Impact of Granite Exploitation on the Livelihood of Netim Community of Akamkpa Local Government Area of Cross River State

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Abstract

This work assessed the impact of granite exploitation and its contribution to the livelihood of the people of Netim community in Akamkpa Local Government Area of Cross River State. This study was done using 225 randomly selected residents and mine workers in the area. The data generated for this study was collected using questionnaire, personal interview, and focus group discussion. Also, the contributions of the mining companies in the form of corporate social responsibilities were assessed. The hypotheses was tested at 0.05 significant level and the result of the analysis shows that the rural population in Netim are largely dependent on granite mining activities for employment, income, increased business activities and improved social services and infrastructural development amongst others. The findings of this research work revealed that granite mining has contributed immensely to the socio-economic development and livelihood of the people of Netim community in spite of the adverse environmental effects caused by granite exploitation in the area. It was recommended amongst others, that the mining companies should sustain and improve the corporate social responsibilities of their host community and evolve measures that will help to reclaim the wasted land and reduced the effects of their activities on the environment.

Key Words*: Corporate social responsibility, livelihoods, environment, focus group discussion, Granite, Exploitation,*

INTRODUCTION

Mineral exploitation is the process of mining mineral substances (commercially viable concentrate) beneath the earth's surface. Mineral resources are natural substances with definite chemical composition and characteristics of physical properties by which they are identified (Basset and Kupfer, 1964). Some minerals occur as a single element and others occur in combination.

Mining may well have been the second of man's earliest endeavor, granted that agriculture was the first (Hartman and Mitmansky, 2002). The two, certainly ranked together as the primary or basic industries of human specialization. Mining is used in its broadest contexts, as encompassing the extraction of all naturally occurring mineral substances which may be solid, liquid or gas for the essential needs of man's utilization. Granite which falls under the category of igneous rock is a non-metallic mineral. Granite possesses some characteristics, which are very useful for many purposes, especially for construction, hence, it is known as a construction mineral (Osasan 2008).

In recent times, the value placed on granite and the demand for it in the building and construction industries and other engineering works, such as roads, airport, seaports and other construction works generally make granite an indispensable mineral resource. Mitchel (1975) sees natural resources as an institutional arrangement as well as political custom. He explained that the development of a resource is achieved during the transformation of "neutral stuff" into a commodity to serve humanity; and that the attribute of nature are more than the "neutral stuff" until man is able to perceive its presence and recognize their capacity to satisfy common needs and devise a means of utilizing them.

Warren (2006) observed that granite resource exploitation in any region brings about certain types of activities, which are critical to economic development. These include commercial activities, influx of population, revenue generation, communication, employment opportunities, provision of infrastructure and increase in transportation network. These constitute the immediate gains that are visible where mineral resources are exploited. In support of the above, Zimmerman (1933) provides a functional definition for natural resources which is still relevant today. Zimmerman argued that neither the environment as such nor part of the environment is a resource until it is exploited and capable of satisfying human needs.

Granite resource exploitation has contributed to the development of many countries (Akande and Idris 2005). Mining serves as a source of revenue to government in the areas of issuance of mining certificates, mining leases, royalties, explosive permits, blasting certificates and so on (Osasan 2008). In southern African countries, large scale mineral exploitation has contributed over 90% of all the foreign exchange earnings, 60% of Gross National Products, 50% of total government revenue and 30% of total employment (Masiku, 2009). Osasan (2008), in his research on the economic assessment of granite mining in Oyo State, Nigeria, reveals that the mining sector creates more opportunities for employment and economic development. He concludes that a vibrant mining sector like any other sector provides a good platform for a country's growth and development.

Granite deposit in Netim was not a resource to the people until mining activities started in the early 70's. Before the exploitation of the mineral, the people considered granite stone in their locality as an object of worship. Sacrifices were made to it, believing it to be a god. The perception of the people towards their deity (stone god) took a dramatic turn in 1972 when Strabag Company Limited visited Netim and confirmed that the granite deposits in the area is of commercial quantity and value. The survey established that these granite deposits could be of vital importance to the rural people whose livelihood depends on it. This prompted immediate exploitation, and it attracted many other companies to the area. Since then, and in addition to other companies, mining companies, mining activities and businesses have been going on in the area. There is therefore the need to assess the contribution of granite exploitation in the area. This is what this study is set out to do. The exploitation of granite, and its associated businesses in Netim for some thirty years ago, has brought remarkable changes in the area. In spite of this, most studies have focused on the impact of granite exploitation on the physical environment with little or no assessment of its contribution to the livelihood of the people of Netim.

