------- (iii) No, I don't want to save money ---------- (iv) No, I am repaying loan ----------

42. Are you saving for specific purposes? Yes ---------- No ----------

43. Please select the purpose of your savings (i) To buy property --------- (ii) For old age --------- (iii) Children education ---------- (iv) As a buffer for hard times ---------- (vi) For purchase of mining equipment ---------- (v) Family support ---------- (vi) Repayment of loan ------- (vii) Other (please specify) ----------

44. Are any of your household members including yourself involved in mining activities? Yes ---------- No ---------- **(if yes, ask questions in Section C and D)**

45. If yes, how many of your household members are involved in mining activities? ----------

46. Which of the following shocks/risks have your household experienced in the community in the last one year?

S/No	Shocks/risks	Yes	No
1	Food shortage		
2	Low price of products (farm products or products from mining)		
3	Member of household sick		
4	Involved in conflict		
5	Injury to a household member		
6	Mine related health problems to a household member		
7	Eviction threat		
8	Legal problem		
9	Theft		
10	Fire incident		
11	Failure to recover money lent to others		
12	Loan repayment problem		
13	Flood or draught		
14	Terrorism attack		
15	Crop failure		

SECTION C: Information on Mining Activities (For only respondents that are involved in mining activities)

1. What is your major reason for involving in mining activity (**only one response**)?
(i) My main source of income ---------- (ii) as a source of supplementary income ---------- (iii) Because it is my people's occupation ---------- (iv) Because there is mineral deposit on my land ---------- (v) Other, specify ----------
2. List the mining activities you are involved in (for example, digging of minerals, prospecting, processing, and marketing)? ----------
3. How long (in years) have you been involved in mining? ----------
4. Which minerals do you mine ----------
5. Do you have a mining license? Yes ---------- No ----------
6. Do you pay any type of levy or rent to government? Yes ---------- No ----------
7. Which level of government do you pay? Federal ---------- (ii) State ---------- (iii) LGA ---------- (iv) all of the above ---------- (v) Only Federal and State governments ---------- (vi) Only State and LGA ---------- (vii) Only Federal and LGA ----------
8. If yes what is it called? ----------
9. If you pay levy or rent, how often do you pay? (i) Monthly ---------- (ii) Annually ----------
(iii) Irregular ----------
10. How much do you pay each time? ----------
11. Who owns the land/site where you mine? (i) It belongs to me ---------- (ii) my community ------(iii) government ---------- (iv) Cooperative society or a group ---------- (v) other, please specify ----------
12. If you **do not own** the land, do you pay rent? (i) Yes, any day I mine ----------(ii) Yes, monthly ---------- (iii) Yes, annually ---------- (iv) No ----------
13. If you **own** the land/site you mine, how did you acquire it? (i) bought the land ---------- (ii) Inheritance ---------- (iii) lease from government ---------- (iv) Lease for a cooperative society ---------- (v) Lease from the community ---------- (vi) Lease from an individual ---------- (vii) other, specify ----------
14. Do you have some mining equipment? Yes ---------- No ----------
15. If you have, list the equipment that you have ----------
16. How much is your monthly earning/income from mining ----------
17. If you consider all your expenses in mining activities, what is the average total amount you spend on mining per month? ----------

18. Do you protect yourself during mining operation? Yes---------- No----------
19. Which of the following protective materials do you have? (i) First aid kits ---------- (ii) protective clothing ---------- (iii) Helmets---------- (iv) Gloves ----------
(v) Hearing protection ---------- (vi) Dust muffles ---------- (vii) Eye goggles ---------- (vii) others, specify ----------
20. What is the level of involvement of women in mining activity in your community? High ----------
(ii) Moderate ---------- (iii) Low ---------- (iv) Not involved ----------
22. Are women discriminated against in mining activities in your community? Yes ---------- No ----------

SECTION D: Information on Mining Environmental Compliance and Regulations (For only respondents that are involved in mining activities)

1. Do you know about mining laws and regulations/standards in Nigeria? Yes---------- No----------
2. List the mining laws and regulations you know? ----------

---
3. Do you comply with the laws and standards in mining? Yes ---------- No----------

4. Please rate the following challenges to compliance to mining standards in your area

S/No	Challenges to compliance	High	Medium	Low	Not at all
1	Lack of expertise in the mining sector				
2	Lack of knowledge of laws, regulations and their requirements				
3	Charges and fees for environmental registration/compliance				
4	Bottlenecks in approval and compliance process				
5	Lack of nearby health facilities or first aid facilities				
6	Lack of emergency response by the government from the mining sites				
7	Lack of good road network in the mining sites				
8	Threat of contaminants and diseases				
9	Human conflicts				
10	Lack of occupational health and safety equipment				

11	Lack of knowledge of mining standards and regulation				
12	High cost of prospecting and mining ventures				
13	Inadequate communications network				
14	Corruption in licensing and renewal of mining rights				
15	Inadequate water in mining sites				
16	Untrained mining workers				

5. Please kindly state:

a) The regulations and environmental requirements you considered high and difficult to comply with ----------

b) What are your reasons? ----------

c) Charges and fees you would want government to amend ----------

d) Areas of bottlenecks in approvals and/or compliance processes that are stifling ----------

6. Please rate the following challenges you face as regards artisanal mining in your area

S/No	Challenges	High	Medium	Low	Not at all
	Environmental and social				
1	Stagnant water in abandoned quarries and mine pits				
2	Lack of land ownership for women in the area				
3	Lack of food and water				
4	Long distance of mining sites in the wilderness				
5	Conflicts as a result of land ownership of mining sites				
6	Conflicts as a result of				

	changes in mining rights				
7	Poor or lack of shelter in mining sites				
8	Wildlife menace				
9	Menace of armed bandits, kidnappers and terrorists in the areas				
10	Mineral theft				
11	Low quantity of sand in dry season				
12	Blockage of mine sites by water during rainy season which disrupts mining activities				
	Financial				
13	Inaccessibility to credit facilities				
14	Low income levels				
16	Low wages in the artisanal mining sector				
17	High cost of transport to the mining sites				
18	Lack of capital to purchase mining equipment				
19	Lack of organized market for minerals				
	Infrastructure/Equipment				
20	Inadequate mining equipment and machinery				
21	Poor communication network				
22	Inaccessible mining sites				
23	Lack of equipment and facilities for value addition				
	Institutional				
24	Child labour and violation of labour rights				
25	Inadequate training and sensitization on the mining regulations and policies				
26	Insecurity at the mining sites				

27	Lack of knowledge on basic mining and geological skills				
28	Lack of skills and knowledge on value addition				
29	Illegal collection of levies by government officials				
30	Corruption in the issuing of mining permits, and licences and mineral titles				
31	Low levels of enforcement of regulations and policies				
32	Lack of land compensation and resettlement				
33	Multiple taxation by government				
34	Poor enforcement of mining regulations				
34b	Intimidation of workers by state government officials				
	Health and Safety				
35	Disease outbreak such as malaria, diarrhoea and bilharzias in mining sites				
36	Sexual harassment of women in mining sites				
37	Use of explosives that affect hearing and cause collapse of mining sites				
38	Lack of protective equipment				
39	Lack of precautionary signage at mining sites				
40	Spread of HIV/AIDS at mining communities due to influx of people and prostitution				
41	Mineral contamination of food and body such as lead and mercury				

19. Which of these strategies do you think if applied can help in overcoming the challenges faced as a result of mining in your community

(i) Provision of good access roads to mining sites Yes ---------- ---- No ----------

(ii) Provision of mining equipment for example excavators and pale loaders Yes---------- No ----------

(iii) Provision of first aid facilities Yes ---------- No ----------

(iv) Improved access to loan/credit facilities Yes ---------- No ----------

(v) Sensitization and enlightenment of miners on the negative effects of mining Yes ---------- No ----------

(vi) Training of mine workers on best mining practices Yes ---------- No ----------

(vii) Provision of security at mine sites Yes---------- No ----------

(viii) Government should curb incessant youth disturbances at mine sites Yes ---------- No ----------

(ix) Government should stop illegal charges by youths and community leaders Yes ---------- No ----------

(x) Government should organize stakeholder consultations to discuss key issues that bother on mining Yes ---------- No ----------

(xi) Government should provide grants to support mining operators Yes ---------- No ----------

(xii) Government should decentralize the issuing of mining permits and licenses (to zones and states not only in the federal government) Yes ---------- No ----------

20. In all the strategies you indicated above, which one do you consider most important ----------

21. Please list other strategies you consider important ----------

SECTION D: Consequences and perceptions about Mining Activity in your Community (For all households)

1. Which of these have you observed as a result of mining in your community?

S/No	Effects	Yes	No
1	Deposition of harmful material into rivers and streams from where you collect water in your community		
2	Collapse of mining tunnels due to use of explosives		
3	Clearing of vegetation during prospecting and mining without rehabilitation		

4	Abandoned mining sites, pits and tunnels		
5	People work for many days in the mining sites without going back home to their families		
6	Sexual harassment of women by male counterparts at the mining sites		
7	Outbreak of disease in the mining areas such as malaria, diarrhoea and bilharzias		
8	Prostitution and other criminal activities due to mining activities in your community		
9	Conflicts as a result of mining activities		
10	Armed robbery, kidnapping and terrorism as a result of mining in your area		
11	Influx of people especially strangers into our community as a result of mining activities		
12	Spread of HIV/AIDS		
13	Drinking water contamination		
14	Mineral contamination of food and body such as lead and mercury contamination		
15	Noise from heavy equipment such as bulldozers, excavators, dredging and drilling equipment		
16	Participation of children in mining activities		
17	Cracking of building walls and destruction of houses due to explosives		
18	Youth restiveness		
19	Large number of school dropouts due to engagement in mining activities		
20	Soil contamination which affects crop yields		
22	There is discrimination of women as regards mining activity in my community		

2. How much have you spent in the last one month on medical bills relating to health issue due to mining in your area? ----------

3. How much have you spent in the last on month due to conflicts as a result of mining activities ----------

4. Considering the effect of mining in your community, what is your opinion about these?

S/No	**Issues**	**SA**	**A**	**U**	**D**	**SD**
1	Mining activities should be suspended in my community					
2	The use of explosives in mining should be banned					
3	Government should help the community manage the environment to reduce effect of mining					
4	Government should provide health					

	facilities in the community to help deal with health issues as a result of mining					
5	Government should help improve on the security in my community					
6	The community leaders should help address the security situation in the community					
7	Government should provide portable water for the community					
8	Government should ensure that abandoned mines are recovered or made good					
9	Government should establish a regulatory enforcement agency (mining police) only for the mining sector					
10	Government should withdraw the license of any miner or mining company that allow children to work at their sites					
11	Government should sensitize miner on the use of explosives					
12	Miners should be made to pay for damage caused as a result mining for example from the use of explosives					
13	Government should provide security at mining sites					
14	Government should conduct public enlightenment on mining and its importance in order to educate youths, community leaders and miners					
15	Miners should find an alternative to explosives in mining					
16	Government should withdraw the license of miners that leave open pits after mining					

Please list other things you think that can be done to reduce the effect of mining in your community ----------
---

---

5. Considering the effect of mining in your community and supposing that government wants to collect some levy from every household in the community to facilitate the supervision of mining activity and to deal with the problems as a result of mining activities; this will help ensure that

the problems due to mining are substantially reduced, also note that the money will be paid into an account provided by government; will you be willing to pay? Yes ---------- No ----------

6. If yes how much will you be willing to pay every month? ----------

7. If you are not willing to pay, what are your reasons?
(i)----------(ii)----------(iii)----------(iv)----------

8. Which of these initiatives have your community applied to address mining concerns?

(i) Community members paid fees to address security concerns Yes ---------- No ----------

(ii) Community members developed a procedure to deal with conflicts arising from mining Yes ---------- No ----------

(iii) Community members organized health campaigns Yes ---------- No ----------

(iv) Community members compelled mining companies and individuals to deal with environmental issues as a result of mining operations Yes ---------- No ----------

(v) Our community imposed fines on those that cause trouble at mining sites Yes ---------- No ----------

(vi) Community members invited law enforcement agents during crisis at mining sites Yes ---------- No ----------

(vii) Our community formally complained to government about the devastation mining activities is causing in the community Yes ---------- No ----------

(viii) Our community asked small scale miners to close down due to poor recovery of land after mining Yes ---------- No ----------

(ix) List other actions that you community has taken in order to address the concerns about mining in your community ----------

INTERVIEW SCHEDULE FOR MINING COMPANIES FOR MINDIVER SESA

This study will help to find out your opinion about the socioeconomic environmental and health effects of mining activities in your location and your opinion on how the negatives effects can be

reduced and the positive effects enhanced. All information to be supplied will be treated with absolute confidence and be used for the purpose of the study only.
We look forward to receiving your unalloyed support and assistance.

Section A: Background Information

Name of Enumerator: ……..
Name of Supervisor: …….
State: ……
LGA ……
Name of Mining Site…….……
Category of Mining Site (ASM or licensed) ……
Name of Community ……..
GPS – Longitude ---------- Latitude ----------

SECTION B: Attributes of the mining firm and its leadership

1. Name of the respondents…….....
2. Designation in the mining firm……
3 Relationship of the respondent to the mining head (for ASM)…… (a) wife…(b) husband (c) staff (d) son/daughter (e) others (specify)……
1. What is the category of your mining firm as regards size? (a) Micro (less than 5 employees) ---------- ------ (b) Small (5-19 employees) ---------- (c) Medium (greater than 20 and less than or equal to 99 employees) ---------- (d) Large (100 and above employees) ----------
2. What is the total number of employees in the company ----------
3. What is the highest educational qualification of the head of institution? (a) Did not attend school---------- (b) Primary school certificate---------- (c) Junior Secondary school certificate ---------- (d) WASC/GCE ---------- (e) OND ---------- (f) HND/Degree ---------- (g) Master's/PhD Degree ----------
4. What is the age of the head of company? ----------
5. How long (in years) has he or she been involved in the mining sector? ----------
6. What was the value of your company total receipts (income) in 2018 ----------

SECTION C: Information on Mining Activities of the company

1a. Do you have a mining license? Yes ---------- No ----------
1b. what type or categories of mining license do you have? ----------
1c. Which minerals do you mine ----------
2. Who owns the land/site where your company mine? (i) It belongs to the company ---------- (ii) the community where we mine---------- (iii) government ---------- (iv) Cooperative society or a group ---------- (v) other, please specify ----------

3. If you **do not own** the land, do you pay rent? (i) Yes, any day I mine ----------(ii) Yes, monthly ---------- (iii) Yes, annually ---------- (iv) No ----------

4. If you **own** the land/site you mine, how did you acquire it? (i) bought the land ----------

(ii) Lease from government ---------- (iii) Lease from a cooperative society ---------- (iv) Lease from the community ---------- (v) Lease from an individual ---------- (vi) other, specify ----------

5. Do you have some mining equipment? Yes ---------- No ----------

6. If you have, list the equipment that you have ----------

7. How much is your company's monthly earning/income from mining ----------

8. If you consider all your expenses in mining activities, what is the average total amount you spend on mining per month? ----------

9. Do your workers protect themselves during mining operation? Yes---------- No----------

10. Do you have a health and safety guidelines pasted at strategic locations in your company and mining site **(enumerator confirm this by checking)** Yes---------- No----------

11. Which of the following protective materials do you have in your company? (i) First aid kits ---------- (ii) protective clothing ---------- (iii) Helmets---------- (iv) Gloves -------

(v) Hearing protection ---------- (vi) Dust muffles ---------- (vii) others, specify ----------

12. Do you know about mining laws and regulations/standards in Nigeria? Yes---------- No----------

13. List the mining laws and regulations you know? ----------

14. Does your company comply with the laws and standards in mining? Yes ---------- No----------

14B. Do you think the existing mining laws are adequate/effective? Yes……. No……

14C. If the existing mining laws are not adequate/effective, what are the concerns in the laws that need to be addressed?.....

