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The Impact of Quarrying Activities and its Effects on the Environment in Mayo-Belwa Local Government Area: Hosere Joyi Community

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ABSTRACT

Quarrying is an activity where stones are dug for the purpose of being used in building, making roads through cutting, digging or blasting. Quarrying is a short-term activity with long term effects. It comes along with the promises of wealth and jobs but it also brings high environmental costs. The aim of the paper is to unearth impacts that quarrying activities has and its effects on health of the people living close to the quarries as well as physical environment. The paper utilized multiple data sourcing method: Personal observation, oral interview, questionnaires administration as well as Maps of the study area. A total of 200 questionnaires were administered to residents of the four settlements sampled. The data were analyzed using descriptive statistical analyses. The findings were based on the responses from local residents, quarry workers and owners. The results revealed that there are high rates of environmental problems. This paper concludes that the quarrying activity has affected the peoples' health, rooms, walls, farmlands, vegetation and surroundings in negative ways. It therefore recommends that the Government and other environmental stakeholders should ensure proper enforcement of the laws governing the Physical planning and regulations on any development of quarrying and mining industries. Government should revoke licenses of the quarry owner who do not adhere to the set laws. Environmental impact assessments and Environmental risk assessments are some of the ways forward.

Key Words: *Impact, Quarrying Activities, Environment, Mayo-Belwa*

INTRODUCTION

Quarrying activity is a necessity that provides much of the materials used in traditional hard flooring, such as granite, limestone, marble, sandstone and slate (Lameed and Ayodele, 2010). Quarry activity involve blast rocks with explosives in order to extract material for processing despite extraction gives rise to noise pollution, air pollution, damage to biodiversity and habitat destruction Okafor (2006). Several international protocols have been established by the global community to deal with the emerging environmental issues. The Federal Environmental Protection Agency (FEPA) Decree No. 58 of 1988, amended as Decree No 59 of 1992 empowers FEPA now Federal Ministry of Environment to

oversee the environment, with specific powers to make regulations and particularly prescribes standards for water quality, effluent limitations, air quality, atmospheric protection, ozone protection, noise control and control of hazardous substances. These operations generally involve removal of over burden, drilling, blasting and crushing of rock materials. The impacts depend on both size and locations produced by these operations. Manifestations of specific impacts are on the air, water, soil, earth surface, flora and fauna, and human beings (Areola, 1991; Enger and Smith, 2002). Quarrying is a huge supporter of local economic development; it enhances trade, creating jobs for people annually, creating new habitats sometimes new roads are built, first to transport the machines and then extracted materials which are then left to be used by residents. Most people in quarrying regions wholly depend on these quarrying for their livelihoods aside from other economic activities. However, like many other man-made activities, quarrying activities cause significant impact on the environment (Okafor, 2006). Installation of crusher units in the city or in its periphery pose environmental and health hazards to nearby residents in and around quarry or crusher units. Industrialists prefer crushers to be located nearer to the source of raw material such as stone mines, river beds etc. In most cases the stone crushers come up in clusters of number of units ranging from five to fifty in one cluster need electricity supply and man power for its operation. Quarried rock lead to removing the protective cover of an aquifer may cause severe pollution of the groundwater. Sites of quarries, therefore, should be selected by considering the hydrogeological, environmental and economic factors (Mehmet, 1990). Some types of quarries will produce significant amounts of waste material such as clay and silt (Wang, 2007), unfortunately discharge dust that settles not only on land, plants and trees but also on surface waters used for drinking and other domestic chores by the community (Osha, 2006). Quarry sites in Nigeria are faced with challenges of increase in disease infection, discomfort, etc. due to the absence of planning. Many of the urban environmental problems of pollutions, vibration, ecological issues etc. associated with the existence of quarrying activities in the urban and Peri-urban areas. According to environmental experts, (Holmes, 2003) the uncontrolled expansion of quarrying in Senegal has led to coastal erosion, a reduction in the area of available farmland and skin and lung problems for the quarry workers and people who live nearby. The effects have forced the government of the day to

