ENVRONMENTAL IMPACT OF MINING ON BIODIVERSITY OF ANKA LOCAL GOVERNMENT AREA OPEN MINING SITE, ZAMFARA STATE, NIGERIA

ADO, SAMUEL JOSEPH
PRE-ND SCIENCE AND TECHNOLOGY DEPARTMENT
FEDERAL POLYTECHNIC KAURA NAMODA, ZAMFARA STATE
adosamuel1962@gmail.com

Abstract

Biodiversity denotes all the varieties of plants and animals' life in a particular habitat, a high level of which is usually considered to be very important and desirable. Biodiversity sustains human livelihood and life itself. An estimated 45 per cent of the global economy is based on biological products and processes. As the biodiversity harbours a great amount of diversity with respect to species diversity, crop diversity etc. which provide a rich amount of a well evolved system over time background support for rich resources. Biodiversity contributes to soil protection, nutrient cycling, pollination, flood control and genetic resources. Studies have reported the roles of biodiversity in maintaining ecosystem and strengthening their resilience in responding to anthropogenic change. Biodiversity in agricultural ecosystem is important for the productivity of farmer livelihoods. In Anka Local Government Area of Zamfara state, in recent years, intervention of human activities has been very much noticed. Mining is on the increase for the last few decades in the area, covering huge belt of land, and eventually also harming the forest cover and the population of human beings especially children. Environmental Impacts Assessment (EIA) was carried out on the effects on the mining site, plan or programme on the environment. This paper attempts to reveal the baseline environmental quality and socio-economic setting in and around such mining sites with special reference to the effects on the biodiversity, air, water, changes on land use pattern and occupational health effects of mine workers, among other things.

Keywords: Biodiversity, EIA, Fauna, Floral, Mining.

Introduction

Anka Local Government Area is a land rich in variety of resources and relatively dense shrubs and forests. Environmental Impact Assessment (EIA) is an objective analysis of the probable changes in the bio-physical, physical and socio-economic characteristics of the environment. The prediction and evaluation of the environmental consequence enable the planners to plan better so as to avoid irreparable damage to biodiversity and to ensure sustainable development (Tyagi & Singh, 2014). Mining tends to make notable impact on the environment. The impact varying in severity depending on whether the mine is working or abandoned, the mining methods used, and the geological condition of the area. It causes massive damage to landscape and biological communities of the earth. The scientific way of mining posits a serious threat to the biodiversity, resulting in the reduction of forest cover, erosion of soil in a greater scale, pollution of water, air and land, and reduction in forests' size. The problems of waste rock dumps become devastation to the landscape around mining area (Ogezi, 1988). Mining is achieved through several activities from exploration through exploitation to processing and finally to the consumers. Through every phase of the mining activity, extensive man-made damage is caused to the environment (Kumar & Kumar, 2014). Due to improper planning and negligence of regulations,

mining activities result in an appreciable damage, deterioration of biodiversity, degradation and some medicinal plants such as Neem (Azadirachta indica), Mango (Magnifera indica) and ecological damage of air, soil and water occurs. (Tyagi & Singh 2014, Dhur & Ahmed 1993).

Study area

Anka is a Local Government Area in Zamfara State, Nigeria. Its headquarters are in the town of Anka at 12^0 06^1 30^1 N 5^0 56 00^1 E. It has an area of 2, 746 km^2 and population of 142,280 as at the 2006 census. The study area is located at Kuru-kuru very close to Jarkuka village in the central part of the local government area of Anka.

Fig. 1. Study area of Anka Local Government Area.

Source: www.nigerianmuse.com Retrieved on 4thApril, 2019

Materials and Methods

Field studies (6 trips) were conducted from time to time between August 2018 and February 2019. Data and literature were gathered from various sources. The information related to the status of health of the inhabitants and socio-economic impact were collected by using structured questionnaires. The respondents were randomly selected, mine workers and the head of families residing in mine areas. This paper is aimed at studying the environmental impact of mining on biodiversity of the sites of mining, one of the mineral rich mining sites in Zamfara State. Moreover, the paper focuses on other impact of the quality of air, water, forest, river etc. There is theoretical agreement that EIA methodologies are important and are gradually becoming an integral part of environmental planning and major developmental projects. The methodology used is being discussed below