The commencement of these activities in the area has attracted quite a large population, especially non-natives to the area. This increase in population seems to have socio-economic implications in the area. Besides this, the inhabitants of Netim were largely dependent on agriculture, before now, as their main source of livelihood. But since the inception of granite exploitation, this traditional means of livelihood (agriculture) seems to have been abandoned for granite exploitation and its related businesses. This situation is likely to have found favor with the people, as those who switched to granite exploitation in the area are leading politicians and influential business people. The town has also witnessed a tremendous increase in the provision of environmental infrastructure and social services. This situation is not unconnected with mining activities and associated businesses going on in the area. There is therefore the need to investigate the contributions of granite exploitation to the livelihood of the inhabitants of Netim. This study is therefore poised to provide answers to the following questions.

i. What was the socio-economic condition of the area prior to granite exploitation and now?
ii. What are the socio-economic characteristics of the people involved in the chain of granite mining activities in the area?
iii. To what extent has the exploitation and business of granite contributed to the livelihood of the people in Netim?
iv. In which ways have the mining companies been performing their Corporate Social Responsibilities (CSR) in Netim community?

Conceptual Framework

The sustainable livelihood approach is adopted as the conceptual framework for this research. The sustainable livelihood framework is an analytical tool that simplifies the understanding of livelihood strategies (DFID, 2001). Figure 5 below shows the sustainable livelihood framework.

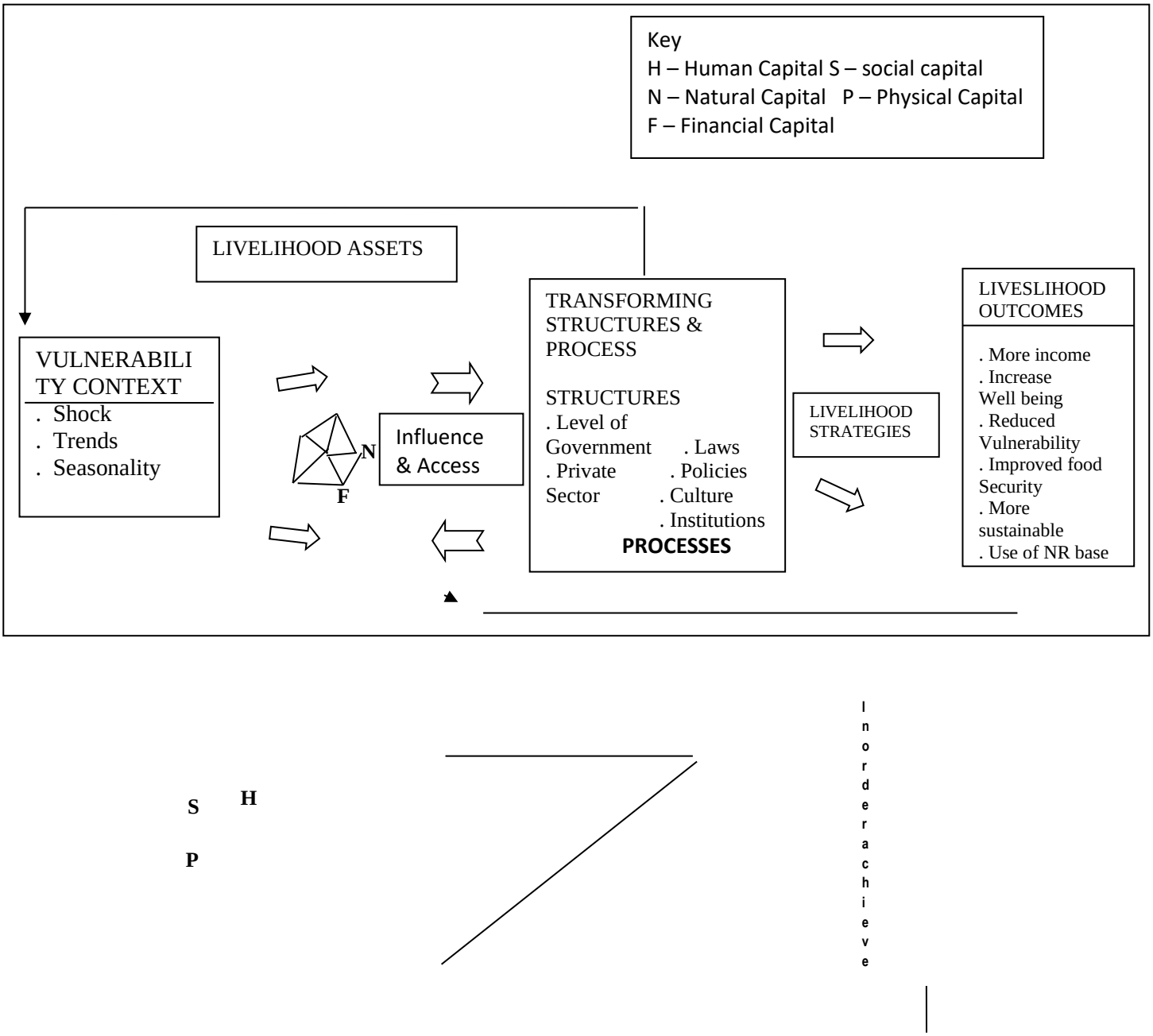

Figure 5: Sustainable livelihood frameworks (DFID, 2012)