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stop issuing more permits to the people who want to engage in the quarrying activities in the affected areas within the country. These settlements of Hosere Joyi community are both nuclear and disperse homes for traditional farmers they depend on their land for agricultural production and dotted with walls cracking, collapsed and defected structures, endangering the buildings and their occupants. Their traditional shrine site for their annual circumcision festival was distorted and farmlands became a borrow pit. These visible conditions suggest that it will be necessary to empirically study these areas in order to deflate their insecurity potentials, hence this study. The aim of the paper therefore, is to examine the environmental impact and effects of the quarrying activities on the environment in Mayo – Belwa local government area: Hosere Joyi community with a view to advancing appropriate physical planning recommendations that will improve environmental situation of the study area.

OBJECTIVES

To Describe the Nature of the Quarrying Activities in Hosere Joyi Community

To report facts about Quarrying activities and its effects in general and Mayo – Belwa county: Hosere Joyi Community in particular. To establish the environmental impacts of the Quarry in Hosere Joyi Community through the ecological, demographic, chemical, physical and aerial effects particularly on climates/air, water, physical structure and landscape. To proffer appropriate recommendations which will enhance significant overall positive environmental, demographic and physical impact of the quarrying activities in the Hosere Joyi Community.

The Study Area

Mayo-Belwa Local Government Area located in the southern senatorial district of Adamawa State with its headquarters situated at about 65km from Yola, the state capital. It lies on the latitude of 11.40^0 N to 12.5^0 North of the equator and between longitude of 8.00^0 E to 9.10^0E at the Greenwich meridian; with a total population of approximately 202,894 people with the total land mass of 1,768 Km^2 NPC, 2006. The study site Hosere Joyi village is located in political ward of Mayo – Farang District, 3km from Mayo-Belwa town and 2km away from Mayo –Belwa – Jada - Ganye Highway. The people of the area majority are Sate tribes they are

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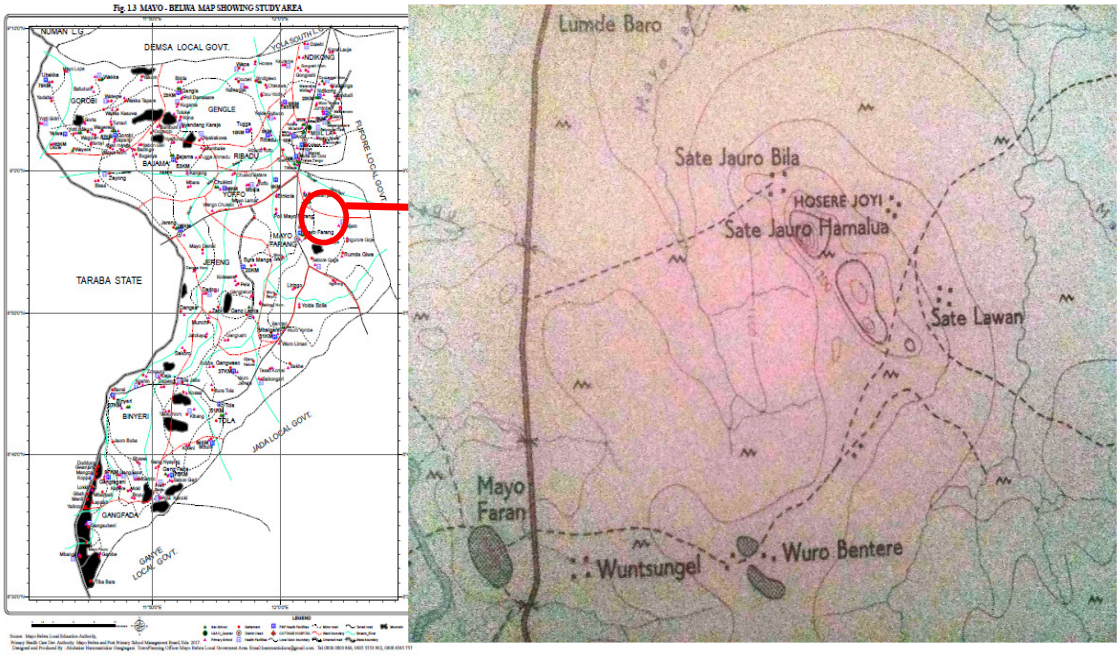
farmers with few are business oriented their religion few are Muslim, with majority Christian and Traditional believers. Hosere Joyi village has no social amenities is surrounded with Neighboring Settlements Including Jilima, Rumde – Baro, Sate Lawan, Sate Jauro Bila, Wuntsungel and Wuro – Bentere. The people are noted for the pass history, craftsmanship, music, dance, dress patterns and cordial relationship. The Vegetation of the study area falls under guinea savannah it has a thick vegetation cover comprising mainly if tall grasses, shrubs, and trees. Geology and Soil of the area is underlain by basement complex rocks. These are very ancient rocks originally made up of complete structures of the African continental igneous rocks mainly basalts with some metamorphic rocks. They have mineral contents, the soil developed on these rocks are moderately deep, well drained with textual surface horizons due to the richness of minerals in the parent rock. These soil are generally well suited to agricultural production as shown by relative intensive users.



