

INVESTIGATION INTO THE ADVERSE ENVIRONMENTAL DEGRADATION AND INCREASING FATALITY RATE RESULTING FROM BAD COAL MINING PRACTICES IN COMMUNITIES OF KOGI STATE, NIGERIA.

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ABSTRACT

Coal a fossil fuel, which exist in high quality and abundant quantity in the Eastern part of Kogi State, particular around Ankpa in Okaba, Okobo villages and other surrounding settlements. However, with unplanned and unregulated extraction of this resource, what should be a “blessing” has become a “curse” This is owing to the fact that the environment from where coal is extracted is polluted and adversely degraded, people die in their numbers, health and environmental issues are trivialized and the general coal extraction is carried out without due consideration of international best practices in mining of minerals and fossil fuel that puts in place health, safety and environmental impact standards. Reports of coal concentration and exposure rate far exceeds world standard of ambient atmospheric air, soil and water accepted quality levels and standards. Chronic diseases and even death have resulted from uncontrolled exposure of people and environment to improper coal mining methods. Recommended mining practice is suggested to reduce the level of environmental harm done to the coal mining villages in Kogi State.

Keywords: Coal, deposit, degradation, mining, pollution, reserves.

INTRODUCTION

According to Nigeria’s bureau of statistics, Okaba, Okobo with other villages and hamlets in Ankpa Local Government Area of Kogi State Nigeria are blessed with coal reserve of well over 380 million tonnes. This enormous amount of coal deposits could conveniently serve as source of electrical power to millions of Nigerians who currently have little or no access to electricity supply. Coal occurrence in the area is its greatest albatross – a blessing turned to curse in these communities [1]. Increased coal mining activities became rampant in these communities when The Nigerian government granted the ETA Zuna Group as well as the Dangote Cement Company plc license to mine coal in the locality. While the Dangote Cement Company plc required coal to power their cement production plant, the ETA Zuma Group was granted license to mine 100 million tonnes of coal from Okaba, Okobo and other villages in the Ankpa area as well as license to build coal power plants in nearby Itobe, Kogi state, which is capable of generating 1,200 MW with Okaba and Okobo serving as coal feeders.

Coal is a complex, organic, bedded sedimentary rock characterized as a fossil fuel composed of complex mixtures of organic mixtures with a few trace elements and compounds mostly of organic origin. It is formed by decomposition of plants over a long period under intense heat and pressure. Some of the elements associated with coal combine to

form discrete minerals such as pyrite - a metallic mineral composed of iron and sulfur arguably the most abundant sulfide mineral present on earth. Other trace elements concentrated in coal bed include silver (Ag), zinc (Zn), or germanium, which have potential to be hazardous if they exist in higher concentration. Leachate contained in coal mining sewage and waste may contain significantly undesirable elements or compounds resulting from the coal excavation process. When sulfur is released from decomposing pyrite mixes with water to produce sulfuric acid, which leads to acid rain or even rock drainage.

Anambra Coal Basin (which contains the most viable and economical amount of Nigerian coal resources) is subdivided into three (3) major coal districts, namely: Kogi, Benue (Orupka-Ezimo) and Enugu Coal Districts [2]. The Kogi Coal District is estimated to cover about 225,000 hectares of the Anambra Coal Basin, which lies on the North-Eastern side. Ogboyaga, has the largest amount of available coal data, where 27 exploratory holes have been drilled and cored, while 15 separate measurements have been taken from outcrops of the coal seam in stream and drainages. The Ankpa area comprising of Okaba, Okobo and other surrounding villages and hamlets are of great interest in coal mining in this district. Several core holes which intercept the main coal seam have been drilled with a total estimate of 100 million tonnes of coal in about 2,770 hectares in the Okaba/Okobo areas with an additional non-reportable 435 million tonnes coal resource projected to the west of existing deposit. A total of 223 million tonnes averaging 3.6 meters thick, which underlies 8,900 hectares, or 4 percent of the District is estimated to exist in the Kogi coal district with a total non-reportable resources of about 600 million tones [2][3][4].

Coal mining activities in Okaba, Okobo and other villages and hamlets in that area employ surface mining method, referred to as opencast mining operation. This method is adopted for its economic reason – as the coal seam exist close to the surface. The mining technique requires overburden removal, where top soil covering the coal seam is removed by excavation to expose the coal. The deposit is then drilled, fragmented and tactically excavated in strips. Conveyance, haulage and transportation is done using draglines, bucket wheel excavators, power shovels, large trucks and belt conveyors.

ADVERSE HEALTH AND ENVIRONMENTAL IMPACT OF COAL MINING IN THE AREA

Coal mining in Okaba and Okobo and the surrounding villages has caused some pollution that have distorted the ecosystem and changed the lives of people in the communities. These pollutants affect the atmosphere, biosphere, hydrosphere and lithosphere.