Source: http//www.livelihoods.org/info/guidiance_sheets_pdfs/section2.pdf

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The sustainable livelihood framework, as shown in figure 5, is divided into five key components which include livelihood assets, transforming structures and processes (policy, institutions, and processes), vulnerability context, livelihood strategies and livelihood outcomes. The arrows, as shown in the framework, link the different components, reflecting how the people convert assets to activities and how policies, institutions, and processes affect the key components. The livelihood of people, their assets and control of resources can be affected largely beyond their control. The vulnerability context in the framework shows how the external environments in which the people live in relation to small scale mining achieve their livelihood outcome.

The vulnerability context, as identified in the framework, encompasses shocks such as diseases, accident and death, which are common features associated with granite mining. The shocks identified in the framework could be price fluctuation, loss of granite product/loss of money during any business transaction process. The sustainable livelihood framework also shows that seasonality and trends can be related to stress, which are predictable events that affect livelihood outcome from livelihood strategies. Seasonality in relation to granite mining can be related to weather changes that can affect productivity, especially during the rainy season where the activities of the workers are reduced. Seasonality is also related to price fluctuation, as shown in the diagram, which is mainly determined by the demand of granite products. The vulnerability contexts, as shown in the framework, acknowledge how people cope with stress and shocks that are common in the industries. Small-scale mining basically relies on social networks such as family and friends for materials and immaterial support to achieve livelihood outcome.The land through which mining activities is carried out is referred to as the natural capital which the workers freely access to engage in granite mining activities. The human capital includes the physical capability and ability to labour. In small scale mining, the granite workers depend on skills acquired through apprenticeship from experienced workers.

Ellis (2000) explains financial capital to mean cash, savings, loans, remittances and credit. The granite workers use financial resources to rent work places and buy tools or hire workers. The physical capital can be referred to as basic infrastructure and producer goods to support livelihoods. This could be roads, shelters, access to information. Producer goods are tools people use to function productively, such as tools and equipment needed for accessibility to the area, which may contributes to the increase in the turnout of customers in the community, thereby making mining a fast-income-generating activity. The framework explains social capital to livelihood objective. These could be developed through networks and connections, either vertical (patron/client) or horizontal (between individuals with common interest) that increase people's trust and ability to work together to achieve their desired objectives (DFID, 2001). Social capital is an asset that workers depend upon, especially in the form of shocks, stress and weather changes that may affect their activities for livelihood outcome. Transforming structures and processes in the framework occupy a central role in determining the accessibility to assets. Structures, as identify by the framework, include public and private organizations that enhance or hinder accessibility to a resource. Scoones (1998) describes institutions as formal and informal regulations structured by the rules and norms of a given society. The understanding of institutional processes allows identification of restrictions and opportunities to sustainable livelihood. On the

other hand, informal institutions such as culture and regulations at mining areas may hinder accessibility of women to mining activities, hence affecting their livelihood outcomes.

Livelihood strategies, as shown in the framework, are a range of combination of activities and choices that people make in order to achieve their livelihood objectives. Livelihood strategies are determined by the resources available, depending on the assets people have and the structures and processes that impact on them, such as tradition and the vulnerability which they operates, where people choose their livelihood strategies that will best provide livelihood outcomes. The livelihood strategy in this research work is on the granite exploitation in Netim. The framework identifies the livelihood outcomes as an achievement or output of livelihood strategies. Increase in income, as shown in the framework, reduces vulnerability of the poor to shocks such as disease, accidents and death. The increase in workers' income improves the well-being both at the individual and household level. The feedback arrows, as shown in the framework, show that livelihood outcomes can be converted into assets. For instance, financial increase as a result of livelihood outcomes can be converted into physical capital, such as equipment and tools for increase productivity and realization of livelihood outcomes. In this framework, the different types of capital are very important in achieving livelihood strategies which buttress Ashley and Carney's observation (1999) that no particular asset can solitarily support the poor, but they often combine and nurture different livelihood assets to meet their needs.