Mayo-Belwa LGA Map showing Study Area, Source: Mayo-Belwa LGA Works Dept. 2019.

The quarrying Industry in Mayo – Belwa town had spread over (7Km^2) comprising the one

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At Binkola PW quarrying (3km^2) and Hosere Joyi Triacta quarrying (4Km^2). Thus over 7Km^2 of land resources have been committed into the quarrying aspect of this industry.

Literature Review

India quarrying has affected many of the people working in the mining industry. According to (Azad S.A and Ashish 2006) stone quarrying and crushing has been known as a highly hazardous work, whereby workers are affected by many debilitating occupational health hazards and diseases. Mostly the migrant workers are engaged in this highly unorganized industry. The most common exposure is from silica dust, which causes Silicosis among the exposed workers. According to (Ayodele & Lameed 2010) projects are usually sited for and embarked upon to satisfy the social and economic needs of the company without the need and aspiration of the neighboring and nearest communities as well as the impact on the primary environment. (Aigbedion, 2005) according to him, large amount of dust from the cement factories and mining operations in the Nigerian limestone quarries are discharged daily into the air. Similarly a lot of air-borne particulate matters are generated by the numerous stone crushing industries in the country. When the air is laden with such dust, it causes health hazards for some people. For example, pollution studies around Sagamu and Ewekoro cement works in Ogun State have shown that several people are suffering from eye pain, and asthmatic attack due to the dust-laden air that prevails within a few kilometers radius of the factories. A common negative effect of quarrying minerals from the earth's surface is the destruction of its natural landscape, creating open space in the ground and generating heaps of rock wastes that cannot be easily disposed off. These phenomena are amply demonstrated in several parts of Nigeria, where commercial mining or quarrying had occurred in the past or is currently taking place. In Kenya with the construction of Thika Super Highway, the company in charge of constructing the road has started several quarries along the Eastern bypass which are causing a lot of air pollution. The company is only concerned about their project and does not take into consideration the welfare of the people living close to the quarries. The people living close to the quarries are also affected

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by the activities that go on in that area. (Azad and Ashish 2006) In Village Pali in India, the safety of human beings is not put into consideration, which Hosere Joyi community in Mayo – Belwa County is inclusive. Quarrying activities in Nigeria has caused significant impact on the environment, the blasting rocks with explosives in order to extract material for processing gives rise to noise pollution, air pollution, damage to biodiversity and habitat destruction which affect the human environment of a particular area Okafor (2006).