……

15. Are you up-to-date in carrying out your environmental audits? (Enumerator cite the report or clearance certificate) Yes ---------- No ----------

16. Please rate the following challenges to compliance to mining standards by the mining companies

S/No	Challenges to compliance	High	Medium	Low	Not at all
1	Lack of expertise in the mining sector				
2	Regulations and requirements				
3	Charges and fees for environmental registration/compliance				
4	Bottlenecks in approval and compliance process				
5	Lack of nearby health facilities or first aid facilities				
6	Lack of emergency response by the government from the mining sites				
7	Lack of good road network in the mining sites				
8	Threat of contaminants and diseases				
9	Human conflicts				
10	Lack of occupational health and safety equipment				
11	Lack of knowledge of mining standards and regulation				
12	High cost of prospecting and mining ventures				
13	Inadequate communications network				
14	Corruption in licensing and renewal of mining rights				
15	Inadequate water in mining sites				
16	Untrained mining workers				

Follow up to 16 (challenges to compliance to mining standards)
Please kindly state:
a) the regulations and environmental requirements you considered high and difficult to comply with and your reason…….
.

b) charges and fees you would want government to amend ……
……
c) areas of bottlenecks in approvals and/or compliance processes that are stifling……
……

17. Please rate the following challenges you face as regards mining in the location where you mine

S/No	Challenges	High	Medium	Low	Not at all
	Environmental and social				
1	Conflicts as a result of land ownership of mining sites				
2	Conflicts as a result of changes in mining rights and mineral titles				
3	Poor or lack of shelter in mining sites				
4	Wildlife menace				
5	Menace of armed bandits, kidnappers and terrorists in the areas				
6	Mineral theft				
7	Hostility from the host community				
	Financial				
7	Inaccessibility to credit facilities				
8	Poor returns from mining				
9	High cost of mining equipment				
10	Lack of capital to purchase mining equipment				
11	Lack of organized market for minerals				
	Infrastructure/Equipment				
12	Inadequate mining equipment and machinery				
13	Poor communication network				
14	Inaccessible mining sites				
15	Lack of equipment and facilities for value addition				
	Institutional				
16	Inadequate training knowledge and sensitization on the mining regulations and policies				
17	Insecurity at the mining sites				

18	Lack of knowledge on basic mining and geological skills				
19	Lack of skills and knowledge on value addition				
20	Illegal collection of levies by government officials				
21	Corruption in the issuing of mining permits, and licences and mineral titles				
22	Low levels of enforcement of regulations and policies				
	Health and Safety				
22	Disease outbreak such as malaria, diarrhoea and bilharzias in mining sites				
23	Sexual harassment of women in mining sites				
24	Use of explosives that affect hearing and cause collapse of mining sites				
25	***Lack of protective equipment***				
26	Lack of precautionary signage at mining sites				
27	Spread of HIV/AIDS at mining communities influx of people and prostitution				
28	Mineral contamination of food and body such as lead and mercury				

18. List the strategies you think that can be applied in overcoming the challenges faced as a result of mining activities in your location (Please enumerator, prompt them to suggest as many solutions as possible) --
----

Appendix 5: Nigerian Solid Mineral Commodities and Typical Environmental Issues

Mineral		***Geology***	***Mining methods***	***Basic on-site beneficiation & processing***	***Waste streams***	***Typical environmental issues***
Metallic Minerals	**Cassiterite Sn**	1. Granite and rhyolite of the younger Granite complex. 2. Granite Gneiss and diorite of the younger granite 3. Primary deposit in pegmatites	Pegmatite tin worked by small underground and open-cut workings. Alluvial tin might be worked by dredges.	Basic gravity processing after primary crushing	Large volumes of generally inert, coarse tailings	Visual impact of numerous small open-cut workings. Local deforestation for mine support.
	Iron Ore Fe	1. Oolitic ironstones within Cretaceous sandstone, mudstone and clay sequence of Bida Formation. 2. Banded iron formation ferruginous quartzite interblended with migmatite-gneiss. 3. Lateritic ironstone with loose angular fragments.	Very large scale, drill and blast, truck and shovel open pit mining operations	Can be as simple as crushing and washing, although heavy-media separation and magnetic separation used.	Generally small volumes of waste, but overburden and low grade material from open pits	Visual impact of large, red open pits as well as waste dumps and usually large process facilities
	Lead *(Galena)* Pb	Basement complex rocks of gneiss-migmatite suite. Galena occurs in veins cutting the suite.	Mainly underground mining of vein deposits. Some open-pitting of surface deposits.	Crushing, milling, flotation to produce concentrate. Basic flotation reagents used.	Large volume of waste in relation to product (50% to 75%) Flotation tailings (TMF). Waste rock from u/g development.	Residual metals and ARD in TMF and waste dumps. AMD if high-pyrite in orebody.
	Lead – Zinc Pb/Zn	1. Sulphide vein cutting Cretaceous sandstones and shales.	Mainly underground mining of vein deposits. Some open-pitting of surface	Crushing, milling, flotation to produce concentrate. Basic flotation reagents used.	Large volume of waste in relation to product (50% to 75%) Flotation tailings (TMF).	Residual metals and ARD in TMF and waste dumps. AMD if high-pyrite in

		2. Hydrothermal vein cutting into the sequence of shales, limestone as the ASU River Group 3. Galena veins cutting the sequence of shales and limestone of Asu river Group	deposits.		Waste rock from u/g development.	orebody.
	Lead – Fluoride Pb/F	1. Vein deposit in basinal sequence of sandstone. Mudstone, shales, and limestone of Asu river group. 2. Galena occurs as hydrothermal vein within the sequence of limestone, siltstones of Asu river group.	Underground mining of generally steep, vein type orebodies using sub-level stoping or caving method.	Crushing, grinding, flotation to produce a concentrate.	Large volume of waste in relation to product (50% to 75%) Flotation tailings (TMF). Waste rock from u/g development.	Residual metals and ARD in TMF and waste dumps. AMD if high-pyrite in orebody.
	Manganese Mn	1. As layers within the clays and grits of Illo Formation. 2. Manganese occurs disseminated within the gneiss-migmatite complex.	Open pit mining using standard truck and shovel operation after drill and blast. Some underground mining if grades warrant.	Crushing, screening, washing, sink-float and high intensity magnetic separation is simplest form of processing.	Moderate volumes of generally inert waste rock and tailings.	Visual impact of large open pit mining operations.
	Ilmenite – Rutile	1. Younger granite 2. Gneisses, schist and quartzite in granitoids.	Ilmenite-rutile usually worked as open pit or dredge operation.	Simple magnetic and electrostatic methods.	Large volumes of mostly benign igneous or metamorphic rock, or gravels from alluvial or beach sand operations.	Possibility of uranium bearing minerals in the waste stream.
	Wolframite W	Pegmatites within basement gneisses, schist and granites.	Small open cuts along individual pegmatite veins or underground workings	Gravity separation using simple jigs and tables	Mostly feldspar and siliceous coarse waste rock.	Visual impact of numerous small scale mining efforts. Deforestation of area for mine support.
	Lithium	Pegmatites within	Small open cuts along	Crushing, heavy-media	Mostly feldspar and	Visual impact of

	Li	basement gneisses, schist and granites.	individual pegmatite veins or underground workings	separation, grinding and classification, flotation and magnetic separation.	siliceous coarse waste rock.	numerous small scale mining efforts. Deforestation of area for mine support. Possibility of radioactive minerals in waste stream.
	Chromite **Cr**	Occurs as magmatic segregations within ultramafic bodies.	Restricted almost entirely to small-scale underground operations (outside of South Africa).	Large volumes of coarse igneous waste rock.	Relatively large coarse waste dumps.	Possibility of asbestos in waste rock.
	Uranium **U**	Pegmatites within basement gneisses, schist and granites.	Small open cuts along individual pegmatite veins or underground workings	Uranium minerals would tend to be hand sorted from the ore.	Mostly feldspar and siliceous coarse waste rock.	Visual impact of numerous small scale mining efforts. Deforestation of area for mine support. Possibility of radioactive minerals in waste stream.
	Tantalite	Pegmatites within basement gneisses, schist and granites.	Small open cuts along individual pegmatite veins or underground workings	Simple gravity concentration using jigs and tables	Mostly feldspar and siliceous coarse waste rock.	Visual impact of numerous small scale mining efforts. Deforestation of area for mine support.
	Columbite	Primary deposit in the biotite granite of the younger Granite complex.	Small open cuts along individual pegmatite veins or underground workings	Simple gravity concentration using jigs and tables	Mostly feldspar and siliceous coarse waste rock.	Visual impact of numerous small scale mining efforts. Deforestation of area for mine support.
	Bismuth	Associated with Pb/Zn and Sn deposits.	Mainly underground mining of vein deposits. Some open-pitting of surface deposits.	Crushing, milling, flotation to produce concentrate. Basic flotation reagents used.	Large volume of waste in relation to product (50% to 75%) Flotation tailings (TMF). Waste rock from u/g development.	Residual metals and ARD in TMF and waste dumps. AMD if high-pyrite in orebody.
	Molybdenite	In the Nigerian setting, likely to be as pegmatite	Shallow underground or surface open cuts.	Crushing, milling, flotation to produce	Much coarse, mostly inert waste.	Visual impact of numerous small scale

		with Sn.		concentrate. Basic flotation reagents used.	Flotation tailings.	mining efforts. Deforestation of area for mine support.
			Open pit for surface deposits (porphry). Underground mining.	Crushing and grinding, then 1. Heap leach, or 2. Biox, and/or 3. Cyanidation & CIL extraction of gold. Gold refining.	Large volume of waste in relation to product (>95%) Heap leach - Spent heaps Tailings from CN/CIL in TMF. Waste rock and low-grade ore.	CN and residual metals (including As) in TMF and tailings discharge/seepage. TMF failure releasing CN. ARD if high pyrite.
		Residual Au in old mine dumps and tailings				
Gem-stone	**Amethyst**	Occurs in vein within the basement granite gneisses.	Small-scale, open cut and/or shallow underground workings	Hand sorting.	Large volumes of siliceous/feldspar-rich coarse waste.	Unsightly scarred landscape with many irregular workings. Deforestation also to support underground workings
	Beryl	Occurs within pegmatitic bodies in basement complex.	Small-scale, open cut and/or shallow underground workings	Hand sorting.	Large volumes of siliceous/feldspar-rich coarse waste.	Unsightly scarred landscape with many irregular workings. Deforestation also to support underground workings
	Sapphire	Occurs in alkaline basalts	Type of corundum, very hard mineral, small-scale mining, either open cut or underground	Hand sorting.	Relatively large volumes of coarse waste material	Unsightly scarred landscape with many irregular workings. Deforestation also to support underground workings
	Tourmaline	Occurs within migmatite –gneiss complex intruded by granitoid.	Small-scale, open cut and/or shallow underground workings	Hand sorting.	Relatively large volumes of coarse waste material	Unsightly scarred landscape with many irregular workings. Deforestation also to

						support underground workings
	Aqua - marine	Occurs in narrow stock-work veins in the copula zone of younger granite intrusion.	Small-scale, open cut and/or shallow underground workings	Hand sorting.	Relatively large volumes of coarse waste material	Unsightly scarred landscape with many irregular workings. Deforestation also to support underground workings
	Emerald & Topaz		Small-scale, open cut and/or shallow underground workings	Hand sorting.	Relatively large volumes of coarse waste material	Unsightly scarred landscape with many irregular workings. Deforestation also to support underground workings
	Garnet		Small-scale, open cut and/or shallow underground workings	Hand sorting, or crushing, grinding and screening with flotation and magnetic separation if large scale.	Relatively large volumes of coarse waste material	Unsightly scarred landscape with many irregular workings. Deforestation also to support underground workings
Industrial minerals	**Barite**	Fissure vein deposit within a sequence of sandstone, limestone, mudstone and shale of Eze-Aku Group and Asu river Group. Vertical dip structuring NE width between 2m and 5m.	Underground extraction and/or small open cut.	Gravity separation, or crushing, grinding and flotation if occurring with sulphides.	Small amount of coarse waste. TMF if flotation involved.	TMF if flotation route chosen.
	Gypsum	Sedimentary sequence of clays and shales with gypsum intercalations in Filka Formation. Gypsum occurs as layers or lenses within the sedimentary sequence.	Dependent on depth, underground room and pillar operation, trackless or open pit if close to surface.	Simple crushing and screening.	Minimal waste, but possibly clays and shales (inert).	Subsidence if underground mining utilised.
		In-situ primary deposits 1. Coarse biotite – horn blend granite	Open pits, hydraulic mining.	Settlement and refining.	Large volume of waste in relation to product (90%) Sand & gravel waste –	Water consumption. Consumption of land by large waste areas.

		overlaying sandstone 2. Basement gneisses intruded by granitoids.			large waste dumps. Fine mica waste – TMF Material is mainly inert.	Deep open pits, no backfilling. Dust blow.
		Secondary sedimentary deposits: 3. Cretaceous sedimentary formation with kaolin interbedded with the sandstones. 4. Flat lying, sedimentary layer within the middle member of the Cretaceous Illo formation.	Open pits, shovel & truck.	Limited. Some refining.	Waste varies 30% to 60%) Overburden and interburden – often dumped outside pit.	Water consumption. Consumption of land by large waste areas. Deep open pits, no backfilling. Dust blow.
	Talc	Pods and lenses of talc bodies associated with amphibolites	Standard open pit truck and shovel operation or underground.	Talc is graded visually, hand sorted. Possibly some milling, flotation and magnetic separation.	Dependent on mining method, some coarse waste.	Can have asbestos associated with it.
	Diatomite	Elementary sequence of clays and sandy clays.	Open pit selective mining (without drill and blast). Truck and shovel.	Extract and dry to sell bulk product.	None	Large shallow open pits and waste dumps.
	Magnesite	Hydrothermal alteration of carbonates; alteration of serpentinite; sedimentary magnesite most common.	Magnesite associated with serpentinites would tend to be worked underground, whereas sedimentary derived magnesite by open pit.	Grinding, flotation and heavy media separation with wet and dry gravity concentration, photometric sorting, and/or magnetic separation.	Low grade material sent to waste with other generally inert products.	Open pit with or without TMF and plant.
	Feldspar	Very common rock forming minerals particularly in acid igneous rocks. Granite pegmatites common.	Feldspar tends to be extracted by conventional open pit mining using a truck and shovel approach	Crushing, grinding and flotation.	Tailings Management Facility, silica sand may be a bi-product.	Large open pits with conventional mine facilities.