Coal mining activities involving excavation and transportation of mined materials, results in high amount of coal dust occurrence and dangerous gaseous emission in the air. This is dangerous when inhaled by humans and animals over a long period of time. Movement of coal bearing heavy duty equipment and trucks also raises dust level to an elevated level. Respiratory disorders such as asthma, and bronchitis and lung diseases result from such exposure to coal dust from the mine and other coal handling activities. Large exposure to metals such as lead or mercury often found associated with coal mining combines with dust, result in complicated health issues for the communities, with children and women worse hit – causing stunt physical and mental growth.

Coal mining especially when carried out in open-cast, destroys the entire landscape of both the pit and the surrounding area. Farm lands are degraded and most mined out land are not reclaimed. Most of the times efforts to restore land in these areas to its original state before mining often fail [4]. Where pits and trenches are dug, the surfaces collapse, cave in or sink. Mined out areas are susceptible to flooding and erosion. impervious surfaces exposed around the construction site and coal mine fields increase the potential for extensive erosion which result in a change in the land use pattern of the areas.

Coal mining activities has also generated heavy noise which is nauseating, disruptive and discomforting to the communities. Heavy equipment used for excavation, haulage and transportation have also caused intense ground vibration beyond acceptable limits that have resulted in crack on buildings with cases of collapse of existing surface structures.

Ground water degradation and contamination result from construction equipment which generates high volume of oil waste. Uncontrolled fueling, servicing protocols and maintenance work for construction and mining machinery at the worksite and minefield have adverse impact on ground water due to leakage and spill. Improper discharge or leakage results in contamination of surface as well as sub-surface water.

NEGATIVE SOCIO-ECONOMIC IMPACTS OF COAL MINING IN THE AREA

As a result of increase in road traffic resulting from mining activities and transportation of mined materials, there is high volume of road traffic and increased risk of accident, injuries and death. More people, vehicles and equipment use the road distorting its carrying capacity. The influx of people into the area has led to imbalance in age-sex dynamics; increased infrastructural usage and consequent breakdown; increased communicable diseases; overpopulation and overcrowding; undue pressure on already deficient and dilapidated physical, social and economic infrastructure; increased sexually transmitted diseases; increase in insecurity and crime; laziness and shift from conventional occupation (farming) to fast earning mining job; increase in social vices and higher cost of living.

METHODOLOGY

This study carried out a socio-economic investigation of villages, hamlets and communities around Okaba and Okobo settlements in Ankpa local government area of Kogi State Nigeria. The primary data for this study include site visit and observation, interviews with settlers in these communities and group discussions focused on coal communities in the area. Desk research with data clustered from existing literature was also used in the estimation of secondary data collection.

Testing of land (soil) and air samples were collected, measured and investigated for some toxic elements.

Description of Study Area

The area comprises of coal communities in the Eastern flank of Kogi state particularly Okaba, Okobo and other smaller hamlets and villages in Ankpa local government area. The geographical coordinates of the area are $7^{\circ} 23' 0''$ North, $7^{\circ} 44' 0''$ East. The geological setting is sedimentary environment underlain by Mesozoic rocks between the Benue through and Awgu formation, lithological composition is alternating sandstones, shales, sandy shales and mudstones, with various horizons of coal seams or carbonaceous shales. The sequence of rock types is characterized by a pattern marked by repeated units of at least five times, which suggests repeated uplifts with subsidence of the land, along with deposition of transgressive as well as regressive sequences.