Policy Framework and Legislations that Governs the Quarrying Industry

Without contesting the fact that the quarrying industry is first and foremost an economic venture, it is equally becoming a contemporary necessity that the effects of any action to be taken on land, or effects of resources to be committed shall have on the environment should be acceptable else, we fowl our nest to our doom (Ilesanmi 1996). The American society for instance recognized this need through their National Environmental Policy Acts (NEPA) of 1970 in which they accepted that they were trustees of the environment for succeeding generations and as such, they must only encourage productive and enjoyable harmony between man and his environment - promoting efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man (Carter, 1977). The Nigerian environment is also ripe for such assessment of environmental impacts especially at the advent of our own Federal Environmental Protection Agency (FEPA). The Federal Environmental Protection Agency (FEPA) Decree No. 58 of 1988, amended as Decree No 59 of 1992 empowers FEPA now Federal Ministry of Environment to oversee the environment, with specific powers to make regulations and particularly prescribes standards for water quality, effluent limitations, air quality, atmospheric protection, ozone protection, noise control and control of hazardous substances. National Environmental Protection (pollution abatement in industries and facilities generating waste) Regulation S.I.9 (1991), which prohibits all industries and facilities to "release hazardous and toxic substances into air, water or land of Nigeria ecosystems beyond limits approved by the Agency". National Guidelines and Standards for Environmental Pollution Control in Nigeria (1991), which prescribes guidelines and standards for six areas of environmental pollution control. The Occupational Safety and Health Act, 2007 and Environmental Management Coordination Act 1990.They

are guidelines used in the mining industry such as the level of noise, vibrations and protective clothing for the workers in different workplace. This paper attempts to establish whether the relevant provisions of the Acts are observed in the study area. Quarry activity involve blast rocks with explosives in order to extract material for processing despite extraction gives rise to noise pollution, air pollution, damage to biodiversity and habitat destruction. Solid materials in the form of smoke, dust and also vapour generated during quarrying operations are usually suspended over a long period in the air. Dust from quarry sites is a major source of air pollution, although the severity will depend on factors like the local microclimate conditions, the concentration of dust particles in the ambient air, the size of the dust particles and their chemistry. The dust also adversely affects visibility, reduces growth of vegetation and hampers aesthetics of the area. Apart from the dust emitted, toxic compounds such as fluoride, Magnesium, Lead, Zinc, Copper, Beryllium, Sulphuric acid and Hydrochloric acid are injurious to the vegetation and human health.

METHODOLOGY

Three groups of strata were identified: Quarry Company, Quarry workers and area residents. According to Mugenda (2008) stratified random sampling helps to achieve the desired representation of various sub groups in the population. The types of data used for this paper include spatial, demographic, vegetation, environmental quality and legality of activities. Spatial Characteristics include the geographical extent of the study area and sampled wards, spatial distribution of facilities, spatial constraints and opportunities to quarry planning, spatial activities of quarry in the study area and type of problems occurrence. The LGA maps available with the town planning, works department were used for this purpose. The base maps were updated with quarry and location related data as obtained in the study area by observation and key respondents' input like residential areas, farmland and human being. Demographic data covering the population and its characteristics such as gender, age distribution, occupation, residential status, duration of stay in the study area and status were obtained from the National Populations Commission in Yola. Data on quarry activities including types of problems, effects, prevalent in the study area, were collected from residents and workers.

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RESULTS AND DISCUSSION

Demographic Characteristics of Respondents

The characteristics of the respondents are presented in Table 1, covering their gender, residential status, age, occupation, employment, duration of stay as well as settlement status. The responses reveal that (59.5%) were male while females were (40.5%). The residential statuses of the respondents are landlord (19%) while accommodated by parents (81%). Their age distribution showed that 56% of the respondents were youths between 18-27 years. The remaining 19% were those above 37 years old. By occupation, 16.5% of the respondents were students, followed by others who were neither students nor civil servants (21%) and others with (62.5%). In actual sense, about (38.5%) of the respondents were employed while (61.5%) of the respondents were unemployed. About 73% of the respondents have stayed in the study area for over 7 years. Only 63.5%of the respondents claimed to be indigenes of the area while 36.5% said they were migrants.