Rural livelihood comprises the capability assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with, and recover from, stress and shocks and maintain or enhance both its capability asset both now and in future, while not undermining the natural resource base (Chambers and Conway, 1992). Ellis (2000) sees livelihood in relations to assets and activities influenced by social relations, gender, kin, and institution, although excluded in his definition is capability and sustainability. Capabilities are both a means and an end to attaining livelihood outcomes.Sen (1984) provides a wider scope of rural livelihood concept. He observed that capabilities are 'what people do or be with their entitlement', a concept which encompasses far much more than the material concerns of food intake or income. Such idea represents more than the human capital which allows people to do things, but also values elements of 'capability' or well-being that is able to perform certain functions. For any rural community to achieve rural livelihood, the people require a range of assets to achieve positive livelihood outcomes, and so no single category of assets on its own is sufficient to yield the varied livelihood outcomes people seek to achieve, especially in the rural community. Assets are therefore utilized to pursue different kinds of livelihood that people desire.

Helmore and Sign (2002) observe that no rural community is perceived to be poor or be in lack but they recognize the inherent potentials in individuals, households and communities which are used to build positive livelihood outcomes. Rural livelihood could be achieved through access to natural capital, skills and infrastructures that can enable the rural people achieve livelihood outcomes. The ability to pursue different livelihood assets is dependent on the basis material of social, tangible and intangible asset that people have in their possession. Livelihood resources may be seen as capital base from which different productivity streams are derived, which rural livelihood depends upon.

Ellis (2000) identifies livelihood assets to include natural, human, physical, financial and social capitals. Ellis explains that a combination of these assets gives positive livelihood outcomes. He sees natural capital to include natural resources such as soil, water, air, genetic resources and environmental services from which resource flow and services spring, from which livelihood outcomes are derived. He explains financial capital to mean cash credit, savings and other assets, including basic infrastructure and production equipment and technologies, which are essential to the pursuit of rural livelihood. He explains that human capital involves knowledge, skills, ability to labour, and physical capability for successful pursuit of different livelihood outcomes. By physical capital he means basic infrastructure, which could support livelihood in the rural community, such as roads, electricity, water supply, etc. He sees social capital as a social resource which people draw in pursuit of their livelihood outcomes. Rural livelihood is achieved through the combination of these 'capital' assets, for livelihood is dependent on the outcomes.

In summary, therefore, rural livelihood is dependent on the natural assets the rural environment which the rural areas possess, which Ellis (2000) refers to as the STRENGTH of such rural environment, which the rural areas must utilized to achieve their livelihood objectives. The strength which the people of Netim possess is the granite deposits, which can be referred to as their natural capital, in combination with other capitals to achieve their livelihood goals.

Concept of Corporate Social Responsibility

The corporate social responsibility concept was first propounded by Richard Mahoney, a Canadian lawyer, who specialized in public policy and regulatory law in 1992. The concept defined the obligation of business community towards the wellbeing of the people in the community in which they operate. Such an obligation include the construction of roads, provision of welfare packages during festivals, awards of scholarship, provision of safety wears (aprons, hand gloves, goggles, boats, and so on). The business community is required to safeguard the health and well-being of its workers and that of the society in which they operate. Industrialists are expected to give priority to the occupational health and safety goals by the government for the betterment of its staff. They are required to solve many social and ecological problems such as pollution, waste discharges to the rivers, depletion of natural resources. Thus, it implies that mining companies, whose activities result in air pollution and noise, should be responsible for their actions and held accountable for a safe and sound working environment, devoid of health hazards.

The concern is on whether or not the management policies of the operators do adhere to their responsibilities concerning the provision of safety working environment. Currently, there has been a popular outcry for entrepreneurs to be alive to their corporate social responsibilities (Ekwork, 2011). He further observed that management of the mining companies must appreciate their operating environment, recognize and preserve the aesthetic values as regards their operational processes. They are also to ensure that customers and workers are environmentally conscious. The mining companies have to build a strong reputation for prioritizing ethical, social and ecological issues.Most African countries, like Cameroon, Zambia, the Democratic Republic of Congo, and some southern African countries, establish their railway lines as a result of mineral exploitations (Benjamin, 2004). This explains the fact that the presence of a mineral resource contributes to the development of the area as a whole.

Corporate Social Responsibility Laws in Nigeria

Presently, there are no corporate social responsibility laws in Nigeria. Currently efforts are being made to discuss making a specific law which will cater for corporate social responsibility. However, there is no doubt that several legislations incorporates within their provisions certain expectations that directly or indirectly regulate the observation, for instance, section 279 (4) Companies and Allied Matters Acts 1990, points out that "the director of a company is to have regards in the performance of his functions to include the interest of the company's employees in general as well as the interest of its members". It should be understood that companies in Nigeria are not in any way precluded from carrying out social responsibilities towards the environment, what they do is to ensure that such social friendly policies are embedded in their Article and Memorandum of Association. This is done to achieve corporate social responsibility in the area, since there is no law for corporate social responsibility in Nigeria.