			with drill and blast.			
	Mica	Mica-bearing pegmatites found where metamorphic rocks are in the vicinity of acid intrusions.	Sheet mica may be mined by both surface and underground methods, with minimal explosives.	Primary crushing, grinding and/or flotation.	Tailings Management Facility, silica sand, feldspar may be bi-products.	Unsightly scarred landscape with many irregular workings. Deforestation also to support underground workings
	Phosphate	Phosphate commonly derived from the mineral apatite found in magmatic environments, skarns and carbonatites. Also huge sedimentary phosphates.	Most phosphates extracted by open pit methods from big sedimentary deposits using draglines, power shovels, trucks and pipelines.	Beneficiation by washing, crushing, sizing and flotation.	Quartz, chert, clay, feldspar, mica, calcite and dolomite as waste products.	Potentially large, shallow open pit operations with TMF. Water pollution issues.
	Fluorite	Commonly found in pegmatite deposits and carbonatite intrusions, hydrothermal veins and mantos.	Mostly by underground means, some open pit operations.	Gravity concentration for simple ores, fine grind and flotation for complex ores.	Calcite and silica impurities.	TMF, could have AMD if fluorite associated with sulphides.
	Kyanite	Associated with schists, gneiss, granite and granitic pegmatites, also in contact metamorphic zones.	Mostly mined by open pit methods, by blasting and secondary breaking if required.	Crushing, grinding (wet or dry), magnetite, biotite and garnet removed by high intensity magnetic separation, muscovite, quartz and feldspar by gravity. Flotation.	Moderate quantities of waste products including magnetite, biotite, garnet, muscovite, quartz and feldspar.	TMF, sometimes acid leaching is used to upgrade the concentrate.
	Silica sand	Widespread throughout the world, residual product from weathering, found in beach, alluvial and aeolian environments.	Generally shallow surface operations, often free digging, using truck and shovel.	Simple screening, with various options to reduce impurities such as magnetic separation, jigging and possibly flotation.	Selectively mined, so simple operations, overburden storage + minor solid waste.	Possibly occupies large surface area.
	Brine Salt	Formed within evaporite sequences in sedimentary environments.	Solution mining by injection of water. Injection of fuel oil?	Centralised plant for salt concentration by evaporation.	No solid waste. Water is recycled.	Subsidence of solution caverns.
Construction materials	**Limestone**	1. Medium to coarse grained discontinuous	Open quarries; drill, blast and haul by truck.	Crushing & sizing of product.	Low quantity of waste in relation to product.	Large quarry pit after closure with no prospect

		limestone with siltstones shales and sandstone. 2. Marine sequence of limestone with some intercalation of calcareous marly shales.		Washing of some products	Sub-standard rock and overburden. Fines from washing in lagoon.	of backfilling.
	Granite	Common igneous rock.	Open pit mining, drill and blast, truck and shovel.	Some crushing and screening, possibly dressing for dimension stone.	Minimal waste.	Can produce large quarries.
	Dolomite	Strata of varying origin, hydrothermal vein deposits, cavities or veins in limestone, altered basic igneous rocks.	Open pit mining, drill and blast, truck and shovel.	Crushing and sizing, with some washing to remove fines.	Minimal waste	Visual impact as large quarries possible.
	Marble	1. Migmatite – Gneiss complex. The marble occurs as lenses within the complex. 2. Basement schist, quartzite, carbonate meta-sediments. The marble occurs as contorted lenses within the basement meta-sediments.	Quarries at a range of sizes may be developed. In exceptional circumstances, marble may be extracted from underground, often by room and pillar method.	Industrial marble will require crushing and grinding, dimension stone requires careful extraction by splitting.	Minimal waste, although associated minerals such as tremolite and diopside may be produced as waste product.	Large quarry pit after closure with no prospect of backfilling.
	Brick clay	Very fine grained sedimentary rocks, often laid down in marine or lake environments. Highly variable in composition.	Clay tends to be a high volume, low value commodity and therefore must have a near market. Mined by surface extraction only in shallow, large area open pits.	No specific beneficiation requirements.	Minimal waste, some overburden.	Possible problems with water in pits – pumping often required.
	Refractory clay	Very fine grained	Mined by surface	No specific beneficiation	Minimal waste, some	Possible problems with

		sedimentary rocks, often laid down in marine or lake environments. Highly variable in composition.	extraction only in shallow, large area open pits.	requirements.	overburden.	water in pits – pumping often required.
Coal and Lignite	**Sub – bituminous**	Intermediate coal, dull, black and waxy, shows little woody material, is banded and splits parallel to bedding.				
	Bituminous	Relatively high rank coal, dense, dark, brittle banded, well jointed and breaks into cubical and prismatic blocks.				
	Lignite	Low rank coal. Brownish black, composed of woody matter embedded in macerated and decomposed vegetable matter. banded and jointed.	Open pits, shovel & truck. Large operations use draglines or bucket-wheel excavators.			
Bitumen		Viscous to semisolid hydrocarbon that fills interstices in other porous and permeable rocks. tar sands and oil sands are common names.	Mined in large, relatively shallow open pits. Truck and shovel operations, with or without explosives.	Shipped directly as tar sand or oil sand to processing and refining facilities.	Variable amounts of waste rock dependent on the depth of the bituminous horizon. Some overburden storage.	Large consumption of land. Hydrocarbon pollution of water courses from pit dump runoff.

Appendix 6: Socio-Economic Attributes of Miners at Asm Sites/Communities Visited and their Perception about Some Issues

Attributes	Category	Percentage (%)	Mean
Gender	Male	93.33	
	Female	6.67	
Age	20-30	11.85	44.07
	31-40	31.11	
	41-50	32.59	
	51-60	19.26	
	Above 60	5.19	
Number of Years of experience in mining	Less than 10 years	47.41	12.89
	10-15 years	19.26	
	16-20 years	17.76	
	21-25 years	5.19	
	More than 25 years	10.37	
Reason for mining	Main source of income	87.41	
	Source of supplementary income	4.44	
	Because it is my people's occupation	8.15	
Educational Level	None	5.19	11.23 (average number of years in school)
	Primary	22.96	
	Secondary	49.63	
	Teacher Training/Technical	2.96	
	Higher Education	19.26	
Qualification Obtained	First school leaving certificate	22.96	
	WASC/SSCE	48.15	
	TCII/OND	9.63	
	Degree/HND	10.37	
	MSc/PhD	2.22	
	None	6.67	
Religion	Christian	54.07	
	Islam	45.19	
	Eckankar	0.74	
Marital Status	Married Monogamous	56.72	
	Married Polygamous	24.63	
	Never Married	14.18	
	Separated	0.75	
	Widowed	1.49	
	Divorced	1.49	
	Informal or loose union	0.75	
Belong to social group	Yes	43.28	
	No	56.72	
Do you protect yourself during mining	Yes	73.33	
	No	26.67	
Level of Involvement of women in mining	High	10.69	
	Moderate	17.56	

	Low	46.56	
	Not Involved	25.29	
Are women discriminated against	Yes	18.52	
	No	81.48	

Source: Field data, 2019

Appendix 7: List of Mine Sites Visited

S/No	Name of Site	Location (Local Government/State	Mineral	Category
1	Omene Miners Multipurpose Cooperative Society (MPCS)	Opi, Nsuka LGA, Enugu	Sand	ASM
2	Tinug Resources Concept Ltd	Nyama-Attakwu, Nkanu West, Enugu	Sand	Licensed-SSML
3	Okposi Umuoghara Stone Dealers Association	Umuoghara Izza North LGA, Ebonyi	Limestone and Granite	ASM
4	Jidech Mining Company,	Mkpumakpatakpa Izzi LGA	Lead and Zinc	Licensed-Mining Lease
5	Abimfam community miners	Akamkpa LGA, Cross River	Limestone	ASM
6	Ebiang Achu Enterprises	Camp 11, Mfamosing, Akamkpa LGA, Cross River	Iron ore	Licensed - SSML
7	Oguotso MPCS	Ikpeshi Community Akoko Edo LGA, Edo	Limestone	ASM
8	Somak Industries Nig Ltd	Ikpeshi Community Akoko Edo LGA, Edo	Limestone	Licensed-Quarry Lease
9	Ajasqo Quarry	Ajegunle, Akure South, Ondo	Sand, stone and gravel	ASM
10	EBH Granite Limited	Ofosu, Idan LGA, Ondo State	Granite	Licensed – Quarry Lease
11	SID Farms Global Resources Ltd.	Momi Village, Odeda LGA, Ogun	Feldspar	Licensed – SSML
12	DLK Stone quarry Limited	Odugbayi Village, Odeda LGA, Ogun	Granite	Licensed – Quarry Lease
13	Ishiagu Quarry- Crush Rocks Ltd	Ishiagu, Ivo LGA, Ebonyi	Granite	Licensed
14	Ishiagu Mine- Gexpam Nigeria Ltd	Ishiagu, Ivo LGA Ebonyi	Lead and Zinc	Licensed
15	Okpara Mine	Enugu North LGA, Enugu	Abandoned Coal mine	
16	Ogbete CPS Mine	Enugu North LGA,	Abandoned Coal	

		Enugu	mine	
17	Galadima Kogo	Shiroro LGA, Niger State	Gold	ASM
18	African Mineral and Logistics Limited	Shiroro LGA, Niger State	Gold	Licensed-SSML
19	Checheyi village artisanal mining site	Kwali Area Council, FCT	Gold and Wolframite	ASM
20	Perfect Stone Quarries Limited	Durumi village – Galuwyi district, Mpape in Bwari Area Council	Granite	Licensed
21	Hongyun Mining Industrial Limited	Durumi village – Galuwyi district, Mpape in Bwari Area Council	Granite	
22	Kuru Miners MPCS	Jos South LGA, Plateau State	Tin and Columbite	ASM
23	Solid Unit Nigeria Limited	Kampany Zurak, Wase LGA, Plateau State	Lead-Zinc	Licensd, SSML
24	Al'Saab Quarry multipurpose Society	Sauna, Gezawa LGA, Kano State	Granite	ASM
25	Sauna Quarry Hand Crushers Asso	Sauna, Gezawa LGA, Kano State	Granite	QL
26	Malali Quarry	Kaduna North LGA	Granite	ASM
27	Datum Construction Company Limited	Chikun LGA Kaduna	Granite	Quarry Lease
28	Hamdala Multipurpose Cooperative Society Ltd,	Nafada, Nafada LGA., Gombe State	Gypsum	ASM
29	Triacta Nigeria Limited.	Akkao LGA, Gombe State	Granite	Quarry Licence
30	Gypsum Miners Association Tongo	Funakaye LGA, Gombe State	Gypsum	ASM
31	Dawa Multipurpose Cooperative Mine	Wundi Village, Toro LGA	Tin and Columbite	ASM
32	SLAG Global Investment	Gadabiu Village, Bauchi, Toro LGA	Tin and Gold	SSML
33	Gwaram Multipurpose Cooperative	Alkaleri LGA , Bauchi	Kaolin	ASM
34	Xenotime Nigeria Ltd	Gadabiu, Toro LGA, Bauchi	Tin, Columbite, Gold and Copper	Licensed

Appendix 8: Record of Stakeholder Workshop Minutes

Location: Conference Hall, DLK Event Center Along Moshood Abiola Way, by NNPC Mega Station Abeokuta, Ogun State

Date: 16th July, 2019

South West Stakeholders Zonal Workshop

The South West Stakeholders Zonal Workshop held on 16th of July 2019 and had in attendance Federal and State Government agencies and other stakeholders from Lagos, Oyo, Ondo and Ogun States. The workshop recorded an attendance of 50 people.

Format of Public Consultation

- Arrival and registration
- Introduction of stakeholders present in the meeting
- Welcome remarks
- Overview of MinDiver Project and of SESA
- Stakeholder engagement including inputs, questions and concerns
- Response to questions and concerns
- Key conclusions and agreements

Detailed minutes of the workshop are as follows:

Introduction

The workshop involved participating states from -Ogun, Ondo, Osun, Lagos and Oyo. The objectives of the workshop are to discuss the development of an updated SESA to support legal and policy reforms and to assist in the economic development of the Nigerian mining sector; and to create an avenue for participation and dialogue for all mining stakeholders, including those from key mining sectors that may be impacted by or influence the policy and strategic reforms. The workshop created an avenue for stakeholders including government and private entities to share their experiences and issues and opinions on how to improve government decisions on environmental and social matters for the overall MinDiver project development objective.

Areas of discussion during the workshop included Mining Laws and Policies, FMEnv /SMEnv Laws, enforcement, regulations, charge fees, capacity gaps, EIA process, compliance monitoring and logistics, inter-agency collaborations and overlapping functions and institutional weakness and environmental reforms.

Participants were drawn from spectra of stakeholders from the participating States including community members, miners, NGO personnel, government agencies, and women groups etc.

Opening of The Workshop

The workshop anchored by Dr. Damilola Adesina commenced at 11:45am with an opening prayer. Thereafter, the participants introduced themselves.

Welcome Remarks

The Ogun State Federal Mines Officer, Engr. Ayelabola Olubunmi presented the welcome address. He welcomed those present and thanked them for endeavouring to be punctual to the meeting. He observed that there is currently tremendous effort in the country to achieve the diversification agenda, and that the mining sector should not be left behind. He welcomed the idea of the workshop stating it is a good opportunity to ensure grass-root participation in the development of the mining sector. He urged everyone to particiate in the discussion by proferring possible solutions to the myriads of challenges facing the sector.

Overview of Mindiver Project And of Sesa:
The Consultant gave the overview of MinDiver Project and SESA. He informed the participants that the Ministry of Mines and Steel Development through the Mineral Sector Support for Economic Diversification (MinDiver) Project is desirous of developing the mining sector to play a leading role in the economic diversification, growth and employment in Nigeria. He stated that the purpose of this current exercise is to update the existing SESA which was conducted in 2005 and to prepare a new SESA which captures the current situation of mining and cover every gap that exists between 2005 and 2019. He disclosed that the project is assisted by the World Bank with a loan of USD150m.

The Consultant stated that the objective of the MinDiver project is to improve the attractiveness of the Nigerian mining sector for long-term private sector investment in the exploration and production of minerals; to create a globally competitive sector capable of contributing to wealth creation, providing jobs and advancing social and human security of Nigerians and investors; and identify the priority actions that Government can take to foster the environmentally sustainable, socially equitable and inclusive development of Nigeria's mining sector.

He further stated that preparing SESA is expedient to the overall success of the project because the activities of the planned improvement of the mining sector for economic diversification will result in increased exploitation and exploration of minerals and thus, requires strategic policy on environmental and social sustainability. Thus, SESA will ensure the existence of strong institutions, legislations, policies and synergies that will proactively address the existing and potential environmental and social challenges associated with mineral mining in Nigeria. In its entirety, the exercise according to him will mainstream sector reforms that will help all the stakeholders and actors in the sector to contribute to the growth of the mining sector. The presentation captured issues around the mining sector to include low contribution of the sector to GDP despite the existence of over 34 mineral deposits in Nigeria, poor environmental compliances (land degradation, abandoned mine pits and mining operational hazards), illegal mining and low investment in the sector and regulatory bottlenecks.
The stakeholders were updated on activities that have been carried out and those that are ongoing which include: field work in the 6 selected southern States of Nigeria including Cross River,

Edo, Ondo, Ogun, Enugu and Ebonyi; consultation and data gathering from households within locations of ASM sites; collection of water, soil and air quality measurements around the mining sites visited; interview with licensed miners and relevant government agencies; focus group discussions with women and affected communities.

Reactions from Participants

After the presentations by the Consultant, there were reactions from:

1. The Zonal Federal Mines Officer, Ibadan.
2. The Federal and State Ministries of Environment.
3. The Miners Association of Nigeria.
4. Federal Mines Officers in the various States.
5. NGO Representative from Ondo State.
6. ASM Mine Officers
7. Community Members

Various CONCERNS were put forward as follows:

- **The Zonal FMO** pointed out the issue of duplication of duties across organizations. He stated that there are different regulations assigned with the same duties with respect to regulation of mining in Nigeria. According to him, duplication of duties results in overwhelming the miners with numerous regulations to comply with, and neglect of duties by the different agencies which have the same duties and obligations in the sector. He suggested a harmonization of various environmental agencies and regulations in the mining sector.

- The Zonal FMO further pointed out that due to the capital intensiveness of mining, some operators have difficulty in gathering data.

- The mining sector in Nigeria is still largely at the Artisanal stage and some laws and regulations, e.g. the centralized acquisition of license creates which is hard and stringent for the miners. Obtaining license for small scale miners should be decentralized and domiciled within the State Offices.

- **The MEC Officer for Oyo State** pointed out the issue of excessive dues and levies on the small scale miners. The Ministry of environment imposes levies on the miners in the community. They pay this in addition to royalties, tenement rates as well as business premise fees to the state government.

- He further expressed concern that the poor quality of EIA produced in Nigeria is very much below international standards. The standard and process of obtaining and completing an EIA certification should be upgraded to ensure that EIAs produced in the country meet international standards.

- **The representative of the Federal Ministry of Environment** raised the issue of lack of synergy between relevant organizations.

- He pointed out the low standard of environmental compliance placed on foreign companies and the absence of enforced sanction for polluting the environment.