Table 1: Demographic Characteristics of the Respondents (n = 200)

S/No	Characteristic	Variable/Measure	Frequency	%age
1	Gender	Male Female	119 81	59.5% 40.5%
2	Residential Status	Landlord Accommodated by Parents	38 162	19 81
3	Age Distribution	18 – 27 28 – 37 38 – 47 48 – 57 60 & above	112 50 22 10 6	56 25 11 5 3
4	Occupation Distribution	Civil Servant Student Others	42 33 125	21 16.5 62.5.
5	Employment status	Employed Unemployed	77 123	38.5 61.5
6	Duration of stay	2 – 7 years 8 – 13 years 14 – 19 years 20 years & above	60 42 52 36	30 28 26 18

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7	Settlement status	Indigene	127	63.5
		Migrant	73	36.5

Source: Field survey, Mayo-Belwa (2019)

Environmental Effects

The environmental characteristics of the study area were surveyed and the results presented in Table 2. The study revealed that (89.5%) of the respondents live in Koseyel – Joyi, while 10.5% are on No. Most buildings in the area were between 1 and 10 years old (13%) followed by 11–20years (49.5%), those between 21 and 30 years (28%). 31 -40 years (6.5%) and 41 and above (3%). Distance between your house and quarry site 60- 110 meters (22%), 160 -210 meters is (56%), 260 - 310 meters are (12%) followed by 360 - 410 meters is (5.5%) 460 and above (4.5%). Does quarry activities affect you responded yes with (81.5%) while others responded No with (18.5%). The people are comfortable living closed to the quarry side reported Yes (9%) and No with (91%). The respondent reported that the environmental problems mostly affected their settlements are Air pollution (24%), Land pollution (25%), followed by Noise pollution (9.5%), Water pollution (2.5%) and all of the above (39%). About (76.5%) of the responded on Yes, and No (23.5%) that have any land dispute by the quarry company in the study area. The respondents reported that quarry activities affect their vegetation cover with (71%) Yes while (29%) No. The quarry activities affect the community mostly are Blasting (31.5%), Vibration (28%) then followed by Grinding/crushing (22%), Waste disposing (6%) and Dust accumulation (12.5%). The respondents reported that major problems faced by quarry activities in the study area are Health problems (17%), then Room /wall cracking (21%), Land dispute (7%) while all of the above (55%). The environments of Hosere Joyi have been affected negatively by the quarrying activities. The affected components include physical, biological, cultural, chemical and the ecological environment in this large piece of land. The quarrying activities affect the geology, topography, surface water, ground water resources, water quality, air quality and climatology; the flora and fauna, the buildings, human population trends, historic and archaeological sites, and the peoples' socio-economic wellbeing.

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Table 2: Environmental Characteristics of the Study Area (n = 200)

S/No	Characteristics	Variable/Measure	Frequency	Percentage
1	Do you live in Hosere joyi	Yes	179	89.5
		No	21	10.5
2	Age of Buildings	1 – 10 years	26	13
		11 – 20 years	99	49.5
		21 – 30 years	56	28
		31 – 40 years	13	6.5
		41 and above	6	3
3	What is the distance between your house and quarry site	1 - 50 meters	-	-
		60 - 110 meters	44	22
		160 -210 meters	112	56
		260 - 310 meters	24	12
		360 - 410 meters	11	5.5
		460 and above	9	4.5
4	Does the quarry activities affect you	Yes	163	81.5
		No	37	18.5
5	Are you comfortable living closed to quarry	Yes	18	9
		No	182	91
6	Which of the environmental problem mostly affect your settlements	Air pollution	48	24
		Land pollution	50	25
		Noise pollution	19	9.5
		Water pollution	5	2.5
		All of the above	78	39
7	Do you have any land dispute by the quarry company	Yes	153	76.5
		No	47	23.5
8	Does the quarry activities affect the vegetation of the area	Yes	142	71
		No	58	29
9	Which of the quarry activities affect you mostly	Blasting	63	31.5
		Vibration	56	28
		Grinding/ crushing	44	22
		Waste disposing	12	6
		Dust accumulation	25	12.5
10	What problem did you faced by quarry activities	Health problems	34	17
		Room /wall cracking	42	21