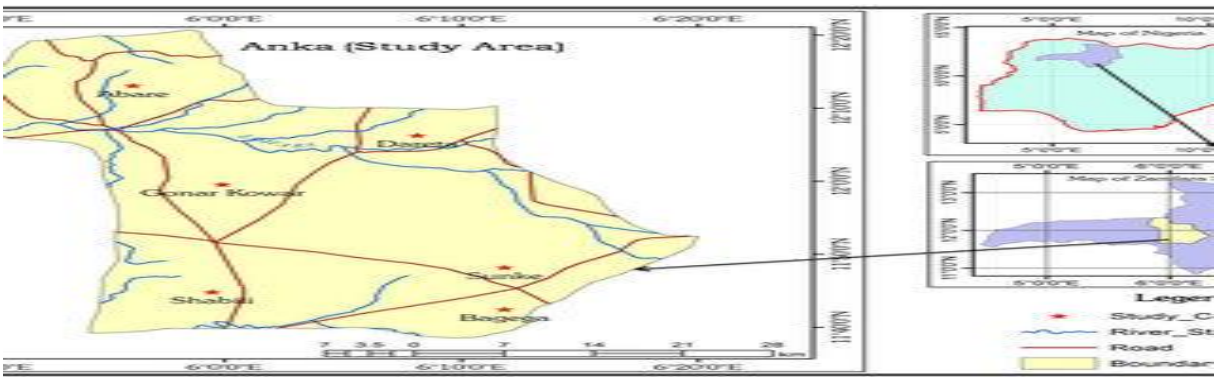
- Noise Environment: Existing status of noise levels in residential, commercial and industrial areas and silence zones within the core and buffer zone have been established, which would consequently affect the inhabitants in those areas in many ways.
- Land Environment: Representative soil samples within the study area were collected and the status of the soil pollution and land degradation were assessed. The productivity and fertility of soil found within the study area have also been assessed using one of the standard method "use a do-it yourself kit". This basic PH test measures your soil's acidity and alkalinity and sometimes major nutrients content available therein. We were constrained with time and resources to do soil lab test, which is also a standard soil testing method.

Fig.2 Mining activities in Anka mining area.

Source: Silverbirdtv.com. Retrieved on the 6th April, 2019

Fig: 3 Mining Site in Anka.

Source: Researchgate.net Retrieved on the 6th April, 2019.



- Floral Environment: The vegetation was studied by laying nested quadrats of varying sizes. For example, trees were sampled in 20m x 20m quardrat, shrubs in 5m x 5m quardats and herbs/ grasses in 1m x 1m quardrats. However, the size and shapes of the sampling plots were modified according to the terrain, area and the requirement of the study. The vegetation growth in the different areas

with progressing age of restoration was also studied.

- Air Environment: The surface meteorological data like wind speed; wind direction, relative humidity, rain full (using rain gauge) ambient temperature etc were collected using air quality meter PCE-RCM II. PCM-RCM II- is a portable hand held particle counter used to monitor Particulate Matter (PM) concentration in the air. Designed to aid in Indoor Air Quality (IAQ) assessments. this particle counter also measures air temperature and relative humidity. This serves an indicative test 2 environmental parameter which enables the measurement of fine dust, formaldehyde, temperature and humidity.
- Water Environment: Analyses of water quality were done by collecting water from hand pumps and ponds located in and around mining areas. The hand pumps were operated 10 minutes before collecting the samples to ascertain water sanity (APHA, 2005). Samples were collected in clean bottles having air tight stoppers for our analysis. It was discovered that, the water quality is poor and not good for drinking because of the presence of lead and other particle therein.

Observations and Discussion

- People of the study area had complained of armed bandits and kidnappers terrorising them daily. The growing trees are reduced to fruitless trees, the soil fertility is depleted and the typography of the land depredated to almost ups and downs here and there. Even their Mango trees (*Magnifera indica*) are affected due to the dust from mining. Plants do not yield much fruits again in Kuru-kuru and Jarkuka villages.
- Dairy farming has been unsustainable since there is no fodder or adequate water available for their animals coupled with the threats of armed bandits and cattle rustling in the areas. In mining areas, the agricultural lands and other vegetation that thrived in abundance previously are struggling to grow ever since the unset of mining. Mining in Anka areas is mainly carried out by open cast extraction method. Open case mining involves the removal of overburdens including the valuable top soil as well as natural vegetable cover. Their activities are associated with harmful effects to the local inhabitants and also biodiversity. It is important to note that, mining activities are carried out in various stages, each of them involving specific environmental impact.The corresponding environmental hazards associated with open cast mining practices are many but the major problems may be summarised as follows:
- Soil Erosion: This is evidence in the mining areas because of clayed nature of soil, poor vegetals cover and general surface drainage to north east side. Soil eruption will take place or extended overburden (OB) dumps which would be about 5m high to begin with but ultimately will increase with time.
- Noise Pollution: Drilling, blasting, movement of shovel, dumper, shouting by workers and waters pumps etc., will create noise. Similar noise would be produced in adjacent places. Such noise and vibration will repel out most of the animals from these areas.
- Water Pollution: Run-off water from over burden (OB) dumps to ground level may increase turbidity of waters. Water may also get contaminated by fine dust from mining. Polluted water spells doom for all animals particularly aquatic life.