- **The Secretary of the Miners Association of Nigeria** pointed out that the policy for the formalization of artisanal mining needs to be reviewed as it cannot be said to be working due to the nomadic nature of the miners.
- As regards EIA fees, there is unfairness in the system of payment. Large and established companies are paid the same fees with small scales and startups.
- He also raised the problem of implementation of mining laws and regulations.
- He pointed out the institutions are very weak. Interference of State government in mining is a problem. Mining is under Exclusive Legislative List; miners pay loyalty, but the State government still imposes tax and VATS on mining companies.
- **The FMO of Ogun State** suggested that companies that are clustered and most especially those that mine one mineral in that clustered area should have a single EIA covering them.
- **The FNGO Ondo State** who spoke on the issue of CDA, stated that investors do not comply with payment of compensation and community development to the community especially when community land is acquired.
- **The ASM Officer for Oyo & Ogun State**s: said there should be provisions made for miners who are nomadic in nature. It is impracticable and cumbersome to require such miners to obtain new license for every different mining project they embark on.
- He also stated that the requirement for formalization through registration of cooperation is a good way to ensure sustainability, durability and community participation in mining.
- He further called for the recognition of the laborers as the real miners because they are the actual people doing the mining, not just dealers and middlemen.
- Women cooperatives should be integrated in mining as well.
- **The MEC Officer for Ogun State** suggested that the cost of EIA should be reduced or regulated in such a way that companies are paid according to their grade and level.
- The MEC Officer on the issue of duplicity of function stated that NESREA is an agency whose functions overlap with the Ministry of Mines and Steel. There should be a regulation setting out a clear definition of agencies in situations where there tends to be an overlap.
- **The representative of Bibirie Miners Association stated that** there should also be training programs that are subsidized or free for miners (especially the laborers) to improve their knowledge on mining.
- **A female contributor** was of the opinion that women should be given a special grant to facilitate and encourage **their participation in the sector. The representative of NGSA observed that** Agencies do not receive enough fund and capacity development to carry out their functions.

- **The Officer from the Ministry of Health bemoaned the fact that** the ministry of health is not involved in the EIA process until issues arise. He pointed out that the situation must change if real progress would be made.

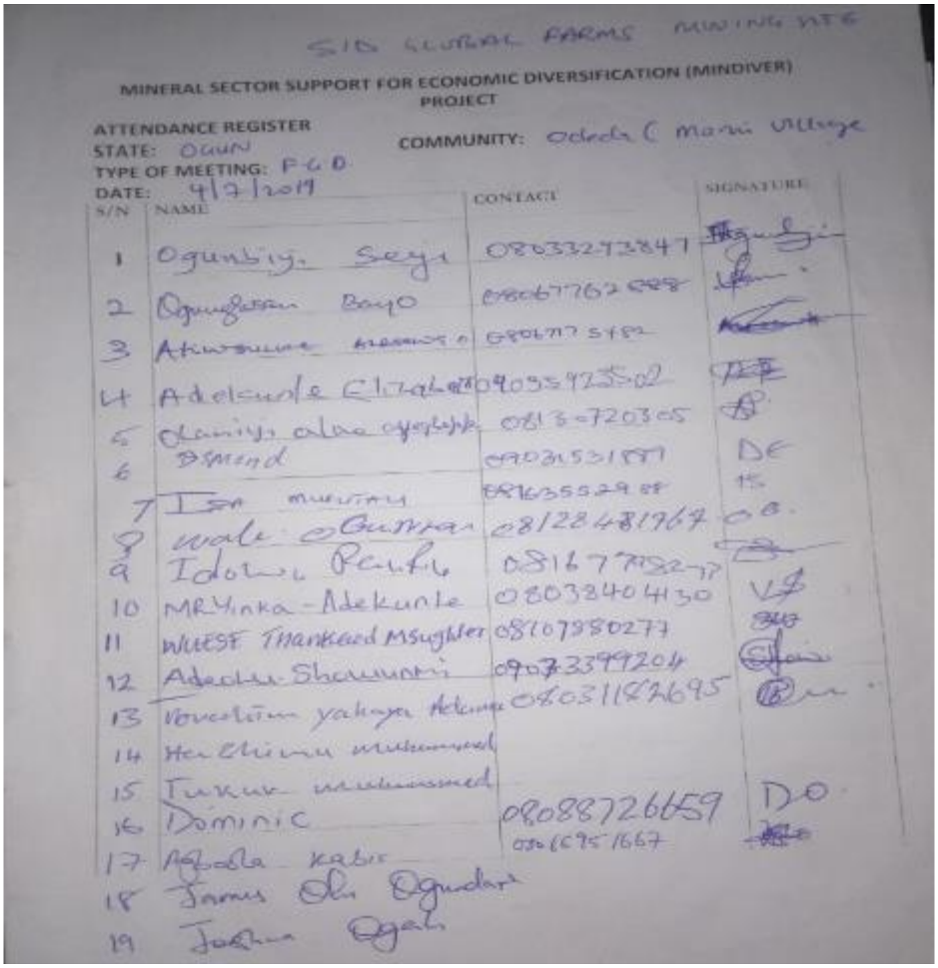
It was generally agreed as follows:

- The fact that people excavating sand on a small scale are being required to provide EIA is not practicable considering the level of manual and small scale nature of their business.
- That compliance with EIA regulations should be a pre-condition for renewal of mining lease.
- That communities should be sensitized on guidelines in preparing CDAs.
- **The representative of the Nigeria Geological Survey Agency** observed that the issue of abandoned pits which is a hazard to the health of communities should be looked into and remedied.
- **A member of the Sunshine Progressive Youth Alliance of Ondo State** pointed out that land reclamation should be enforced on mining companies.

Response by the Consultant
The moderator thanked the participants for their contributions. He assured the stakeholders that the issues raised will be captured in the SESA report.

Vote of thanks
The Secretary General of the Miners Association of Nigeria thanked the organizers and all participants especially the participants from other States for being a part of the workshop. He prayed God to grant them journey mercies to their various destinations.

Closing
The workshop ended at 02:30 pm with a closing prayer said by Miss Blessing Akinsulire from SID Global Farms Resources Ltd.

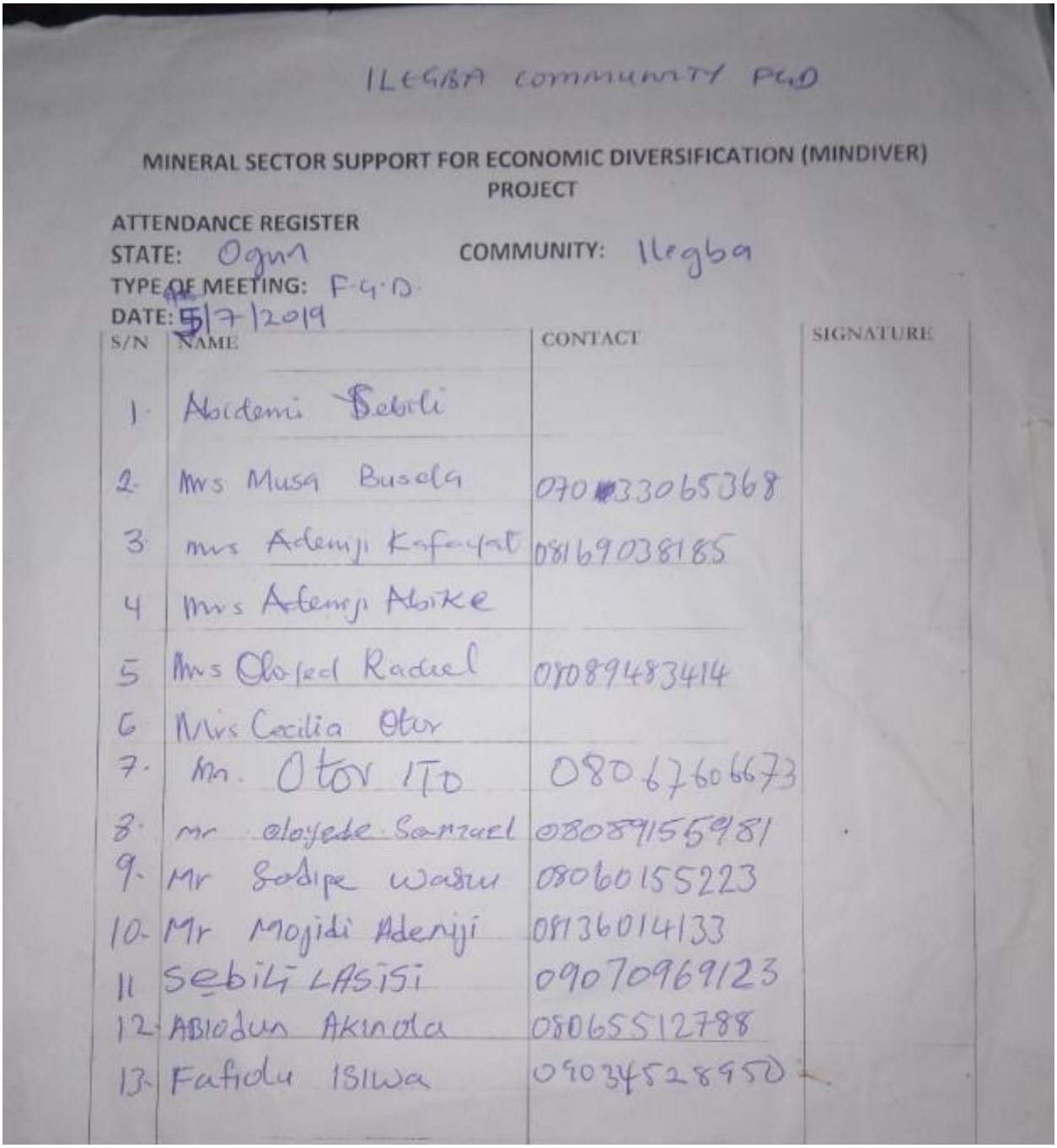


SID GLOBAL FARMS MINING SITE

MINERAL SECTOR SUPPORT FOR ECONOMIC DIVERSIFICATION (MINDIVER) PROJECT

ATTENDANCE REGISTER
STATE: OGUN
COMMUNITY: Odeda (Mami Village
TYPE OF MEETING: FGD
DATE: 4/7/2019

S/N	NAME	CONTACT	SIGNATURE
1	Ogunbiyi Seyi	08033273847	[illegible]
2	Ogungbesan Bayo	08067762888	[illegible]
3	[illegible]	08067775482	[illegible]
4	Adekunle Elizabeth	09035923502	[illegible]
5	Olaniyi olaa oyeyemi	08136720305	[illegible]
6	Desmond	09031531887	DE
7	Isa muritala	08163552988	IS
8	wale Ogunmola	08128481767	OG.
9	Idowu Paulu	08167785277	[illegible]
10	MRYinka-Adekunle	08033404130	VA
11	WUEST Thankgod Msughter	08107380277	[illegible]
12	Adedeji Shamumi	09073399204	[illegible]
13	Novelitum yakuya Adeniyi	08031182695	[illegible]
14	Hon Chiroma muhammed		
15	Tukur muhammed		
16	Dominic	08088726659	DO.
17	Agbola kabir	08016951667	[illegible]
18	James Olu Ogundare		
19	Joshua Ogah		



ILEGBA COMMUNITY FGD

MINERAL SECTOR SUPPORT FOR ECONOMIC DIVERSIFICATION (MINDIVER) PROJECT

ATTENDANCE REGISTER

STATE: Ogun **COMMUNITY:** Ilegba

TYPE OF MEETING: F.G.D.

DATE: 5/7/2019

S/N	NAME	CONTACT	SIGNATURE
1.	Abidemi Bebrli		
2.	Mrs Musa Busola	070 33065368	
3.	mrs Adeniji Kafayat	08169038185	
4	Mrs Adeniji Abike		
5	Mrs Olojed Raquel	08089483414	
6	Mrs Cecilia Otor		
7.	Mr. Otor ITO	08067606673	
8.	mr oloyede Samuel	08089155981	
9.	Mr Sadipe Wasiu	08060155223	
10.	Mr Mojidi Adeniji	08136014133	
11	Sebili LASISI	09070969123	
12.	ABIodun Akinola	08065512788	
13.	Fatiolu ISIWA	09034528950	

Minutes of Stakeholder Meeting

Location: Conference Hall, Federal Secretariat, Calabar, Cross River State

Date: 23rd July, 2019

South South Stakeholders Zonal Workshop

The South South Stakeholders Zonal Workshop held on 23rd of July 2019. In attendance were the members of staff of identified Federal and State Government agencies, NGOs, Miners Association, Civil Society Organisations, Miners from the South South States: Akwa Ibom, Rivers, Bayelsa, Delta and Edo. The workshop recorded an attendance of 60 people.

Format of Public Consultation

- Arrival and registration
- Introduction of stakeholders present in the meeting
- Welcome remarks
- Overview of MinDiver Project and of SESA
- Stakeholder engagement including inputs, questions and concerns
- Response to questions and concerns
- Key conclusions and agreements

Detail minutes of the workshop are as follows:

Introduction

The workshop involved participating states from the South South region.

The objectives of the workshop are to discuss the development of an updated SESA to support legal and policy reforms and to assist in the economic development of the Nigerian mining sector; and to create an avenue for participation and dialogue for all mining stakeholders, including those from key mining sectors that may be impacted by or influence the policy and strategic reforms. The workshop created an avenue for stakeholders including government and private entities to share their experiences and issues and opinions on how to improve government decisions on Environmental and Social matters for the overall MinDiver project development objective.

Areas discussed during the workshop includes Mining Laws and Policies, FMEnv /SMEnv Laws, enforcement, regulations, charge fees, capacity gaps, EIA process, compliance monitoring and logistics, inter-agency collaborations and overlapping functions and institutional weakness and environmental reforms.

Participants were drawn from spectra of stakeholders from the participating States including community members, miners, NGO personnel, Government Agencies, and women groups etc.

Opening of The Workshop

The workshop commenced at 11:00 AM with an opening prayer. Thereafter, the participants introduced themselves. After the introductions, a formal invitation of dignitaries to the high table was made and responded to.

Welcome Remarks

The opening/ welcome remarks was made by the Federal Mines Officer for Cross Rivers State, Engr. Mayowa Omosebi. In his address, the FMO welcomed those present and thanked them for endeavouring to be punctual to the meeting. He welcomed the project and encouraged those present to participate and cooperate.

Overview of Mindiver Project and of SESA:
The Consultant gave an Overview of MinDiver Project and SESA. She informed the participants that the Ministry of Mines and Steel Development through the Mineral Sector Support for Economic Diversification (MinDiver) Project is desirous of developing the mining sector to play a leading role in the economic diversification, growth and employment in Nigeria. She stated that the purpose of this current exercise is to update the existing SESA which was conducted in 2005 and to prepare a new SESA which captures the current situation of mining and cover every gap that exists btween 2005 and 2019. She disclosed that the project is assisted by the World Bank with a loan of USD150m.

The Consultant listed the project components to include:

1. *Component A: Establishing a Strong Foundation for Mining Sector Development (US$68.8 million)* - This component aims to support the Government and strengthen its capacity in administering the mining sector and thus, serve as a regulator effectively.

2. *Component B: Facilitating Downstream Sector Development and Enhancing Competitiveness (US$67.6 million)* - The objective of this component is to facilitate sector development and enhance its competitiveness and attractiveness to investors.

3. *Component C: Project Management and Coordination (US$9.6 million)* - This component will provide support at implementation to the MMSD to undertake project management, in accordance with the World Bank's fiduciary and other guidelines.

Project Preparation Advance (PPA) refinancing (US$4.0 million

The Consultant stated that the Objective of The MinDiver project is to improve the attractiveness of the Nigerian Mining sector for long-term private sector investment in the exploration and production of minerals; create a globally competitive sector capable of contributing to wealth creation, providing jobs and advancing social and human security of Nigerians and investors; and identify the priority actions that Government can take to foster the environmentally sustainable,

socially equitable and inclusive development of the Nigeria's mining sector.

She further stated that preparing SESA is expedient to the overall success of the project because the activities of the planned improvement of the mining sector for economic diversification will result in increased exploitation and exploration of minerals and thus, requires strategic policy on environmental and social sustainability. Thus, SESA will ensure the existence of strong institutions, legislations, policies and synergies that will proactively address the existing and potential environmental and social challenges associated with mineral mining in Nigeria. In its entirety, the exercise according to her will mainstream sector reforms that will help all the stakeholders and actors in the sector to be able to participate well to contributing to the growth of the mining sector. The presentation captured issues around the mining sector to include low contribution of the sector to GDP despite the existence of over 34 mineral deposits in Nigeria, poor environmental compliances (Land degradation, abandoned mine pits and mining operational hazards), illegal mining and low investment in the sector and regulatory bottlenecks.

