

ENVIRONMENT CONCERNS AND SUSTAINABLE DEVELOPMENT: AN IMPACT ASSESSMENT OF ENUGU COAL MINE

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Abstract

Nigerian Coal Corporation started mining in 1915 at Enugu coal mines. The mining led to a large amount of coal mining waste, which has been deposited in surface dumps and landfills that were selected for their accessibility and closeness to the waste source as opposed to environmental concerns. Environmental degradation, ground water pollution, health hazards, elimination of vegetation and disruption of ecosystem and wildlife habitat, destruction of genetic soil profile and pollution of the surrounding agricultural land which limits the production of crops are some of the associated impacts on the environment. This paper approaches environmental sustainability adopting qualitative research methodology using historical method of analysis, and primary and secondary sources of data will be employed. The paper examines the effect of coal mining in Enugu and set conditions necessary for change. Therefore, the paper recommends reclaiming of physically disturbed areas to stop erosion, stabilizing chemically or metal-containing soils to stop unintentional metal leakage into the environment, treating or preventing water contamination and reusing of mining waste.

Key Words: Pollution, Coal mining, Health, Animals, Plants

Introduction

Enugu State in Nigeria's south-east is known for its rich coal deposit. A densely populated metropolitan city, owes its urban status primarily to the existence of very large deposits of coal (mainly of sub-bituminous grade) The inception of the coal mining in Enugu was the Mineral Survey Department established in 1903 under the direction of Mr. W.R. Dunstan, Director of the Imperial Institute of Mineral Survey, London.¹ The Survey 's first finding was Lignite near Asaba² and in 1908, large deposits of Lignite were discovered at Ibusa, Okpanam, Obomkpa and Nnewi.³ As the imperial Institute was testing the quality of the mineral for fuel purposes, other large deposits of coal were discovered in Ngwo in 1909⁴ by a team of geological exploration engineers led by Mr. Kiston.⁵

More intensive geological exploration was carried out between 1910 and 1914 during which they discovered that the coalfield in Ngwo was a sub-bituminous one and good enough for steam raising purposes.⁶ Mining started in Ngwo coalmine in 1915 as the Udi coal mine was opened in Enugu-Ngwo in November 1915. By 1917, further prospecting was carried out resulting to the opening of a second mine at Ukwuna (Iva –valley) which was to become the main source of coal for a while.⁷ Later, other mines such as Onyeama, Okpara, were opened and Obwetti (Ogbete) mine was opened at Ofu-Ezata and was connected to Udi mine in 1918.⁸

The first coal load weighing 7000 tons was mined in 1915, before the railway reached Udi and by 1917, it nearly quadrupled with 24,000 tons. It hit 34,000 tons in 1929. The highest boost was recorded during the war years between 1945 and 1946 when production reached an average of over 580,000 tons.⁹ Simple picks, shovels, and locally produced baskets were the first tools utilized; explosives, drillers, and tubs were only introduced considerably later. The actual task of mining was unpleasant and dangerous, like all mining.¹⁰

Coal mining as a land use bestows wealth and employment opportunity in an area, but assiduously leads to extensive environmental degradation¹¹ and changes in the traditional values of a society. Coal generated lots of revenue for Nigeria between 1916 and 1970 when it was one of Nigeria's major revenues earners. As demonstrated earlier, mining exploration began in present day Enugu state in 1909, with production at the mines in Onyeama, Ogbete, Iva Valley and Okpara climbing from 25, 511 tons in 1916 to an estimated 583, 422 tons between 1945 and 1946 before a decline set in during the Nigeria-Biafra war which took place from 1967 to 1970.

At the end of the war, most parts of the south east had been ravaged and many expatriate mining experts, mostly from Britain and Poland had left Nigeria. The exit of experts coupled with the discovery of commercial quantity of crude oil, made the government to abandon coal resulting in the neglect and subsequent abandonment of the massive infrastructure at the mines managed by the Nigerian Coal Corporation(NCC). The NCC tried to manage operations unsuccessfully for another 30years, but it finally folded in 2002.¹²

Enugu coal mining is an inherently invasive process which has caused damage to a landscape, erosion, death of plants and animals in an area much larger than the mining site and the effects of this damage has continued years after the government has abandoned it. This study, therefore, is aimed to assess the impact of Enugu coal exploitation on the environment and emphasize the importance of environmental management to sustainable development in Nigeria.