- Loss of Aquatic Habitat: Aquatic habitat of Kuru-Kuru is the home to a variety of frogs, fish, crabs, etc. Gentle slopes provide access to large animals such as cattle, carmel etc. With the steep lined division, channels will lead to inaccessibility of large animals. The planktonic life would be lost and recovery of aquatic life changed scene would be slow.
- Loss of Flora: During the course of investigation, it was found that some trees denote an evolving or expanding population, which needs to be maintained. The unsustainable way of illegal and legal mining destroys flora including some important medicinal plants such as neem tree, (*Azadiranchta indica*), mango tree, (*Magnifera indica*) etc. The loss of these valuable medicinal plants needs to be checked to maintain the favourable population structure. Due to open cast mining activities these floral patches would also be destroyed.
- Bush Fire: Many intensive use of the area by labourer and transport workers and motorcycle riders from outside will pose a threat to frequent fires. Accidental fires may occur in mining sites spreading to vast area of land which will cause damage to vegetation and or regeneration of forest growth. Natural regeneration from stool of large animals, root suckers and fallen seed may also be affected.

Conclusion and Recommendations

Mining activities in Anka L.G.A should make several changes in a way it is done. The open cast method is one of the destructive methods in the industrialized world which is substantially proved by the mining sector of that area. This demands a replacement by a suitable method which would be less harmful to the environment and surrounding bushes, other biodiversity areas and also for the agriculture and human health. Mining and transportation of mineral compound need to be carefully done to avoid any kind of harmful hazard as experienced between 2010-2014 when over 400 children and adults died. And pollution being created that would adversely affect the well beings of the society in the state. Also, there needs to be a proper storage of over burden once it is removed. If it is left untreated, it results in washing off into fields and river due to the rainfall. The effects have been experienced severely in Anka L.G.A where several agriculture fields and water bodies were polluted. Water being one of the scarce resources needs to be conserved property for biodiversity which is dependent on equal balance in the nature of all the existing resources. In order to maintain or increase the biodiversity of the area, the following measures should be employed in the area:

- The mining area has numbers of natural plant, they should be allowed to grow, introducing and adding new exotic species should be avoided in the mining area as mining site affects the survival of the plant (resistant problem) due to dust, and other harmful deposits.
- The survey area especially buffers zone has several vegetation. These vegetation patches should be conserved by the government and or NGOs and can be enclosed by proper biological fences which will help the faunal movement at the same time restrict anthropogenic activities. The areas can have several interpretation zones e.g. herb and shrubs zone, bird watching zone, mineral deposit zone etc.
- Natural fruits producing plants and flower bearing species should be encouraged by government to increase insects (butterfly) and bird life. The existing flora can be conserved by

avoiding construction in places that have a healthy plant life.

- Enlightenment programme by the government should be encouraged to discourage youths from illegal mining.
- Hand bills printed in local dialects should be distributed free of charge to the inhabitants of the mining area on the effects of mining in the area.
- Clean portable water should be provided for the people around the mining area free of charge
- Since mining has enhanced their economic standard, legalised mining with modern technology should be in place to replace the illegal open-cast mining.
- Federal and especially the state government should tackle this problem of armed bandits and kidnappers in the mining site, in the state and Nigeria in general.

References

APHA: (2005). Standard Method for Examination of *Water. 21st ed. American Public Health Association, Washington, D.C.*

Environmental Impact Assessment (EIA) (2009). *Study for Exploratory, Drilling of Oil Exploration in the Block PEC kangra-mandi, himechal prodesh, Nehru Environmental Engineering Research Institute* 3:23.

Dhar. B.B. and Ahmed, M. (1993). Impact of Mining and Processing Activities on Surrounding Environment. A case study, *Journal of Mining Research* 2 (2): 43-41.

Kumar, P. and Kumar, N. (2014). Environmental Impact Assessment (EIA) Study of Non-metal Mines. An entire review, *International journal of Engineering & Technical Research (IJETR)* 2(5): 324-326.

NPC, (2006). Nigerian Population Census.

Mahalik, G., Sataoathy, K.B., Nayak, S.K., and Mohapatra, A. (2014). Florish Composition and Botanical Observation in Argul-takher mining areas, Odisha, India. *International Journal of Science and Research. (IJSR)* 3 (12): 890-893.

Ogezi, A. E., (1988): Impact of Mining on Nigeria Environment. In FEPA MONOGRAPH: Towards Pollution Abatement in Nigeria. FEPA. Lagos Silverbirdtv.com Thenigeriavoice.com

Tygi, A. and Singh, V. (2014). Truman's Specific Series Danika Publishing Company: Environmental Impact Analysis, 309 (ed5th). www.nigerianmuse.com