The stakeholders were informed of activities that have been carried out and those that are ongoing which include: field work in the 6 selected southern States of Nigeria including Cross River, Edo, Ondo, Ogun, Enugu and Ebonyi; consultation and data gathering from households within locations of ASM sites; collection of water, soil and air quality measurements around the mining sites visited; interview with licensed miners and relevant government agencies; focus group discussions with women and affected communities

Reactions From Participants

After the overview of the project and SESA, the consultant called for responses from the participants. The following were the concerns raised by the participants:

vi. **Requirement for getting licence is cumbersome.** E.g in applying for licence for two cadastral units, separate bank account statement with minimum of one million is required for each cadastral unit.

vii. **There is absence of Government in the mining communities.**

viii. **Assessment of Funds/Requirement for Collateral**. The high requirement for collateral makes it cumbersome to access loans. There is need for pre-operational loans and grants that actually gets to the grass-root miners. Local initiatives should be considered in awarding grants and assessing loan should be made easier.

ix. **Double Taxation**:

- ✓ Miners in the South South are levied by all three arms of Government. This disrupts operation as the levies become too much for miners and sometimes, some of them cannot stay in business,

- ✓ Fees paid to Government need to be regulated as they are increased yearly and the fees are not proportionate to the profit of each cadastral unit considering that they produce in small scale.
- ✓ The position of State government and involvement of State Government in mining should be carefully spelt out in regulations.

x. **Non proper execution of CDAs which can lead to abandoning of mine pits**. The communities are not well informed about CDAs (preparation, signing and enforcement). The mining companies and their lawyers may draw up these agreements and the community, not understanding it may sign it. There is need for CDAs to be properly regulated by Government through the mining offices in each state to protect the communities from the after-effect of mining. The community needs information and awareness programs. The Ministry of Environment and MEC officers should be actively involved in regulating CDAs.

xi. **Deforestation and abandoning of mine pits by foreign companies**. There are no regulations to enforce regeneration of land after mining especially with foreign (Chinese companies at Akamkpa) companies.

xii. **Lack of synergy/communication between the mining cadastral and the communities.**

xiii. **Regulations to Enforce Regeneration of Land.** Mining companies should be pre-billed and the fund used regeneration of land after they have stopped mining**.**

xiv. **Enforcement of Mining Laws.** The majority of the stakeholder's agreed that the problem with Mining Laws in Nigeria is not sufficiency of laws, a but the enforcement of those laws. According to the stakeholder's, it seems that foreign investors, especially Chinese companies are above the law as there is no effort on the part of Government to hold them accountable for flaunting Mining regulations so long as they pay their royalties.

xv. **Certification of Artisanal Miners (Cluster Mining):**

- ✓ if "illegal miners" are to be recognised as legal miners and addressed as small scale miners, they should be granted some form of recognition by the government and also be encouraged to be formed into cooperatives to mine outside the cadastral units.
- ✓ There should be provision for these small scale miners to be covered by a common EIA especially in clusters where the same mineral is being mined (as is usually the case).

xvi. **On Environmental Impact Certificate**:

- ✓ EIA is approached as a consultancy business and avenue for making money more than as a safety regulation. The cost of obtaining an EIC is unregulated, thereby outrageous.

- ✓ EIA for small scale miners should be flexible and made friendly for small scale miners.
- ✓ The cost of EIA should be reduced or regulated in such a way that companies are paid according to their grade and level.

xvii. **Local Content in Mining Companies Owned by Foreigners**. To improve the mining sector in Nigeria, there should be regulations requiring a laid down percentage of partnership between foreigners and Nigerian Citizens.

xviii. **Women Involvement in Mining**.

- ✓ Women are not generally actively involved in mining, sand dredging etc, but work on the periphery to carry sand etc.
- ✓ Women are indirectly affected especially when mining regulations are not adhered to, leading to accidents that results in these women being widows and put in a position of vulnerability.
- ✓ There should be strict adherence to safety regulations as this affects women and the family at the end of the day.
- ✓ Women are actively involved in reclamation of the land after mining via planting in the land and re-vegetation.
- ✓ On the issue of discrimination, the contributor stated that women do not actively participate in mining as they would want to because it is a male dominated area and the women in the communities are asked to stick to the periphery of the mines.
- ✓ Another issue preventing women from mining is that they are financially handicapped. The inability to access loans and grants to meet the capital intensiveness of mining pose a capital constraint to them.
- ✓ Most of the Mining Associations operations and procedures are at variance with gender inclusiveness. This hostility and non-conducive environment makes it difficult for women to grow in mining.

xix. **Health Impact and involvement of Ministry of Health.** There are health problems arising from lead poisoning and radioactivity of some minerals, especially in situations where community rivers and streams have been poisoned. There have also been accidents in situations where the ground becomes soft and collapses. All these are issues raised by the Federal Ministry of Health representative who claimed that the existing regulation in the EIA process does not recognize their roles or participation in the EIA process.

Response by the Consultant

The moderator thanked the participants for their contributions. He assured the stakeholders that the issues raised will be captured in the SESA report.

Vote of Thanks

Closing remark was made by the representative of Akwa Ibom State Ministry of Mines and Steel Development. He thanked everyone for participating and wished them journey mercies to their various destinations.

South East Zonal Stakeholders' Engagement on the Strategic Enviornmental and Social Assessment (SESA) Held on 24th July 2019 at Banquet Hall, Tropical Toscana Hotel, Independence Hotel, Enugu

The meeting started at 12:00 noon with an introduction of participants, followed by an opening prayer said by Mr. Livinus Ugoh of Umuoghara Stone dealers Ltd, Okposi Ebonyi State.

The Team Leader, Dr Nnaemeka Chukwuone introduced the MinDiver project and informed the forum that the essence of the zonal stakeholder engagement is to discuss the mining project so as to engage the stakeholders in the mining sector and SESA. The Team Leader also informed the forum that the MinDiver is a project being carried out by the Federal Government with funding from the World Bank and that the aim of the MinDiver is to enable the Federal Government understand the issues in the mining sector so as to reduce the negative effects of mining activities on the people and the environment and enhance the positive effects on the populace. This will help to strengthen governance, facilitate diversification of the mining sector and improve project management. The overall aim of the project is to diversify the mine sector and make it more competitive. The beneficiaries of the project include: mine & steel development; strengthening geophysical survey unit; environment and mines unit.

Comments/interventions

- Mrs. Mary Isine , the Zonal Mine and Environmental Compliance Officer, Enugu noted that the Mining Act does not specify the category of people that will carry out an EIA process) whether big companies or small companies). She therefore suggested that the SESA report should contain such recommendation to review the EIA process
- She equally raised the issue of multiple taxation in which the Federal, State, and Local government imposes taxes on miners. She noted that for mining to be sustainable, the problem of taxation should be addressed.
- She also suggested that inter-agency collaboration should be strengthened and better organised
- Mr Simeon Ugwu of Eboyi State suggested that SESA should look into the problem of interference from State government . He noted that mineral is an exclusive preserve of the Federal Government. He equally noted that most of the unlicensed miners are introduced by State Government and as such it becomes difficult for Federal mining officers to monitor the unlicensed miners and improve the environment
- At this point, the Consultant asked whether State Governments issue mining permit to which Mr. Mmakoku Peter Chukwudi, Mines Officer for Imo and Abia States responded

that State Government has no right to issue mining permit under any guise. He noted that it is against Section 76 of Nigeria Mineral and Mining Act.

- However, Mr Jacob Akume of Ebonyi State Ministry of Solid Mineral attempted to clarify State Government involvement. He maintained that the State Government does not issue mining permit noting that Section 116 of the Mineral and Mining Act stipulates the role of stakeholders-government as well as miners. Nonetheless, miners revert to State Government when they have problem with the host community. This led Ebonyi State Government to create the Ebonyi State Ministry of Solid Mineral to ensure that mining benefits both miners and the Ebonyi State Government. While agreeing that the State Government charges some fee to miners, Mr Jacob said that professionals are interfacing to ensure there is harmony. Prof Agwu, a research team member who covered Ebonyi State pointed that from the information obtained in the field that Ebonyi State government uses its apparatus to intimidate miners who have mining permits, imposing different kinds of taxes, summoning companies for meetings and closing down companies for weeks. Prof Agwu also noted that some investors are leaving the State

- Aneke Chidi of JESPAN (a mining company), Ebonyi State also complained of the high tax levied on them by the State Government, saying that it is unsustainable. He affirms that they pay about N14.5 million annually. He also complained that they borrow money to pay this fee and after which State Government will indiscriminately close down operation. He appealed that they need action to challenge the actions of the State Government

- At this point, Mr Peter Nmakogu (Mine Officer, Imo-Abia) offered more insight on Section 116 of the Mineral and Mining Act and the relationship with community development noting that it is not the concern of theState Government but that of the Federal Government. In his view, irrespective of how it is argued, the State Government has no business to close or go to mine site. He said such incidence was witnessed in Lagos State sometime ago and miners challenged and took the Lagos State Government to court and won the case both in Appeal Court and the Supreme Court. He maintained that until the Mining Act is set aside, mining remains in the exclusive list. In that regard, any paper issued by State Government is fraudulent.

- Nnanna Monday of NESRA suggested that there should be delineation of responsibilities by the different agencies while compliance management should be a collective responsibility of the different agencies.

- Mr Akume from Ebonyi State revealed that as civil servants, they may offer professional advice which may not be implemented by the political class. He went further to state that the Federal Government is also guilty as charged remarking that some of the big companies like Royal Salt Limited in Enyingba, Abakaliki in Ebonyi State, which is the biggest salt company in the whole of West Africa but is not offering apprenticeship, is also guilty. He pointed the need for closer collaboration/cooperation.

- Mrs Obioma of Forestry Department, Enugu talking from forestry perspective, was interested in the flora and fauna. She suggested the need for reforestation plans for the country.
- Once more, Mrs Mary Isine remarked that there is an existing inter-agency committee made up of different sectors inaugurated in 2008 and resuscitated recently. Hence, SESA should look at this so that the State will not form another committee that will duplicate what is already in the constitution
- Committees coming up in the State had funding problems. However, the duty of the State committees is to advice the minister.
- Again, Mrs Isine noted that the mining sector did not have Grievance Redress Mechanism

On what can be done to make the Committee effective, the participants listed the following:

- Provision of funds and logistics that will cover the Zone and States because of the movement to different communities until GRM is put in place.
- This is where the State Government should come in. Community development committee can also promote the activity of the host communities beyond scholarship.

The issue of why banks are not lending to miners was also raised.

- Mr Aneke of JESPAN, Ebonyi raised the issue of unreliable geophysical survey data which constraints miners from accessing funds. He therefore suggested policy should be put in place to make it easier for miners to access loans). If possible, let the banks partner with the mining companies until they recover their money.
- Mr Aneke also put forward the issue of mine reserve. At times miners would not be able to give the exact quantity of ore or other minerals in the reserve. For instance, it is important to have a policy to have smelting plant (beneficiate) which will enable miners to separate the different mineral. Just like crude oil can be separated into different end products.
- Mr Benjamin Uche of Geophysical Agency corroborated the lack of bankable data from miners. He further maintained that geological maps are on a small scale. He explained that if one doesn't mine a large scale of 1:500 or 1:1000, one may be tempted to believe that the whole of the area is filled with minerals.
- He advised that geological data mapping should be on a large scale and should be able to delineate into: geophysical and reserve.

From health perspective, the representative of the Perm. Secretary, Ministry of Health, Enugu State, Mr Casmir Odo, urged the organizer of the zonal forum to look at public health issue in the area of flooding and erosion. He noted that in 2012 many communities in Uzo Uwani were displaced and it cost the Government huge sum of money to rehabilitate them. He emphasized that in the interest of Enugu State, policy should address the challenge of flooding and erosion

that will result from mining activities in the State (e.g compensation for affected communities). The representative of the Permanent Secretary also advised that communities could take State Governments to court to enable the judiciary/court define limits of operation for State Governments.

Again, Mrs. Okeke Adaobi of the Mines and Compliance Department also emphasized the need to tackle illegal mining activities. She also advised that Government should always carry out cost-benefit analysis to ascertain the viability of mining sites. In addition, she pointed out that miners are ignorant of mining laws and regulation and therefore seek the need for proper enlightenment. She equally advised that appointment of head of Mineral Resources and Environmental Management Committee (**MIREMCO)** should be based on qualification and experience to promote efficiency and effectiveness. Mr Emmanuel Nwankwo of the Federal Ministry of Environment, Enugu office also suggested that policy should be put in place to ensure proper control of waste from mining activities. This is to forestall host communities coming up in future to demand fee for the management of waste.

Mr Simon Okpoko from Opi community in Nsukka Local Government suggested the involvement of host communities in the design of policy that has to do with mining since the host communities suffer the effect of these mining activities. He also complained that host communities do not benefit anything from the royalties that are paid to the Government. This sometimes make the youths restive when their expectations are not met. He therefore advised that government should device means of increasing citizens awareness and involvement in policy design and implementation.

Mr Umeh of Ali Bom quarry, Abia State enumerating the challenges passed through by miners, complained that miners are going through tremendous attacks especially from host communities. He complained that after paying for hazard, scholarship, etc that communities will still come up with so many other demands. On financial constraints, he stressed that discrimination against the blacks constrains the productive capacity of indigenous companies. For instance, indigenous companies produce like 20 trucks daily while foreign companies (Lebanese and Chinese) produce like 200 trucks daily. This is because the foreign companies have easy access to credit from banks. Corruption is also a factor. In some States, foreign companies pay N5000 per truck which the State and community share. And if this is multiplied with the number of trucks the State and communities find it more rewarding to encourage foreign companies than the indigenous with 20 trucks capacity. He also identified inadequate tools/equipment as part of their challenges. He therefore implored the Government to development indigenous mining quarry and provide the equipment to do the work.

The ASM for Enugu and Anambra also advocated for the restructuring of the departments in the Ministry of Mines and Steel/ Solid Mineral to enable smooth flow of information. He noted that there is a department that has the mandate of extension service. He also stressed that ASMs should be more effective in attending to the challenges of miners and functional vehicles should be given to departments to ease their work.

Mr Justin of the Nigerian Geological Survey Agency advised that the State should have a role to play in the drafting of Community Development Agreement (CDA). He also suggested that

things to be included in the CDA should be solely developmental. Again, that there should be special monitoring agency/team.

On the issue of constraints in accessing credits, Mr Peter, ASM-Imo/Abia explained to the forum that Bank of Industry has made it easier by reducing the condition to 2 guarantors of the rank of at least Level 12 and above in the Nigerian civil service. And then provide mining title or a memorandum of understanding with first party.

Mr Udeh Ebue of Nigeria Engr Society, Enugu State advocated for government inclusion of re-orientation and attitudinal change to the policy. Also, communities should be engaged in monitoring to elicit information from them. State Government should be engaged as mediators between community and miners to bring up sustainable mining.

Two Other important issues Discussed -Capacity (monitoring) & legal issues

Capacity to Control Miners

Mrs.Okeke noted that in some ministries, there are up to 3 vehicles attached to only one person while others do not have vehicles to carry out their duties. This could be a disincentive to other workers in the ministry. She also suggested that the State and Local Government should be involved in mining instead of leaving it on the Exclusive List. This will reduce sabotage from State and Local Government who are closer to the mining activities.

Legal Issues

Mr Emmanuel (ASM-Enugu \/Anambra) explained that the Ministry has inaugurated committee to ensure that illegal mining is arrested. But it is not working in some States. He therefore advocated the need to improve enforcement of mining laws by strengthening mining surveillance.

Mrs Mary Isine, zonal MEC pointed that mining surveillance concerns more with revenue generation while environmental aspect is neglected.

Dr Chukwuone, the Research Team Leader emphasized the need to generate revenue that would not destroy the environment. He stressed that while revenue is important, environmental sustainability is very crucial. Thus, if the environment is not sustained, the Government cannot access the loan.

Mr Jacob form Ebonyi pointed the need to employ more people (capacity building). He also re-emphasized the need for synergy among MEC, NESRA etc as well as synergy between State and Federal Government to achieve result. Also, logistics should be improved as some of these mining sites are far apart. Qualified and competent people should be appointed as head of agencies.