For the protection of the environment, various laws need to be reinforced and put in place for individuals and companies to behave responsibly to the protection of the environment. These laws stipulate criminal sanction for non-compliance as opposed to voluntary adherence. For example, the National Environmental Standard and Regulations Enforcement Agency (NESREA) Establishment Act 2007, this act provides for the standards of compliance with environmental protection. This also provides for environmental and other related offences punishment. Sections 20 – 29, states the expected standard of ensuring environmental protection. Section 20 of (NESREA) particularly relates to air quality of the environment. Section 27 deals with the discharge of hazardous substances and related offences. Section 30 provides for the powers of the officers of the Agency to enter the premises, take sample, investigates and even exercise right of seizure. Section 31 and 32 provides for the offences (Mordi et al, 2012)

According to Mordi (2012) explains another Act that calls for social responsibility is the Harmful waste (Special Criminal Protection Act). This act prohibits the carrying, depositing and dumping of harmful waste on any land, terminal waters and matters relating thereto. In section 1(1) prohibition of all activities relating to purchase, sale, importation, transit, transportation, deposit and storage of harmful waste. Section 1(2) enumerates the offences. The Act makes it a general offence for anyone to deal with harmful waste provides penalty of imprisonment. The act provides for the exclusion of immunity to foreign nationals.

Although there are laws in the criminal code which deal with the protection of the environment. Certain sections of the code provide for the protection of public health. Sections 234 – 248 of the criminal code provides for offences against public health. Section 245 declares as offence the corruption or fouling of water, spring, streams, well, tank, reservoir or place. Section 247 provides for noxious acts and section 243 provides for exposing and adulteration of food or drinks. Section 244 provides for offences relating to dealings with and in diseased meat and section 246 provides for offences against burial in houses (Mordi et al 2012). Despite these laws and sanctions, the challenge of the Nigerian state has always been how to enforce these laws. The issue of concerns is how to make these companies comply or to what extent could these penalties be enforced against a person or group of persons in law. Currently, there is a Bill on corporate social responsibility

which is presently before the Nigerian national assembly (National Assembly of Nigeria 2012) operating in these communities.

The Bill proposes five main divisions which respectively provide for the establishment of the CSR considering the provision of the Bill, its successful passage in the national assembly will certainly be a welcome development and a great reformation of the practice of CSR in Nigeria and this will bring to bear corporate ethics amongst the existing companies in Nigeria.

Materials and Methods

The sample size of this research study is 225, made up of the residents of Netim, management and staff of mining companies operating in the area. The sample for the study was drawn randomly from the five mining companies with staff strength of 586 and the residents of Netim. The distribution of the questionnaire is shown in the table below. A total of 225 respondents were used for this study. To ensure an even spread of the data, stratified sampling technique was adopted in selecting the sample from management and staff of the mining companies, residents of Netim and those involved in the mining activities. Random sampling technique was then used to select members of the sample. Stratified sampling was adopted to select the different classes of people for questionnaire survey and those to be interviewed. These included management and staff of granite companies and residents of the study area. This is to ensure that all classes of people are captured. Also the Random Sampling Technique was used to choose respondents for administration of questionnaire through the use of random numbers.

Discussion of Findings

The people of Netim have experienced rapid socio-economic transformation as a result of granite exploitation in the area which has spanned well close to forty years. There have been increased employment opportunities, enhanced income, and stimulation of business activities, infrastructural development and increased social interaction among the people (as shown in Table 4 and 5). The analysis shows that the people of Netim, although rural in setting, are now less dependent on agricultural activities, thus demonstrating a difference from other rural communities, which is not granite-mining in status.

Although granite-mining activities are undertaken primarily for the benefit of the investors, yet it has provided the basis for diversification of economic activities in the area. The mining activities have created employment and enhanced the income potentials of the people. An interview with one of the small-scale miner's reveals that a person can be involved in multiple occupations for the enhancement his/her income level in order to meet the daily needs of his/her household. Although the people are engaged in more than one income-generating activity, their main occupation is mining and its associated businesses. The identified opportunities in Netim include small-scale mining activities, increased business activities, such as petty trading, hotel business, motor and motor cycle maintenance, welding works, faming, timber exploitation, collection of non-timber forest products, among others.