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		Land dispute	14	7
		All of the above	110	55

Source: Field survey, Mayo-Belwa (2019)

Quarry Activities

Data on quarry activities on the study area are presented in Table 3. Respondents who reported that workers with Yes (93.5%) are working with quarry while (6.5%) are on No. Among the workers reported for the staying of 1-5years (13%), 6-10years (28%), 11-15yeras (16%), 16 -20years (6.5%) and 21 and above (36.5%). While quarry activities affect the workers on Yes (87%) followed by No (13%). The problem faced by the workers in the study area, Health problems (22.5%) followed by Lack of benefit (21%), Lack of helmet (7%) and all of the above with (49.5%). Does quarry activities affect you responded Yes with (174%) and No (26%).The factors affecting workers most in study area are blasting (10%), vibration (25%), grinding of stones (9.5%), crushing /dusting (24%) and all of the above (31.5%).

Table 3: Quarry Activities in the Study Area (n = 200)

S/No	Characteristics	Variable/Measure	Frequency	Percentage
1	Are you working in quarry company	Yes	187	93.5
		No	13	6.5
2	How long are you working them	1 – 5 years	26	13
		6 – 10 years	56	28
		11 – 15 years	32	16
		16 – 20 years	13	6.5
		21 and above	73	36.5
3	Does the quarry activities affect you	Yes	174	87
		No	26	13
4	What problem did you faced	Health problems	45	22.5
		Lack of benefit	42	21
		Lack of helmet	14	7
		All of the above	99	49.5
5	Which of the following affect your most	Blasting	20	10
		Vibration	50	25
		Grinding	19	9.5
		Crushing/ Dust	48	24
		All of the above	63	31.5

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Source: Field survey, Mayo-Belwa (2019)

CONCLUSION

Physical planning has become a principal profession that must contribute to the search for safer rural and cities in our generation. This paper has used the situation in Hosere Joyi community of Mayo – Belwa to elucidate the fact that quarry activities, quarry workers and residents are highly related. Poor physical planning standard for the location of quarry and mining industries within Hosere Joyi community of Mayo – Belwa County. This has affected the residents in those areas near the quarry sites negatively. The welfare of the quarry workers as recommended by the occupational Safety and Health Act and can be attributed to lack of awareness on use of protective gear by the quarry workers was not been taken care. The paper concludes that the quarrying activity has affected the environment mostly in a negative way such as their health, rooms, walls, farmlands; vegetation's and also includes the people in the surrounding periphery areas, the quarry workers and the physical environment.

RECOMMENDATIONS

The paper advance the following set of recommendations to further prevent environmental problems and hazard in Hosere Joyi community: The local planning authorities should be more active and effective on their duties by enforcing Physical planning standards and regulations on any development aim at meeting the minimum required safety standards. The government should revoke licenses of any of the quarry owners that fail to adhere to the set laws. Quarry companies should be mandated to adopt modern technology of dust strapping such that only a negligible quantity of dust escapes from the various operations at quarry site. Stakeholders' recognition and participation in the decision-making should be adopted when it comes to issue of the location of mining and quarrying industries. In the Course of protecting a residential area and farmlands, more priorities should be given to human health than property security. Environmental impact assessments and environmental risk assessment should be carried out regularly so as to minimize the negative effects of quarrying operations on human health and the environment.

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