The participants also unanimously agreed that MIREMCO regulates miners and as such miners should be represented. The participants also highlighted the importance of reforestation. In the same vein, the participants agreed that government should revoke license of miners who fail to begin mining after 3 years of being granted license. Other challenges/recommendations/suggestions from the forum include:

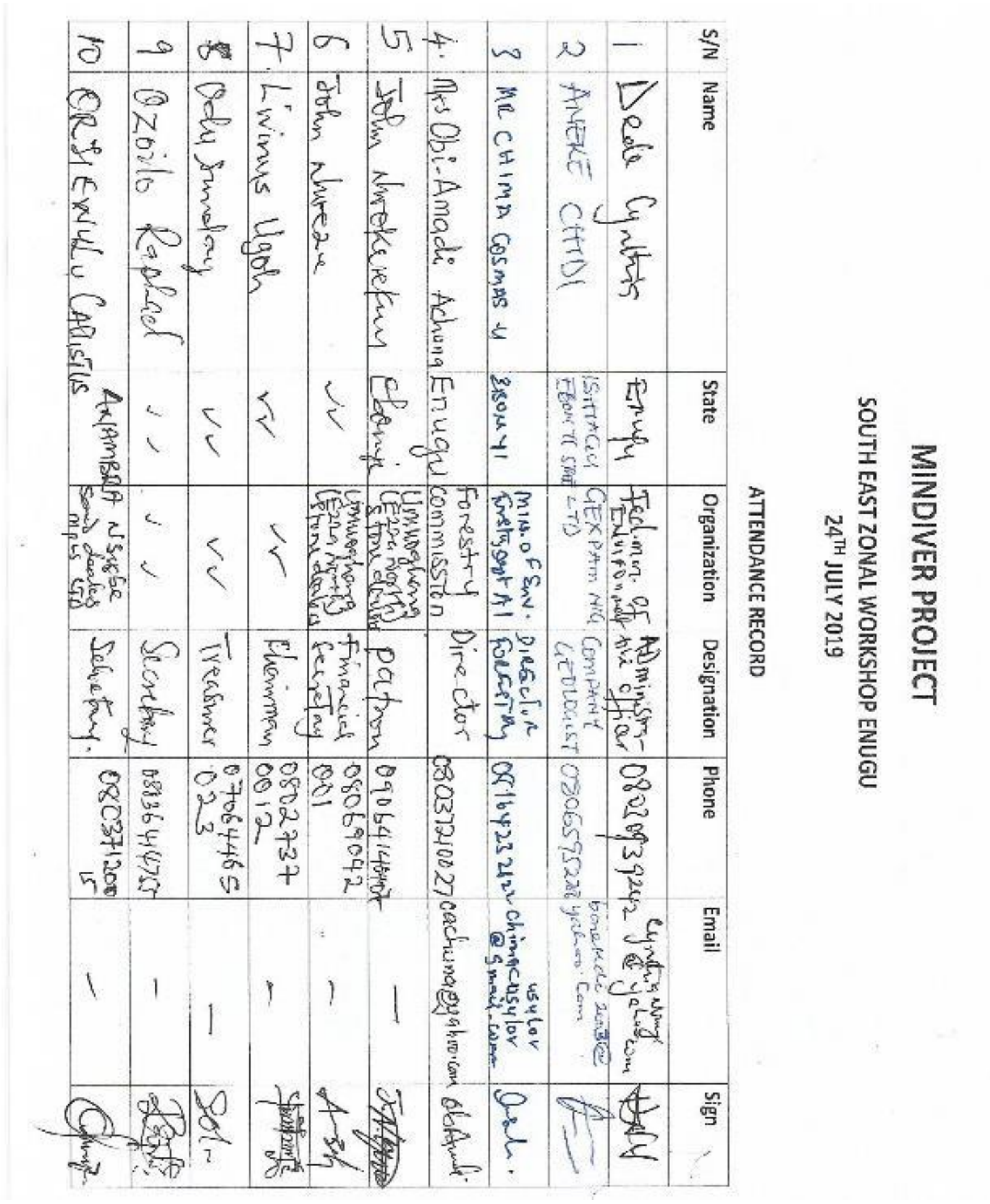
- SESA should assist in carrying out detailed exploration (geological and geophysical survey) to enhance ensure there is bankable geological data. Foreign firms can be hired to do this.
- The issue of mining value chain should be addressed by World Bank helping to establish solid mineral processing centres.
- Establishment of equipment leasing companies to assist MinDiver.
- A major hinderance to sustainable and peaceful operations in the quarries are insecurity and greed of the well-informed leaders of the host communities who would want to appropriate to themselves what belongs to the entire community.
- Apart from loan from BOI loan, one cannot access big loan without the requisite collateral security that are not easy to come by. Again, BOI may not be able to advance loan that can buy mining excavator. Hence, this should be improved upon.
- The community development shouldn't be one-off cash payment but should be developmental projects that are sustainable.
- There should be comprehensive resource and reserve estimation to improve bankable data set.
- There should be waivers for upcoming miners (especially geologist) to enable them start smoothly without capital constraints.
- One way to minimize pollution is to limit the license given to individuals and make it mandatory for miners to join cooperative and get registered with the traditional rulers and youth leaders attesting to their existence and place of operation. This will reduce incidence of abandon mining sites.
- Not much has been done in the area of corporate social responsibility even when companies promise host communities. For instance, companies destroy roads during operation, and nothing is done to improve or repair roads.
- Also, dangerous substance is usually emptied into the river during mining causing health problem and nothing is usually done by mining companies.
- Application of polluters pay principle.
- Reforming the environmental law. Basically, on EIA/ESIA Act.
- Proper monitoring of sites for compliance.
- There should be removal of bottleneck in processing SSML.
- Government should work to provide sustainable market for mining products.
- In as much as mining is in the Exclusive Legislative list, miners should pay appropriately for waste through State Waste Management Authority like Enugu State Waste

Management Authority (ESWAMA). Anything outside this will amount to double taxation

- In Anambra, we dredge at Omambara River. We need good roads, loans or equipment like dredging machine, excavator, trucks and pale loaders etc.
- The Government should reduce the cost of EIA. If possible, categorize it into A and B to accommodate small scale miners.
- Again, the BOI condition can further be reduced to easy access for small scale miners.
- Miners should be sensitized on erosion in Enugu State.
- MinDiver project should encourage the land reclamation of degraded mining site/processing areas through use of safe and environmentally sound technology.
- Ensure that all companies prospecting minerals have contingency plans to combat minor or major land and forest degradation and air pollution in high risk areas.
- There should be special trust fund where certain percentage of money is put aside to take care of host communities to tackle environmental problems.
- Mining operators should include land rehabilitation plan in their agreement.
- Regulatory agency is usually exposed to serious risk when in the field and as such should be well protected probably by attaching security personnel to their offices to improve service delivery.
- MIREMCO exists in some States but the challenge is for the ministry to give Governors the nod to appoint chairmen. In States where the interest of the Governor is IGR, this will reduce the efficiency and effectiveness of the Chairman as he will most likely dance to the dictate of the Governor.

The meeting came to an end at 3:30 pm with a vote of thanks from the Team Leader, Dr Nnaemeka Chukwuone and Mr Oliver Nwuju. They both expressed their appreciation to the participants remarking that the meeting was quite rich and engaging. The closing prayer was said by the representative of the Permanent Secretary, Enugu State Ministry of Health, Pharm. Casmir Odo, Director Pharmaceutical Services, Enugu State.

List of participants



MINDIVER PROJECT

SOUTH EAST ZONAL WORKSHOP ENUGU

24TH JULY 2019

ATTENDANCE RECORD

S/N	Name	State	Organization	Designation	Phone	Email	Sign
1	Dede Cynthia	Enugu	Fed. min. of Environment	Administrative officer	08030939242	cynthia...@yahoo.com	[illegible]
2	ANEKE CHIDI	ISHIAGU EBONYI STATE	GEXPAM NIG LTD	COMPANY GEOLOGIST	08065952...	bonekechi...@yahoo.com	[illegible]
3	MR CHIMA COSMAS U	EBONYI	MIN. OF ENV. Forestry Dept A1	DIRECTOR FORESTRY	08164232121	chimacusylor @gmail.com	[illegible]
4	Mrs Obi-Amadi Achunna	Enugu	Forestry Commission	Director	08037210027	cachuna@yahoo.com	[illegible]
5	John Nwokerefuru	Ebonyi	Umuoghara (Ezza North) Stone dealer	patron	0906414...	—	[illegible]
6	John Nweze	✓✓	Umuoghara (Ezza North) Stone dealers	Financial Secretary	08069042001	—	[illegible]
7	Livinus Ugoh	✓✓	✓✓	Chairman	08024370012	—	[illegible]
8	Odu Sunday	✓✓	✓✓	Treasurer	07064465023	—	[illegible]
9	Ozoilo Raphael	✓✓	✓✓	Secretary	08136414755	—	[illegible]
10	ORJIEWULU CARISTUS	ANAMBRA	NSUGBE Sand dealers MPCS LTD	Secretary.	0803712001 5	—	[illegible]

MINDIVER PROJECT

SOUTH EAST ZONAL WORKSHOP ENUGU

24TH JULY 2019

ATTENDANCE RECORD

S/N	Name	State	Organization	Designation	Phone	Email	Sign
11	Nwankwo Emmanuel	Enugu	FMENV	ACA	07065212330	Nwaobafochi@yahoo.com	
12	Akuma Jacob N.	Ebonyi	MSMDC	A.C.G	08033632195	jcbakuma@yahoo.com	
13	ONYENALI NKECHI.C.	Enugu	FMENV	SSO II	07060617871	adaninkechi@yahoo.com	
14	ATUMA BENADETTE	Enugu	FMENV	ACEO	08034721745	–	
15	EZEALA IFEYINWA LAURA	ENUGU	FMENV	SSO	08065016926	ezealaifeyinwa@gmail.com	
16	Ugwu Chibueze	Ebonyi	MEC	SSO	08037084709	—	
17	IREM AGHA AMA	EBONYI	NGSA	Snr. Geologist	07036017675	emasticmaro@yahoo.com	
18	OBIAKO EMMANUEL	ENUGU/ ANAMBRA	MMSD	SG	08095559778	uchennaobiako@yahoo.com	
19	NZEWIGBO OKEZIE	EBONYI	MMSD/ASM	Geologist	08034939883	okezienzewigbo@gmail.com	
20	Zulike Patience. C	Enugu	FMENV	CSA	07038256214	precious nuclear@yahoo.co	

MINDIVER PROJECT

SOUTH EAST ZONAL WORKSHOP ENUGU

24TH JULY 2019

ATTENDANCE RECORD

S/N	Name	State	Organization	Designation	Phone	Email	Sign
21	Mary Isine	Enugu	MMSD	EG	0803400591	ntelongesyahoo.com	
22	Engr. A.S. Oguru	Ebonyi	MMSD	FMO	[illegible]	[illegible]@yahoo.com	
23	Funmilayo Akinyemi	Enugu	MMSD	Corp Member	08139565731	Olufunmi[illegible]@gmail.com	
24	Onyebuchi Godfrey	Abia	[illegible] National	Member	[illegible]	–	
25	Chibuzo Ironzuchi	Abia	[illegible]	✓	0802857123[illegible]	–	
26	Dr Innocent Ifelunini	Enugu	UNN		[illegible]	innocent.ifelunni@unn.edu.ng	
27	Mba Nnems Monday	Enugu	NESREA	Reg. State Coord.	[illegible]	[illegible]@yahoo.com	
28	Ukpong, Ituen Mbakara	Enugu	NESREA	Principal Engineer	08055584258	[illegible]@gmail.com	
29	Nwanuku Nelson	Enugu	NESREA	SSO	[illegible]	[illegible]@gmail.com	
30	Nnamdi Ugwu	Enugu	[illegible] Resources Concept Ltd.	Manager	07013839428	[illegible]_plc@yahoo.com	

MINDIVER PROJECT

SOUTH EAST ZONAL WORKSHOP ENUGU
24TH JULY 2019

ATTENDANCE RECORD

S/N	Name	State	Organization	Designation	Phone	Email	Sign
31	Izuako Rita C.	Enugu	FMENV	PTO II	08037744977	claraneke@yahoo	[illegible]
32	Ifeanyi Onuorah	Enugu	Gerpm		09015515535	nnanuhurn at yahoo.com	[illegible]
33	Nwafor Ngozi	Enugu	FMENV	CEO	08033674890	ezinnedali@yahoo.com	[illegible]
34	Pharm C. Odo	Enugu	SMOH	Representing Perm Sec	08052624560	cassyoto@yahoo.com	[illegible]
35	Akam Mary C	Ebonyi	MENV	PPES	08068832675	akammary2018@gmail.com	[illegible]
36	Aya Friday C.	Ebonyi	MENV	PSO	07069770209	ayafriday4real@yahoo.co.uk	[illegible]
37	Chinweuba-eze Victoria	Enugu	FMENV	SSO	08034906596	vicky.enyi@gmail.com	[illegible]
38	Simon Okpoko	Enugu	OPI Comm.		07039679161		[illegible]
39	Okey Isiani	Enugu	OMENE, Mining		08038101551		[illegible]
40	Ukwuietinor Ben	Enugu	NGSA	ACG	08036251455	bentayinor@gmail.com	[illegible]

MINDIVER PROJECT

SOUTH EAST ZONAL WORKSHOP ENUGU

24TH JULY 2019

ATTENDANCE RECORD

S/N	Name	State	Organization	Designation	Phone	Email	Sign
41	Aloeh Gabriel O	Enugu	N.G.S.A	Geologist	080630078	[illegible]	[illegible]
42	Anuminy Justin N	Enugu	N.G.S.A	Geologist	08035981592	[illegible]	[illegible]
43	Igboamalu Cordelia	✓	FMENV	–	08057418845	–	[illegible]
44	Adaobi E Okeke	Abia	MMSD	Geologist	08036515561	adakekesaa@yah…	[illegible]
45	Nnaka Gy, peter C.	Imo & Abia	MMSD	Principal Geologist	08066779302	[illegible] @gmail.com	[illegible]
46	Ewa Frederick Eni	Enugu	MMSD	Zonal Mines Officer	08036121557	[illegible] @gmail.com	[illegible]
47	Edim Asidok (Engr.)	Enugu	MMSD	Mines Officer	08038961220	[illegible]	[illegible]
48	Suro Moses Eze	Enugu	Surveyor Gen. Office Min of Lands	Deputy Surveyor General	08066768985	ezmosunday@gmail.com	[illegible]
49	Ani Livinus C	Enugu	Enugu State Ministry of Envir. & Min Res	Geologist	08089356410	—	[illegible]
50	Umeadi, Elias I.	Anambra	MMSD	Mine Officer	07034512881	eliasumeadi@…	[illegible]

Strategic Environmental and Social Assessment (SESA) Stakeholder Workshop for North East Zone

Location: Conference Hall, Federal Secretariat, Bauchi State

Date: 19TH August, 2019

The North East Stakeholders Zonal Workshop was held on 19th of August 2019 and had in attendance members of staff of identified Federal and State Government agencies, ASM Miners, licensed Miners, Community Members, relevant Associations and Unions, NGOs and other stakeholders from Taraba, Gombe, Adamawa and Yobe States. The workshop recorded an attendance of over 60 people.

Introduction

The objectives of the stakeholder meeting were to discuss the development of an updated SESA and to create an avenue for participation and dialogue for all mining stakeholders, including those from key mining sectors that may be impacted by or influence the policy and strategic reforms to make contributions and express concerns to support legal and policy reforms and to assist in the economic development of the Nigerian mining sector. Through the stakeholder workshop, government officials, private entities, community members, associations etc. to share their experiences, issues and opinions on how to improve government decisions on environmental and social matters for the overall MinDiver project development objective.

Areas discussed during the workshop include: Mining Laws and Policies, FMEnv /SMEnv Laws, enforcement, regulations, charge fees, capacity gaps, EIA process, compliance monitoring and logistics, inter-agency collaborations and overlapping functions and institutional weakness and environmental reforms.