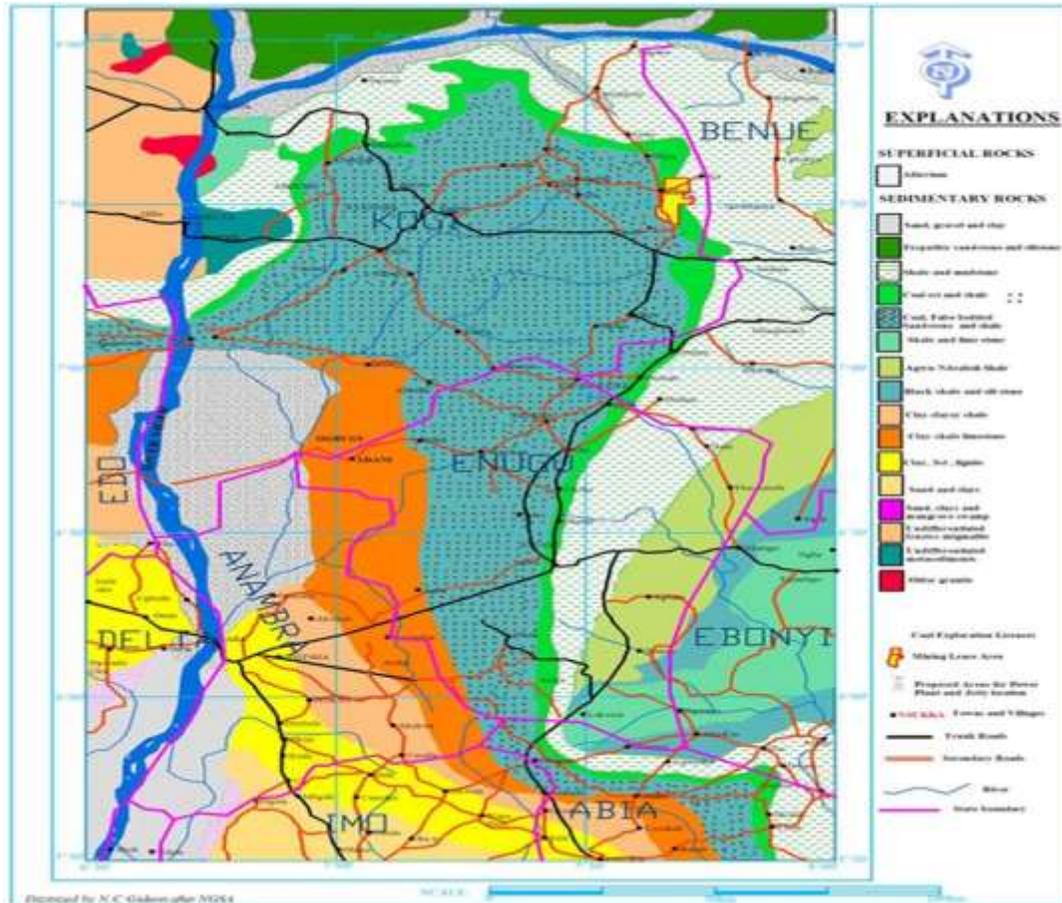


Figure 1: Abridged Geological Map of Nigeria showing the study area [5]

FINDINGS

Coal mining activities have caused heavy metals to contaminate the water as they dissolve into the streams or rivers around the mine site, making the water toxic and acidic for human, animal and plant consumption. Global Rights carried out an analysis and found the level of copper, chromium, cadmium, phosphates and manganese to be too high in soil samples in the mining pit in Okaba/Okobo coal communities. This has led to kidney and liver damage, anemia, eczema, muscle pain, gastro-intestinal disease, hypoglycaemia, etc [6].

Similarly, the air condition as a result of coal mining falls below the United States Environmental Protection Agency (USEPA) standard for ambient air condition quality of below 200ppm. Acceptable level standard for hydrogen sulphide is below 0.03ppm. For nitrogen dioxide, the acceptable standard concentration by the United States Environmental Protection Agency (USEPA) is below 0.0533ppm. Average concentration of gases in the communities under study is tabulated in Table 1. Table 2 shows some physical and chemical parameters of soil and the acceptable level of the Federal Ministry of Environment. Exposure to concentration of these elements are far above these accepted levels and result in drowsiness, acute headache, nausea shortness of breath and chronic lung problems.

Table 1: Average concentration of Hydrogen sulphide and Nitrogen dioxide in coal mining communities in Okaba, Okobo and surrounding communities

S/N	Element	Accepted Ambient Condition (ppm)	Measured Gas Concentration (ppm)
1	H ₂ S	< 0.03	1.1
2	NO ₂	< 0.0533	3.5

Table 2: Average physical and chemical parameters of soil in the study area

Sino	Parameters	Average Measurement	Federal Ministry of Environment Acceptable Limit
1	pH	7	6-9
2	CONDUCTIVITY (US/ cm)	550	1000
3	SALINITY (‰)	0.25	0.1
4	PHOSPHATE	7	5
5	PHOSPHORUS	5.10	0.1
6	NITRATE	13.0	20
7	CHROMIUM	0.10	0.01
8	MAGNESIUM	0.29	50
9	MANGANESE	0.68	0.05
10	IRON	0.20	1.5
11	COPPER	0.53	0.1
12	CADMIUM	0.11	0.01

CONCLUSION

Coal is a great resource to any nation. Kogi State of Nigeria is abundantly endowed with this resource. However, this blessing has impacted negatively on the host environment and distorted the socio economic life of inhabitants in the coal communities. Owing to improper planning and unacceptable mining practices, coal mining in Okaba, Okobo and other villages in the vicinity have resulted in acute environmental degradation and high fatality rate. A safer and more environmental friendly approach to coal mining and its downline processes would change the narrative and reduce the risk in which these communities in Ankpa area of Kogi State are exposed to.

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