It was discovered that mining and its associated activities attract a high percentage of the population into Netim. Prior to the exploitation of granite in Netim, the natives were predominantly

farmers. Less than 5% of the population was on the payroll of any establishment (public or private), but today the story is different. The survey on employment in Netim shows that 92% of the respondents are of the opinion that mining and its associated businesses generate higher employment than any other activity in Netim (see Table 4 and 5). The study also reveals that a significant proportion of the population of Netim is employed in the mining companies and other mining activities in the area. In an interview with some of the people (migrants), they gave reasons why they came to their present location Netim. They said they came to seek employment, trade, and farm, collect farm produce for sale and do timber exploitation. One Mr. Udosen who hails from NsitIbiom, Akwa Ibom State, revealed categorically that his main reason for migrating to the area was for gainful employment and business. In addition, the study reveals that majority of the mine workers are under the age of 33 years, although the greatest concentration is between the ages of 26-33 years of age. Also the analysis on educational experience of mine workers indicates that they have never been to school beyond secondary education. The highest is 42% who had received primary education.

They study also reveals that granite mining is associated with the development of social services and infrastructural facilities in the area. Common among the infrastructures in the areas are electricity, water supply, roads, markets, health centre's,/hospitals, educational facilities, town hall, village square and a bank (First Bank Nig.Plc.) Among the infrastructures named above, only health centre's are provided by the government; all others are contributions of the mining companies to the community.

The existence of First Bank is to carter for the granite industries in the area. Ordinarily, no banking presence would have been in Netim but for the mining companies. The study reveals that all the said infrastructures were not obtainable in Netim until the mining activities took place and lasted for close to ten years of operations. Furthermore, the study reveals that the provision of educational facilities, such as the building classroom blocks, provision of reading materials, provision of scholarships to indigenes of Netim and provision of learning/teaching materials to schools, were all by courtesy of the mining companies.

The only null hypothesis in this study states that there is no significant contribution of granite exploitation to the livelihood of the people of Netim. To test this hypothesis, both the people who work with the mining companies and residents in community who are directly or indirectly associated with the chain of granite exploitation in Netim were requested to respond to the questionnaire items. Their levels of income per month were measured. Their level of income in this case was a measure of their livelihood. Data obtained was subjected to chi-Square test analysis and the test was carried out at 0.05 significant levels. To this end, the null hypothesis was rejected and the alternate hypothesis was sustained, and so it is concluded that granite exploitation in Netim significantly contributes to the livelihood of the people of Netim.

Housing facilities was critical due to the influx of the people into the mining region. The questionnaires study revealed that there is significant improvement in the quality of housing in Netim compared to when mining activities had not commenced in Netim. This is because of the improved income generation of the people in Netim as a result of revenue generated from mining,

its ancillary mining activities and improved business activities in the area. They study observed improved housing conditions in the area, thus indicating the level of development in the area.

Finally, the researcher concludes that there is a remarkable change in the socio-economic environment of Netim. These changes are not without its adverse effects. Such adverse effects include environmental degradation and air pollution amongst others

Conclusion

This research study was aimed at assessing the contributions of granite exploitation on the livelihood of the people of Netim community in Akamkpa Local Government Area of Cross River State. The construction of roads, boreholes, establishment of primary and secondary schools, health centre's, market stalls, banks amongst other benefits were as a result of granite exploitation in Netim. At personal level, granite exploitation in Netim has led to increased economic empowerment of the indigenes and non-indigenes alike. For instance, mine workers have increased revenues from direct employment, increased business activities like hotels, petty trading and so on, while most persons are involved in small-scale mining activities where free entry exists – a business that has gainfully employed so many youths in Netim. In all, the study concluded that granite exploitation has significantly contributed to the livelihood of the people of Netim notwithstanding the adverse effects.

Recommendations

In assessing the contribution of the granite exploitation in Netim, it is recommended as follows:
In an effort to enhance the livelihood of the rural poor, other livelihood strategies such as small-scale granite mining, in addition to agriculture, need to be developed amidst the natural and economic shocks that affect agricultural productivity; such can be used as a coping strategy, hence supporting rural livelihood in Netim community.