Conceptual Clarification

Environment

In the general sense, the term environment refers to the surroundings of an individual, a group, or groups of organisms. It is comprised of everything living or non-living that sustains the different life forms that may be found within a particular ecosystem. According to Mangvwat in Udo & Akpa, environment is the totality of life the biosphere which includes human beings living in harmony with the environment expresses this relationship.¹² This is based on the recognition that the environment is not for exploitation by man but calls for rethinking and a new orientation towards the environment before a solution to environmental damage can be proposed.¹³

According to Gilles and Lucas, the environment has three aspects; the biological, physical, and the socio-economic. The biological is made up of living things (plants and animals); the physical comprises non-living things (such as water bodies, rocks, mountains, soil); while the socio-economic includes the dynamics of inter-relations between humans in their communities (like family, belief systems, culture, trade, politics.)¹⁴ Deducing from above, this paper will conceive the environment as the sum of all the factors that ensure the survival of human and non-human life forms within a given community.

Sustainable Development

There are many definitions of sustainable development. But the most popular definition is by the Brundtland Report. It defined sustainable development as “meeting the needs of the present generation without compromising the needs of future generations”¹⁵ Sustainable development means that development should “keep going”. It emphasizes the creation of sustainable improvement in the quality of life of all people through increases in real income per capita, improvements in education, health and general quality of life and improvements in quality of natural environmental resources. Sustainable development is development that is everlasting and contributes to the quality of life through improvements in natural environments. Natural environments, in turn, supply utility to individuals, inputs to the economic process and services that supports life. Sustainable development describes process in which natural resource base is not allowed to deteriorate. It emphasizes the hitherto unappreciated role of environmental quality and environmental inputs in the process of raising quality of life.

The World Commission on Environment and Development in 1989, defines Sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.¹⁶ The primary objective of sustainable development is to reduce the absolute poverty of the world through providing lasting and secure livelihoods that minimize depletion of resources, environmental degradation, cultural disruption and social instability.

Environment and impacts of Enugu Coal Mining

Coal mining has been a major economic activity in and around the Enugu metropolis though coal has been replaced by crude oil as the major source of energy resulting in the decline and eventual cessation of commercial coal mining activities and production. Coal mining in the Enugu area of Nigeria has generated a lot of mine waste that has been dumped in landfills and surface dumps chosen for convenience and proximity to the waste source rather than environmental considerations thus culminating in environmental degradation and groundwater contamination.¹⁷

Some of the coal mines established in Enugu include Udi Mines, Onyeama Mines, Okpara Mines, Iva Valley Mines and Ribadu Mines. Coal mining activities gave rise to a lot of mine waste which are dumped in landfills and surface dumps. The siting of these dumps was chosen for convenience and proximity to waste source rather than for environmental, geologic or engineering factors, resulting in environmental degradation and potential groundwater contamination.¹⁸ The minerals from the disturbed earth can seep into the ground water ways with chemicals that hazardous to health. For instance, acidic water can flow out of abandoned coal mines which was prevalent at Iva valley where water flowing out of a mine tunnel intercepts the water table at the Iva Valley coal mine through and over surface mine waste dump site and scattered indiscriminately in the area. These water sources are used by the local residents for various needs ranging from domestic to agricultural and industrial.

The inhabitants depend more on surface water sources than groundwater sources as there are quite few boreholes and shallow wells in the area. However, groundwater supply is found to be of better quality when compared to surface water supply. Also groundwater exploited from boreholes is of better quality than those from shallow wells. Most of the residents depend on the exploitation of groundwater through boreholes and shallow (hand-dug) well as well as the few surface water bodies in the area for domestic, agricultural and industrial purposes. The reason for this may be due to direct contamination of the surface water and shallow well supply by the coal mining activities which exposes coal, minerals and lithologies to surface oxidation and leaching. This has health and socio-economic implications for local inhabitants. Water scarcity has remained a major problem for residents of coal mining communities such as Iva Valley, Okpara, Akwuke, among others and portable water is a luxury only a few homes can afford.

For many households, the only options available are the streams and springs which are used for washing, bathing and sometimes cooking. Sadly, they are now being polluted by the activities of the miners.¹⁹ In fact, a respondent attested that since coal mining requires a lot of water, there is usually contamination of surface and groundwater which has been attributed to deformity of growth and miscarriage when such water bodies are shared with host mining communities and when they use the same for their domestic activities.²⁰

Coal mining involves the destruction of rocks using explosives, which may have generated intense noise pollution at coal mine communities in Enugu. Indeed, exploitation of coal mining is considered as the major cause of pollution; the pressing problems in mining regions is pollution of

water sources by heavy metals, cyanides and dust¹⁷, and this may have accounted for water pollution at Akwuke community, Iva valley area among others. Because most of the water resources in mining areas are used as sources of drinking water for inhabitants and livestock, pollution of water sources by cyanide and metals can be a burden to the women and children who use the water for the household and livestock in the rural communities. For instance, Polluted water from the Iva Valley, Onyeama, Ogbete and Okpara mines have contaminated local water sources such as the vital Nmiri Ocha stream at Iva valley, causing dire consequences for the environment, wildlife, agricultural fields, and local residents.