Participants were drawn from spectra of stakeholders from the participating States including community members, miners, NGO personnel, government agencies, and women groups etc.

Opening of The Workshop

The workshop was anchored by Mr. Ola and commenced at 12:00 AM with an opening prayer. Thereafter, the participants introduced themselves. After the introductions, a formal invitation of dignitaries to the high table was made which includes:

1. Federal Mining Officers Present
2. Permanent Secretaries Present
3. Directors of Ministries and Parastatals present.
4. Representatives of NGOs present.

Welcome Remarks

The MinDiver Environmental Specialist presented the welcome address. In his address, he welcomed those present. He gave a brief background of the purpose of the meeting which was to elicit contributions from those present that would be applied to the development of policy and regulatory framework to improve the Nigerian mining sector. He welcomed the idea of the

workshop stating it was a good opportunity to ensure grass-root participation in the development of the mining sector. He concluded by urging everyone to participate through, stating observations and concerns and proffering possible solutions accordingly.

Overview of Mindiver Project and of SESA

The Consultant gave the Overview of MinDiver Project and SESA. He informed the participants that the Ministry of Mines and Steel Development through the Mineral Sector Support for Economic Diversification (MinDiver) Project is desirous of developing the mining sector to play a leading role in the economic diversification, growth and employment in Nigeria. He stated that the purpose of this current exercise is to update the existing SESA which was conducted in 2005 and to prepare a new SESA which captures the current situation of mining and cover every gap that exists between 2005 and 2019. He disclosed that the project is assisted by the World Bank with a loan of USD150m.

The Consultant stated that the Objective of The MinDiver project is to improve the attractiveness of the Nigerian Mining sector for long-term private sector investment in the exploration and production of minerals; create a globally competitive sector capable of contributing to wealth creation, providing jobs and advancing social and human security of Nigerians and investors; and identify the priority actions that Government can take to foster the environmentally sustainable, socially equitable and inclusive development of Nigeria's mining sector.

He further stated that preparing SESA is expedient to the overall success of the project because the activities of the planned improvement of the Mining sector for economic diversification will result in increased exploitation and exploration of minerals and thus, requires strategic policy on environmental and social sustainability thus, SESA will ensure the existence of strong institutions, legislations, policies and synergies that will proactively address the existing and potential environmental and social challenges associated with mineral mining in Nigeria. The exercise according to him will mainstream sector reforms that will help all the stakeholders and actors in the sector to be able to participate well to contributing to the growth of the mining sector.

The Stakeholders were updated on activities that have been carried out which include: field work, consultation and data gathering from households within locations of ASM sites, collection of water, soil and air quality measurements around the mining sites visited, interview with licensed miners and relevant government agencies, Focus group discussions with women and affected communities across the 6 geopolitical States in Nigeria, and those that are ongoing which includes conclusion of Zonal Workshops, data analysis and report writing.

Reactions from Participants

The Consultant asked some relevant questions to elicit contributions and participation from the stakeholders.

Are there regulations, laws or policies relevant to mining that should be repealed or amended?

Responses:

- The 2007 Mining Regulation and the Mining Act regulate mining activities. They are updated as the need arises.
- The laws are sufficient; the only shortcoming lies in enforcement of these laws.
-

Are there issues of enforcement that need to be modified using regulation?
Responses:

- The ministries concerned with environmental protection should be information and awareness created among the miners.
- There should be provision of clear cut funding for MIREMCO as insufficient funding deters the body from properly to carrying out their duties.
- Most relevant ministries including the Federal Mines offices in the North Eastern States do not have enough staff and vehicles to carry out their duties.
- Ecological funds and grants should be made available to the Grassroots - in support of reclamation of land after mining activities are rounded off.
- ***Payment of Compensation for Land***. The mining companies try to short-change the host communities because there are no regulations that expressly spell out guidelines for payment of compensation.

How can value be added to the mining sector policy and regulation?
Responses:

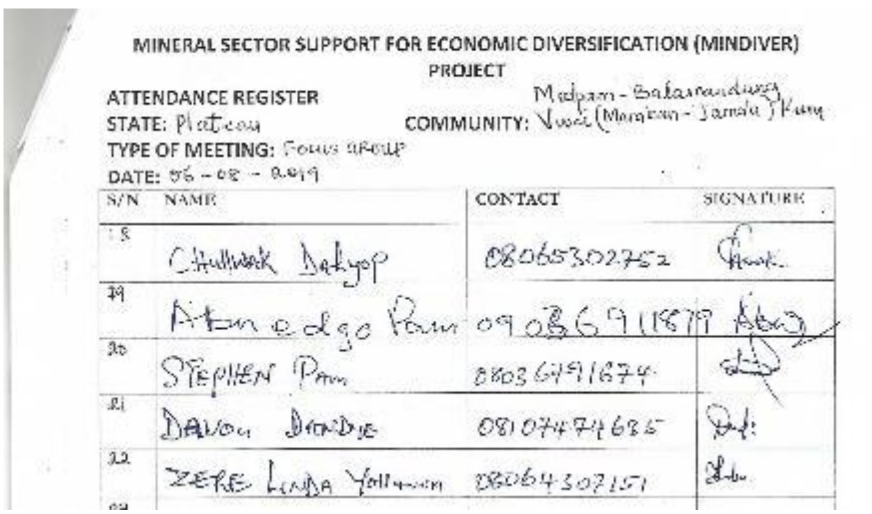
- Issues of CDAs should be taken more seriously. Community members should be made aware of their rights, and of the duties and obligations of mining companies which they host in their Communities.
- Artisanal miners should be certified. This shows that they are properly recognised by government as non-illegal miners.
- The process of obtaining an EIA certificate is very cumbersome and expensive. There should be different guidelines and regulations for obtaining EIA certificate for small-scale and artisanal miners.

Other issues raised:

- ***Infrastructural deficiencies*** as community access roads and bridges are being destroyed by heavy-duty vehicles conveying solid minerals.
- **Mining sector policies and regulations** should be translated into major languages in Nigeria so that indigenous people can read and understand.
- The government should make use of already registered cooperatives to ensure that benefits available to miners get to the grassroots.
- There are currently underage children illegally employed in the mines. The mining act is not very explicit on age limit of mineworkers. It is important that the Mining Act expressly spell out the age considered illegal for mining employment.

Response by the Consultant
The Consultant thanked the participants for their contributions. He assured the stakeholders that the issues raised will be captured in the SESA report.

Figure 1: Public Consultation with SLAG Global Investment licensed Mine, Toro LGA, Gadabiu Village, Bauchi



MINERAL SECTOR SUPPORT FOR ECONOMIC DIVERSIFICATION (MINDIVER) PROJECT

ATTENDANCE REGISTER

STATE: Plateau

COMMUNITY: Vwei (Mangkan - Jamda) Kum Medpam - Balarandung

TYPE OF MEETING: Focus group

DATE: 06 - 08 - 2019

S/N	NAME	CONTACT	SIGNATURE
18	Chullwak Datyop	08065302752	[illegible]
19	Atim edgo Pam	09086911879	[illegible]
20	STEPHEN Pam	08036491674	[illegible]
21	DAVOU DANDIE	08107474635	[illegible]
22	ZERE LINDA Yohanam	08064307151	[illegible]

Focus Group

Minerals mined: Tin & Columbite

MINERAL SECTOR SUPPORT FOR ECONOMIC DIVERSIFICATION (MINDIVER) PROJECT

ATTENDANCE REGISTER

STATE: Plateau **COMMUNITY:** Kuru miners' Co-operative Society Kuru

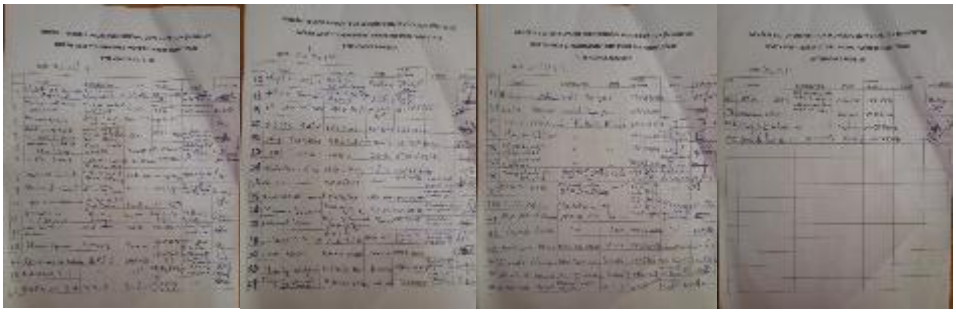
TYPE OF MEETING: Focus Group

DATE: 07 – 08 – 2019

S/N	NAME	CONTACT	SIGNATURE
1	BULUS PAM CHUWANG	08037307723	[signature]
2	Helen Dalyop	07036230448	[signature]
3	JOSEPH GIMBA	08038528568	[signature]
4	Joshua John	08039780059	[signature]
5	PWAJOK JATAU	08133172122	[signature]
6	RHODA LINUS TOMA	08148160016	[signature]
7	DALYOP PETER	08060930997	[signature]
8	SUNDAY JAMA	07068464098	[signature]
9	Moses David Dagut	08033237689	[signature]
10	Yohana Choji	08031969740	[signature]
11	Yohanna JAMA	08061560128	[signature]
12	Esther Dung Awuk	08068084622	[signature]
13	monica Ayuba Dung	08036039257	[signature]
14	Dalyop John	07036230448	[signature]
15	Iliya Samuel	07030680826	[signature]
16	Dinatu F. Kwis	08030420533	[signature]
17	Pam Chuwang	0903319106	[signature]

Minutes of The Stakeholders Workshop for North West Zone Held on The 23rd of August 2019 at De Neveilla Hotels LTD. Kaduna State

The workshop started at about 11:00AM with an opening prayer by a Muslim faithful after which there was a brief session of self-introduction by each of the attendees. In attendance were staff members from MMSD Abuja, MinDiver, MMSD Zonal office in Kaduna, representatives from MIREMCO, Kaduna and Kano chapters, MEC and ASM officers from the various North West States, licensed mining company representatives, Artisanal and small scale miners, village head of Malali community and other representatives from affected communities. A total of 50 participants were present at the workshop.



The workshop was moderated by Mr. Ola, the environmental officer for MinDiver project while the opening remark was done by the Lead Consultant for MinDiver Project, who gave an overview and purpose of the SESA, where he pointed out some of the gaps in the 2005 SESA report which the present SESA will improve on. One of the key issues identified was that in the 2005 SESA, eight (8) States were visited, whereas twelve (12) States including FCT has been visited in the present SESA. Questionnaires were also sent to other states not visited during the field visits, which are being returned. The workshop has also helped to bring together stakeholders from states that were not visited during the field visit.

Key Discussion

Questions with the community:

Have the existing laws/regulations adequately protected you?

Responses:

- The Secretary of Malali community, Mr. Aliyu Ibrahim Suleiman said they don't know or have the mining laws/regulations and that land degradation of which reclamation is not done is also a major challenge.
- Mr. Zakari Suleiman (MIREMCO Kano) was of the opinion that the chiefs of the communities are not even aware that these laws exist hence; these laws/regulations should be translated into local languages and given to them.

- Madam Charity Malgwi from MIREMCO Kaduna State chapter also responded to this question and said that in Kaduna State, they are working on translating these laws/regulations into local languages, printed in booklets that will be distributed to the various communities. Hajia Aishatu Aliu from women in mining Kaduna State chapter responded to this question as well by saying that most communities do not know about the mining laws/regulations; they are just interested in the commission which they will get from the miners.

- Toko Mike of MinDiver responded to the request of translating the laws/regulations into local languages and said that a contractor will be coming on board to review these laws, translate it to the local languages and put it in a booklet.

Are there environmental or social issues that mining poses in your community?

Responses:

- In response to this question, the Secretary of Malali community Mr. Aliyu Suleiman said there is an increasing rate of underaged miners, that these children ought to be in school. This brought about an argument of which about 20 persons were against underaged mining and about 9 persons supported it. Hajia Aishatu Aliu emphasized the need for underaged mining to stop because it is what brings about molestation. She also mentioned that these children are often used as cheap labour.

- A participant from Sokoto was of the opinion that children should be allowed to engage in mining because they use the money for their school fees, assist their families and it is also an avenue for them to learn the business so as to take over from the older people in the future.

- Hajia Habiba from Sokoto was against the idea of the underaged engaging in mining activities. She said that they do not permit them to work in their mine sites.

What are the key issues that discourage women in mining?

Response:

- On the issue of women engaging in mining, Hajia Aishatu Aliu from Women in Mining, Kaduna State chapter emphasized on the need for adequate awareness to encourage the women that have interest and capacity to go into mining.

Questions with the Miners:

Is mining a lucrative business in Nigeria?

Responses:

- Mr Zakari Suleiman of MIREMCO Kano said that mining is a lucrative business in Nigeria.

- Hajia Aishatu Aliu was also of the opinion that mining is a lucrative business in Nigeria but needs support to make it more lucrative. The support is in the area of creating more awareness and addressing the security issues associated with mining; that they cannot continue to mine in an area where they cannot possibly get security within the community. She also mentioned that government has a role to play in bringing the community to the knowledge of the law by coming in when there is a project because when anything is happening presently, you get the knowledge of it at that moment.

Are you aware of the existing environmental and social laws regulating the mining sector?

Response:

- Hajia Habiba from Sokoto said they are aware of the existing environmental and social laws regulating the mining sector but need more enlightenment.

In your opinion, are the laws and policies adequate? If no, which areas of the law do you want government to change?

Responses:

- Hajia Habiba said they find it difficult to comply with the law of having mining license because it requires having certain amount of money in one's account which most of them cannot meet up with.

- Another point made was that government should harmonize the issue of regulation and come up with a body that will regulate mining operations and activities.

Questions with the mining officers:

From your field experience, what are the areas you would want to advise government to redress or change in the mining laws?

Responses:

- Engr. Suleiman Adamu (Zonal Mines Office Kaduna) raised a point on double taxation and royalties on miners of sand and sharp sand. They collect royalties and taxes from these miners as stated in the Mining Act of 2011 and National Inland Waterways Authority (NIWA) still harasses these miners for royalties and taxes based on NIWA Act 2004. He said the mining Act is more recent than the NIWA Act and should be followed. He emphasized on the need for harmony to avoid double taxation.

- Mr. Umar Haruna (MEC Officer for Kaduna) made mention of the amount paid for EIA being too high for ASM and was of the opinion that the cost for EIA should be reduced for the ASM.
- There should be mining officers and ASM officers assigned to each state rather than overburden an officer to oversee more than a state.

What are the social issues and risks that affect staff commitment and results in pursuing environmental compliance and monitoring?

Responses:

- Police officers should be employed and attached to the mine offices to accompany the mining officers to the field because these officers are also at security risk.
- Hazard/ Risk allowance should be included in the mining officers' allowances.

Conclusion:

The workshop came to a close at 1PM with a closing remark and vote of thanks by Mr Ola after which the closing prayer was said by madam Charity Malgwi of MIREMCO, Kaduna State chapter.

Pictures from Site

Datum Construction Nig. Ltd. (Licensed site) – Chikun LGA Kaduna state

North Central Zonal Stakeholders' Engagement on The Strategic Enviornmental and Social Assessment (Sesa) Held On 27th August 2019 At Hotel De Bently, Abuja

Mineral Sector Support for Economic Diversification Project (MinDiver Project)

The meeting commenced at 11:10 am with Barr. Kelechi Igbanigbor welcoming every guest to the program. The opening prayer was said by Engr. O.O Kehinde (Deputy Director, Mines and Steel Development). Thereafter, guests introduced themselves. Mr. Olasehinde made the opening remarks acknowledging the fact that the Nigeria government understands the importance of stakeholders in the MinDiver project. Mr. Olasehinde stressed that the consultants have done their desk and fieldwork but equally needs the contribution of stakeholders from the different sectors to make the result of the research much more robust. He stressed that the outcome of the interaction will go a long way to strengthen the SESA that will be prepared at the end of the project. He emphasized the fact that the wealth of experience of the stakeholders is very critical to improving the quality of the document and the intervention thereof.