- In order to ensure sustainable development, there is need to recognize informal activities such as small-scale granite miners by policy makers. Environmental sustainability should be given high priority in an effort to preserve finite resources for the future generation. There is need to ensure that mining operations are conducted in such a way that broader benefits to the community are openly acknowledged and concerted efforts are made to ensure that their benefits can be sustained even when mining activities have stopped in Netim.
- The realization of these benefits will enhance sustainable development in the exploitation of these non-renewable natural resources in Netim. Hentschel (2003) notes that, because informal producers are not supported by mining laws or the legal system in most developing countries, it is not easy for informally produced goods or products to penetrate the formal market. As a recommendation, there is need to encourage value-added products which fetch more money, to strengthen the local market. Recognizing the importance of small-scale mining activities will help address the needs of the workers and provision of necessary assistance. Legalizing the activities is one of the strategies to reduce environmental degradation.
- The researcher recommends purposeful investments in the training of technical manpower in the rural areas as an urgent necessity to ensure growth and efficiency of modern economic activities in our rural environment. The present concept of education has gone beyond the traditional concept. Hence, the rural people are considered for unskilled activities by the

mining companies. Therefore, vocational counselling should be encouraged at the secondary stage, to enlighten the rural population to take career training in technical education.

- Agricultural incentives such as fertilizers should be made available to the rural population involved in farming to improve the fertility of the soil, since most lands are polluted and wasted as a result of granite exploitation. Above all, the unplanned approach of the mining companies in the exploitation of granite in the region demands some questioning. Since the mining activities are carried out within a short distance from human settlement, the atmosphere within the region is unbearable for human habitation. Therefore, the relocation of Netim settlement is necessary in view of the danger it posses to health. The enforcement of safety standards should be followed vigorously. It is also recommended that location of industries utilizing mineral resources in the rural areas is necessary, to ensure increased benefits to the people, rather than the present practice of locating such industries in the urban centres.
- There should be sustained and concerted efforts to re-afforest the wasteland by mining activities. Such efforts will help to preserve the environment for the future and reduce green house effects and global warming generally. In view of this research work, if the recommendations are given attention to, a sustainable rural development and the socio-economic livelihood of the rural population in the mining region will be ensured in Netim, thus alleviating poverty among the rural poor.