Consequently, some animals and trees has gone into extinct in the coal mine communities such as wild sugar cane trees, mahogany trees and tortoise.²¹ Due to exposure to the toxic water, many former miners and residents alike have often reported eye problems, liver, and lung diseases. Unfortunately, some of the residents have little or no choice than to use the water since buying water from tankers is unaffordable for them.

Coal mining, whether underground or strip/surface mining as it is being done inside Iva Valley and other mine sites in Enugu devastates the immediate environment, causing deforestation, biodiversity, and habitat loss as water, air and soil pollution through the release of toxic chemicals. Pollution of the soil is the destruction of the earth's topmost layer which is usually cultivated to grow food. In trying to clean the way for a coal mine, for instance, trees are brought down or even burned, plants are uprooted and the topsoil is scraped away. This results in the destruction of the land which can no longer be used for planting crops.

When these trees which sequesterate carbon from the atmosphere are cut off, they leave more carbon in the atmosphere. The respondent equally attested to the fact that the dust generated from the mining activities put miners and those who live nearby at risk of developing a lung disease called pneumoconiosis because of their exposure to the airborne respiratory dust.²² A report by the World Counts shows that cardiopulmonary disease, hypertension, and kidney disease are found at higher rates in people who live near coal mines.²³ The burning of coal mainly to produce energy also releases large amounts of carbon dioxide which traps the heat in the atmosphere and leads to accelerated climate change. Underground mining allows coal companies to dig for coal deeper into the ground. The problem is that huge amount of earth and rock are brought from underneath the earth.

These mining wastes can become toxic when they are exposed to air and water. Even the dust particles can cause all kinds of health problems to the residents exposed to it. For instance, blindness was the major health hazard caused by mining in Akwuke, while in Iva the respondents concurred that mining was the major reason for their many incidence of blindness. Consequently,

this has forced some of the inhabitants whose houses are situated close to mine sites to change location as their air and water get polluted.²⁴

Villages and settlements in the neighborhood of mines experience unpleasant earth movements when rocks are blasted. Atypical example is Nyakabale village where as a result of mine-induced explosions, some 1800 villagers were forcibly displaced in Mtakuja, Nyamalembu and Nyamange villages in Mtakuja Ward, following the establishment of the Geita Gold Mine in Tanzania.²⁵ In the same vein, mining disrupted the pattern of settlement of residents of Akwuke and Iva communities through the relocation of people that were living in close proximity to the mine site. People who live near the mine sites relocated to other areas as a result of the adverse impact of mining activities on the area of their settlement. The adverse impacts of mining on the host communities include displacement of local people from ancestral lands, society and cultural heritage. The long-term implications of such displacement include accelerated food insecurity to landless inhabitants, increased poverty and intensified environmental degradation, which can culminate in conflict between the local people and the mine operators.

Conclusion and Recommendation

This study of environment and Enugu coal mine describes the relationship between coal mining and its impacts on soil, water, agricultural crop production along with other health problems. The coal miners and coal mine communities had greater risk of experiencing injury, even death as well as other social problems. This information is important for raising awareness among policy makers, mine workers and coal mine communities. Nevertheless, it is pertinent to note that beside the negative impact of coal mining, coal is an important source of energy. However, coal mine communities in Enugu such as Ngwo, Ogbete, Iva valley, Akwuke, and Onyeama has greatly been affected by coal mining activities resulting to contaminated ground water, deforestation and erosion, displacement of communities, chemical, air and dust pollution and health hazards. The government and policy makers should take some proper steps including:

- Land rehabilitation should involve reversing the impact of mining after a project is completed, through reforestation and waste management. Working more closely with the surrounding communities can minimize the impact of mining on the affected communities.
- The mine waste dumps that are presently scattered all over the abandoned mine site and exposed to surface oxidation conditions should be properly disposed to arrest further water and environmental degradation.²⁶ Mine waste dumps should be scientifically disposed with respect to the geology and chemistry of the area and waste type. The waste should be disposed in landfills/underground to avoid surface chemical reactions and

contamination of environment and surface water resources; and since fractures and primary porosity/permeability serve as seepage pathways the landfills should be sited in the Enugu Shale units where it may be contained since this formation is the least fractured and porous/permeable.