Following the opening remark, Prof Agwu made a presentation on the SESA after which there was interactive session.

Interactive Session

Before the main deliberations, Barr. Kelechi called the attention of stakeholders to CDA, EIAs which have been highlighted by other zones. She stressed the issue of wealth and how it can be appropriately captured. She called on those working in monitoring or evaluation to highlight some of the challenges they have been facing in carrying out their duty/jobs. Before the interactive session, the moderator asked if there are people that have reservation with the use of local/English language.

One of the Geologist asked how relevant are the data collected by the fieldworkers. The question was subsequently addressed by stakeholders explaining the relevance of the data collected in informing policy decisions. Mr. Linus (ASM, FCT0) asserted that mining hinges on 3P- people, plant, and profit. He pointed that when the miner is well trained, mining will not degrade the environment. He noted that if the officers in the field are not footed, there is bound to suboptimal results. This happened to the project monitoring unit (PMU) of the World Bank. E.g it is what happened in Abakiliki. They emphasized that the ASM officers should be well-thought/trained so that there will be follow up after the gestation period of the project-assisting Artisanal miners to continue and grow. It was suggested that Government can go modern (use of airborne, electromagnetic). In addition, the stakeholders stressed the need for more enlightenment concerning child labour. Mr. Michael Toko pointed that MinDiver is a technical project that is supporting mining activities in developing policies. It is not constructing new projects but has activities for all mining agencies. Other highlights of the interaction include the following:

- There is weak safety net in the mining sector. ECOWAS mining Directive should be active.
- Laws are not clear about what communities are.
- Laws are not also clear about inter-ministerial synergy-hence there is no clear role.
- Laws are not firm about the role of Customs Services.
- Who funds Mineral Resources and Environmental Management Committee (**MIREMCO)?** And what should be the benefit?
- The issue of multiple taxation was raised.
- There should be need to work out appropriate formula for Royalty.
- EIA systems are not working.
- There is the need to move from EIA to Environmental and Social Human Right Impact Assessment.
- If the mineral resources to be derived will not benefit the community, then it should not be derived.
- There is the need to learn from models that have worked somewhere.
- There is also the need to depend less on Foreign investors and more on indigenous investors in the mining sector.
- Beneficiation of minerals must be given priority. Mining must benefit the Nigerian people.

Mustapha (Chairman, MIREMCO Niger State) stressed the following:

- The Need for serious synergy between ministries. Ministry and State Department.

- Sometimes mining license is given by the ministry whether EIA is adequate or not.
- Federal and State dichotomy. The State owns the mining sites and when the Federal have it, it can be dead on arrival.
- There is a strenuous condition in access to credit.
- They pleaded that the final Report of the SESA be made available for the public to which Barr. Kelechi assured him that the document will be made available

What are the security challenges?

- A stakeholder from Niger State said that at a point, the people almost sent a message to stop mining activities just like Zamfara State. The Niger State Government is spending a lot of money for logistics in terms of purchase of vehicles, equipment, informant etc (these are enormous).
- Mr Peter from Niger State revealed that miners in Niger State do not observe environmental compliance/laws. He added that some companies are operating without EIA that stipulates what the companies should do for the community. He further maintained that companies are not supposed to commence operation until EIA is completed.
- Similarly, another stakeholder emphasized the importance of community engagement. He suggested that a scoping workshop should be done in the local government or community where the project is to be cited. The consultants could organize such workshop jointly with the community before the commencement of the project.
- The stakeholders raised concern about non-disclosure of documents before project commencement. In response, the officers from the ministry of environment disagreed with the comment noting that the documents are usually sent out but the minimum the ministry does is to send such document to the local government and the community where the project is domiciled. Also, the document is hosted on the ministry website.
- Mining laws and regulations should reflect the mining activities that take place.
- Licensing procedure is too cumbersome and expensive for artisanal small-scale miners.
- The ministry officers also corrected the impression that ministry of environment stays in Abuja to review reports pointing that consultations are carried out both at the local government area and community level. The ministry officers also said they will welcome any observed lapses in their operation.
- The gap between the Cadastral office and the mines compliance/mines office is too wide. This should be corrected to reduce friction. In addition, stakeholders suggested that before a company is issued a license by the cadastral office, the ASM/compliance officer should endeavor to find out whether the information supplied is well captured.
- Miners should take environmental issues seriously.

- Until the practice of government taxation is resolved, multiple taxation will not be solved. For instance, in-as-much as the Cadastral office issues license, the community should be recognized.
- Dr Joseph from Ministry of environment, Niger State, pointed out the following:
    - There is the need to devise workable strategy between the Federal and State Government. This is because the Federal government cannot provide enough staff. Even the State with the number of staff cannot do the work efficiently even if the staff members work 24 hours daily.
- So long as the State is not carried along CDA, **MIREMCO** will continue to work but will not produce result.
- When signing CDA, it should be clear the ministry should be carried along to avoid few people hijacking the process. In summary, the exclusiveness of mineral law should be revisited. There is the need to recognize the existence State mineral resources. Again, the Federal and State Government should both look at the issue of multiple taxation.
- Engr. Kehinde advised that government should place importance on value addition. Before license is issued therefore should be clear picture of value addition as this will enhance employment generation.
- In terms of credit access, government should assess the agencies disbursing the World bank loan to ascertain what is happening with the loan and how it is being disbursed. This will ensure that the right thing is done and much more people have access to such credit facility at relaxed conditions.
- Jacob Kudo (Cadastral Office) said that it is sometimes difficult to reserve license for Artisanal miners where there are big companies especially as the country is also driving for revenue.
- Obed KANGO (Chairman miners association, Niger State)- while he noted that mining is lucrative, stressed the need for improved correspondence between applicants for mining license and the office in charge of license.
- Besides the deposit money banks, the World Bank can set up an independent financial outfit that will handle credit disbursement. Some of the Bank of Industry staff do not understand mining activities and therefore cannot do proper assessment of the mining companies for credit. Government should be able to employ knowledgeable persons in an independent outfit.
- There is the need for bankable geological data to attract investors.
- Government should also address the issue of speculation.
- Mrs. Usman (MEC Officer, Benue State) maintained that one way to protect project is for the local government to acquire equity in the project so local government becomes stakeholder in the project and be able to protect the project.

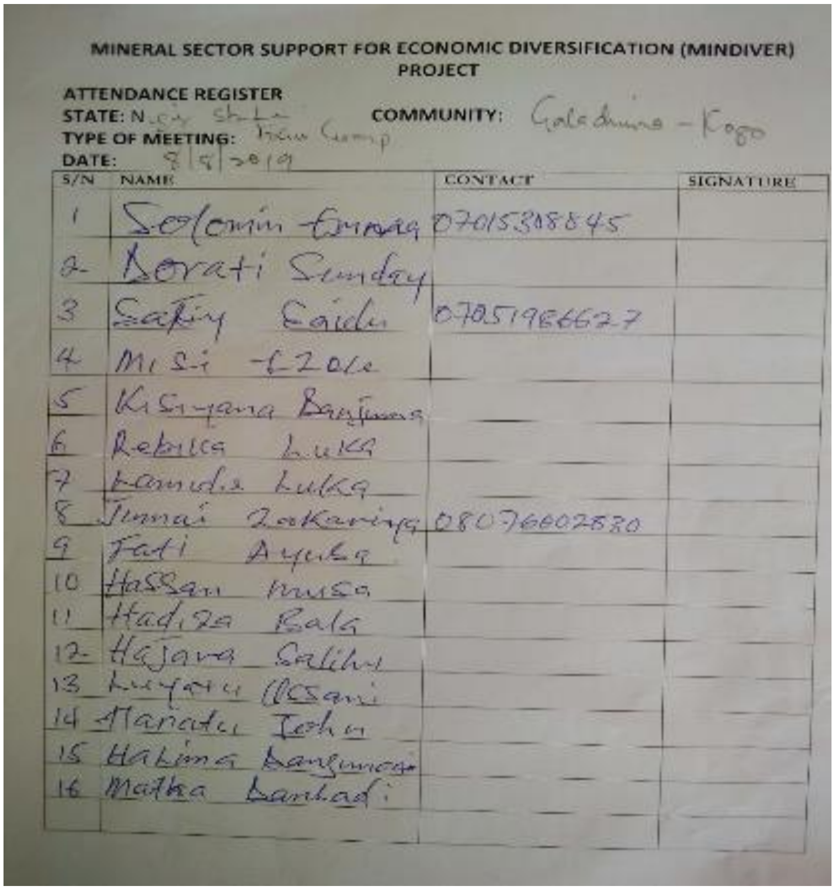
- At the community level, Abdulahi from Shiroro pointed that explosives affect their water and animal. There should be alternative to explosives and dynamites.
- There could be some social issues in the mining site that have to do with gender violence or sexual abuse. An officer from the Ministry gave an instance in a State (**not in the North Central**) where a Chinese Company refused to buy mining products from women unless they have canal dealings with the women.
- The stakeholders also suggested that the mining sector should introduce Grievance Redress Mechanism within the sector with MIREMCO and community having representatives. The community should be able to understand the document and know whom to report to.

Other issues discussed

- The ASM officers need to be equipped with the necessary working tools and also training for them on manipulation of equipment.
- Allowing ASM operators get SSML where necessary and not making it difficult for them like the case of FCT.
- Improved security at the mining sites since most of these activities take place in remote rural communities.
- Improved synergies between MinDiver and ministry of water resources.
- There should be review of environmental law and ensure compliance of miners to environmental laws.
- There should be proper waste management.
- Most mining and quarrying companies do not have environmental officers.
- Artisanal and small-scale miners do not carry out EIA, EPRP, CDA etc. It is therefore difficult to enforce environmental laws and reclamation plans.
- Again, many mine workers are not provided with PPE; even when provided, many fail to use them.
- The Government should employ youths from mining communities since royalty is paid to Government and not communities.
- Government should address the problem of illegal mining.
- Mining should be allowed in the Exclusive List to maintain uniformity. Again, the State Government could abuse powers particularly during political campaign period.
- Some of the factors that militate against effective compliance monitoring by MEC officers include:

- The MMSD appears to prioritize revenue generation by field officers over the enforcement of environmental and social obligations. It is therefore recommended that:
    - The ministry should make all the three technical departments fully independent in terms of funding. Again, quarterly funding should be made available to MEC and ASM independently.
    - The mining cadastral office must ensure that mineral titles are renewed subject to adequate compliance to environmental obligations. The renewal applications must be endorsed by MEC department before renewed MCO.
- The stakeholders' frowned at exploration titles given to prospective investors who keep sites unused for several years while it is neither revoked nor given to more serious and ready investors to take over such sites.
- Community agreement should be implemented and taken seriously by the mining companies.
- Staff members of the Ministry should be allowed to conduct EIA instead of consultants.
- Government should address the impact of mining on agriculture because mining generally requires large land areas. Again, land degradation is one of the effects of mining activities. Strategy should be put in place to reclaim land degraded as a result of mining activities. Such as planting of trees on abandoned mine sites. There should be sensitization of mining communities on the effects of illegal mining activities
- Many lives have been lost as a result of lead poisoning in the course of mining. Hence, the use of personal protective equipment should be enforced to avoid any form of outbreak such as the case of Shirkirs in Rafi Local Government in Niger State.

The meeting ended at 2:13 pm with Mr. Olasehinde Oladusi thanking everybody for the rich interaction/contributions. Closing prayer was said by Ibrahim Kabir



MINERAL SECTOR SUPPORT FOR ECONOMIC DIVERSIFICATION (MINDIVER) PROJECT

ATTENDANCE REGISTER

STATE: Niger State   COMMUNITY: Galadima – Kogo

TYPE OF MEETING: Focus Group

DATE: 8/8/2019

S/N	NAME	CONTACT	SIGNATURE
1	Solomin Emmag	07015308845	
2	Dorati Sunday		
3	Safiy Saidu	07051986627	
4	Misi Ezole		
5	Kisinyana Banjuma		
6	Rebeca Luka		
7	Lamidi Luka		
8	Jummai Zakariya	08076602830	
9	Fati Ayuba		
10	Hassan Musa		
11	Hadiza Bala		
12	Hajara Salihu		
13	Luyatu Usmani		
14	Maratu Isha		
15	Halima Banjuma		
16	Matha Danladi		

Minerals: Granite

MINERAL SECTOR SUPPORT FOR ECONOMIC DIVERSIFICATION (MINDIVER) PROJECT

ATTENDANCE REGISTER

STATE: Plateau

COMMUNITY: Vwei (Marabun - Jamale) Kuru
Madparo - Gwalamaadung [illegible]

TYPE OF MEETING: Focus Group

DATE: 06 – 08 – 2019

S/N	NAME	CONTACT	SIGNATURE
1	DUNG M ZI	08034459565	[illegible]
2	PAM D A HWIOL	080 36 3414[illegible]	[illegible]
3	Yohanna K Pam	08065328553	[illegible]
4	Gwipwu Badung Fidelis	07035827267	[illegible]
5	Tok Bitrus Davou	08037847186[illegible]	[illegible]
6	Pamwuos Vwios Bitrus	08108830198	[illegible]
7	Chung Emmanuel Pwajok	08206655143	[illegible]
8	Dauid Ezekiel Mabwsei	07063357246	[illegible]
9	MARK BITRUS PAMVO	07064793876	[illegible]
10	RWANG JUGU	08131358852	[illegible]
11	Alis A Bature	07066657366	[illegible]
12	Gyang Musa Kakon	0816066 2204	[illegible]
13	Clement Jugu Alpha	[illegible]	[illegible]
14	Ldupa Danjuma		[illegible]
15	Dalyop James Rwajuk	07035721231	[illegible]
16	De Gyang Bitrus		[illegible]
17	Patrick Manjei	08062551539	[illegible]

MINERAL SECTOR SUPPORT FOR ECONOMIC DIVERSIFICATION (MINDIVER) PROJECT

ATTENDANCE REGISTER

STATE: Plateau

COMMUNITY: Vwei (Maraban-Jama'a) Kuru Mdpam - Balamandung

TYPE OF MEETING: Focus Group

DATE: 06 – 08 – 2019

S/N	NAME	CONTACT	SIGNATURE
18	CHullwak Dakyop	08065302752	Chwak.
19	Abnedgo Pam	09063691879	Abn
20	STEPHEN PAM	08036791674	[signature]
21	DAVOU DANDYG	08107474635	Dav:
22	ZERE LINDA YOHANNA	08064307151	[signature]
23			

Minerals mined: Tin & Columbite

MINERAL SECTOR SUPPORT FOR ECONOMIC DIVERSIFICATION (MINDIVER) PROJECT

ATTENDANCE REGISTER

STATE: Plateau **COMMUNITY:** Kuru miners' co-operative society Kuru

TYPE OF MEETING: Focus Group

DATE: 07 – 08 – 2019

S/N	NAME	CONTACT	SIGNATURE
1	Bulus Pam Chuwang	08037307723	
2	Helen Dalyop	07036230448	
3	Joseph Gimba	08038528568	
4	Joshua John	08039780059	
5	Pwajok Jatau	08133172122	
6	Rhoda Linus Toma	08148160016	
7	Dalyop Peter	08060930997	
8	Sunday Jama	07068464098	
9	Moses David Dagut	08033237689	
10	Yohana Choji	08031969340	
11	Yohanna Jama	08061560128	
12	Esther Dung Awuk	08068084622	
13	Monica Ayuba Dung	08036039257	
14	Dalyop John	07076230448	
15	Iliya Samuel	07030680826	
16	Dinatu F. Kwis	08030420533	
17	Pam Chuwang	0903319106	

From Left *- Group picture with women miners in Bauchi state*

From Right *- Interview with community leaders in Ondo State during the SESA study*

Artisanal Mining site at Checheyi village Kwali, Abuja

Processing of gold/ wolframite from the gold ore with chemicals and the pollution of water bodies

Artisanal Mining site at Checheyi village Kwali, Abuja

Processing of gold/ wolframite from the gold ore with chemicals and the pollution of water bodies

Group of artisanal miners mining Gold in Galadima Kogo