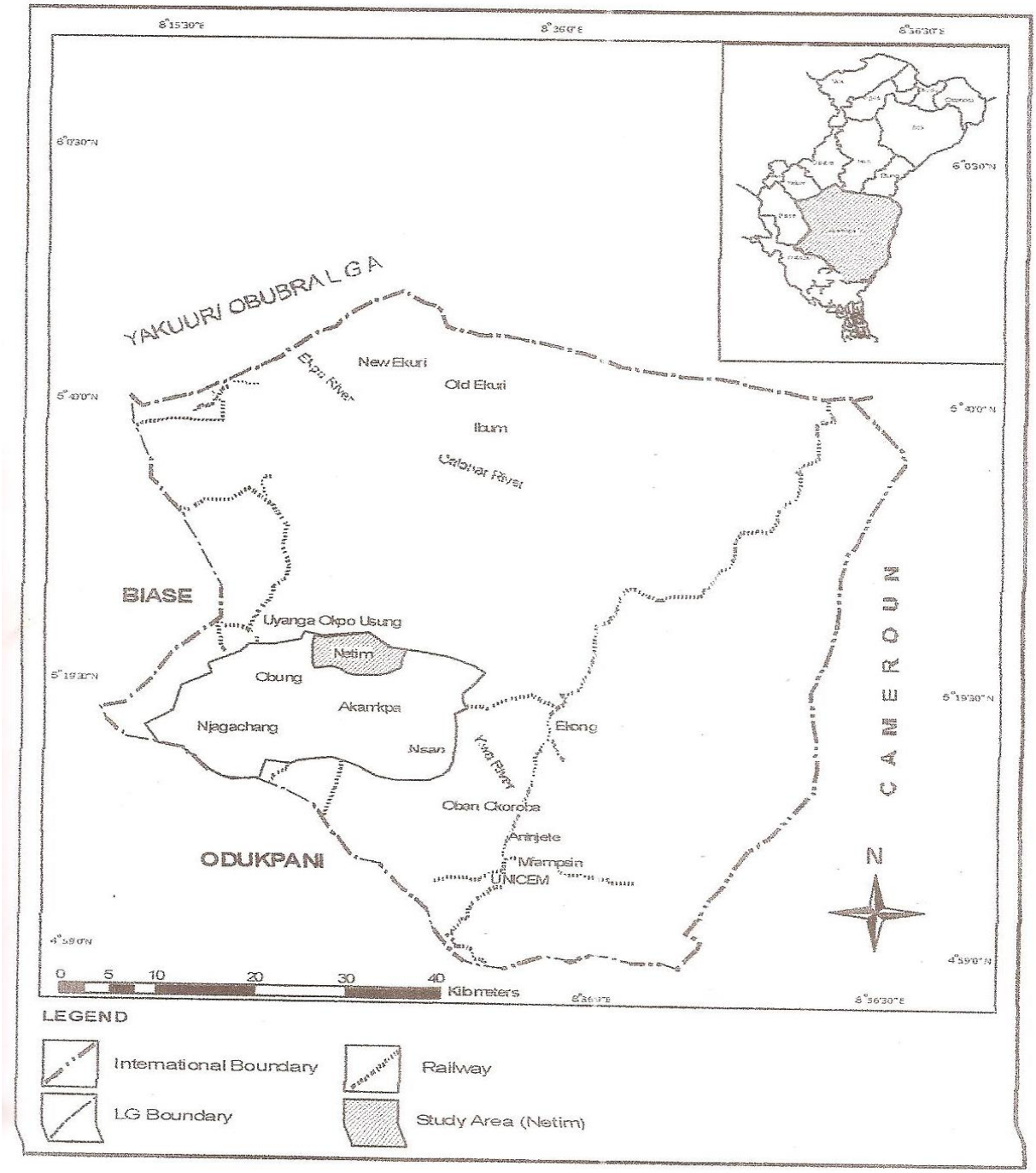

Fig 1.2: Map of Akamkpa Local Government Area Showing the Study Area
Source: Adapted from the GIS Unit, University of Calabar, 2010

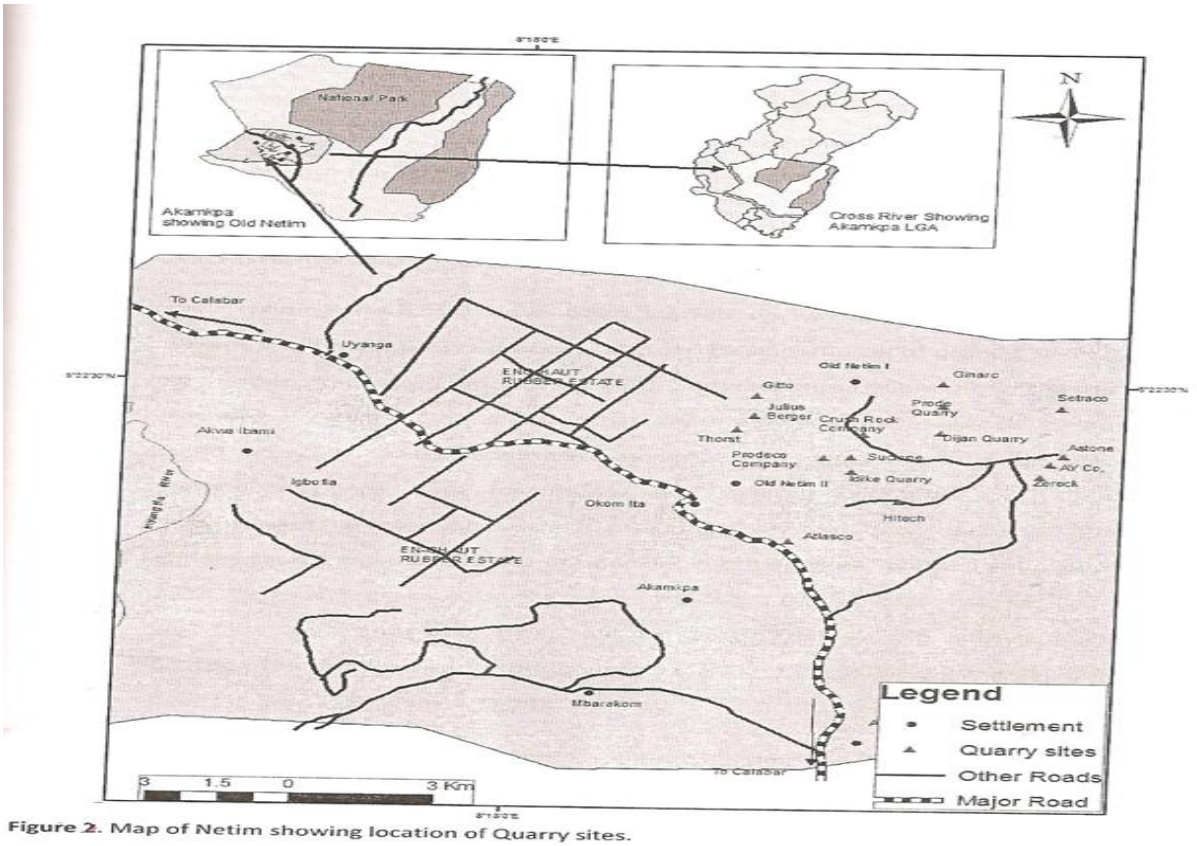

Figure 2. Map of Netim showing location of Quarry sites.

Source: Survey Department, Ministry of Lands and Housing Calabar, Cross River State.

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