- Awareness should be created about the negative impacts or risks of mining activities on human health.
- Mine drainage water must be run out after proper treatment of water.
- Public portable water schemes should be revived in the area to serve the water needs of the locals. Surface water resources should be well treated and piped to homes and other service points to stop the local inhabitants from consuming the contaminated water. Water from the Ninth Mile Corner–Ngwo Borehole Field/Network can also be piped to this area for use as the water quality is better in these far-removed areas.
- The authority must develop the process of reusing the vast amount of mine drainage water to reduce the ground water depletion or shortage during the dry season.²⁷
- Efficient Treatment plant must be developed for waste management
- Stakeholders in the water, environment and mining sectors should be educated/enlightened on the impact of coal mining and better ways of ameliorating its effect. This can be achieved by way of training, seminars, workshops and conferences.
- The coal mine inhabitants must be aware about the negative impacts of mining activities on the soil and water quality for agricultural purposes should also be a part of this campaign.
- There should be proper subsidies for the affected coal mine communities in Enugu. Surface water resources and groundwater exploited from a shallow well has been shown to be contaminated with acidity, iron, and sulphate. The water must, therefore, be treated before consumption by the local inhabitants to protect the health of the consumers

Endnotes

1. EI. S. Ayalogu, “Enugu Coal Industry and its Impact on Ngwo up to 1979”. B.A Project Report, Department of History, University of Nigeria, Nsukka. 1988, 15
2. A. Akpala, “Background to Enugu Shooting Incident in 1949” in K.O Dike et al (e.ds.) *Journal of Historical Society of Nigeria*, Vol 3, No 2 (Ibadan: Ibadan University Press, 1965) 335
3. I.S Ayalogu “Enugu Coal Industry” ...17
4. I.S Ayalogu “Enugu Coal Industry” ...17
5. NAE/ONDIST. “This is Enugu in Anambra State”1980, 2.
6. Ayalogu “Enugu Coal Industry” ...17
7. Akpala, “Background to Enugu Shooting Incident” ...337
8. Elizabeth Isichei, *A History of the Igbo People*. (London: The Macmillan Press Ltd, 1976). P. 203

9. Akpala, “Background to Enugu Shooting Incident” ...337
10. Elizabeth Isichei *A History of the Igbo People*. Pp. 203-4

11. E. J. Atlas, “Coal Mining in Enugu District”, <https://ejatlas.org/conflict/enugu> Accessed 2/02/2024
12. Ajakaiye DE. 1985. “Environmental Problems Associated with Mineral Exploitation in Nigeria”. Paper presented at the 21st Annual Conference of the Nigeria Mining and Geosciences Society; Jos. pp. 140–148.
13. O. Udoh and A. Akpa, *Environmental Education for Sustainable Development: Focus on Nigeria*. (Jos:Fat Ameh Nigeria, 1997)
14. David B. Ugal, “Women, Environment Degradation and Sustainable Development” in Okpeh Ochayi Okpeh etal (eds,) *Themes on Women Studies in Africa: Perspective from Nigeria vol 1* ABUJA; Donafrique Publishers, 2015. <http://www.gdrc.org/gender/gender-envi.html> Accessed 02/02/24
15. M.L.Jhingan, *The Economics of Development and Planning 41st Edition* (Delhi: Kumud Printographics, 1992).29
16. JudithMary Ogochukwu Iloh, “Gender Inequality and Challenges to Sustainable Development in Nigeria”, in Okpeh Ochayi Okpeh etal(eds), *Themes on Women Studies in Africa: Perspective from Nigeria*. vol 1, ABUJA; Donafrique Publishers, 2015)588 .
17. C. M. Obiadi, et al, Okpara, “Coal Mines in Enugu State, Southeast Nigeria”. <https://www.mindat.org/feature> Accessed 03/02/2024
18. H.I Ezeigbo and B. N Ezeanyim, “Environmental Pollution from Coal Mining Activities in the Enugu Area, Anambra State, Nigeria: Mine Water Environ”, *1993,12:53–62* <http://link.spring.com/pdf> Accessed 2/02/24
19. Arinze Chijioke, “Investigation: Coal Miners make a Fortune while Destroying Livelihoods, Environment in Enugu” www.thecable.ng Accessed 03/02/2024

20. Emmanuel Ani, “Socio-Economic Challenges of Coal Mining”. An Interview with a 69 years old trader in Akwuke, 17/03/2023.
21. Emmanuel Ani, “Socio-Economic Challenges of Coal Mining”. An Interview with a 69 years old trader in Akwuke, 17/03/2023.
22. Mary Ugwu. “Health Implications of Coal Mining”. An Interview with a 58 years old community health worker in Ngwo. 25/05/2023
23. Isaac Agu. “On Coal Mining”. An Interview with a 56 years old community leader and teacher who lived all his life and witnessed the coal mining at Iva valley. 2/04/2023
24. Princewill C. Ogbonna etal, “Environmental impact Assessment of Coal Mining in Enugu Nigeria”. [https:// doi.org/10.1080/14615517.2014.941711](https://doi.org/10.1080/14615517.2014.941711). Accessed 2/2/2024
25. Obiadi, et al “Okpara Coal Mines”, <https://www.mindat.org>feature> Accessed 03/02/2024
26. K. Sarma, “Impact of Coal Mining on Vegetation: A case Study in Jaintia Hill district of Meghalaya, India”. Msc Thesis, Enschede: International Institute for Geo-Information Science and earth Observation, 2002, 85.