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Socio-economic impacts of sand and gravel mining activities in Nsugbe, Anambra state, Nigeria.

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Abstract:

This work studied the socio-economic impacts of sand and gravel mining activities in Nsugbe, Anambra State Nigeria. The work is hinged on the concept of sustainable development. Questionnaire was randomly administered to generate the data used. Descriptive statistics was used to analyze the data while the one tailed Z-test was used to test the two hypotheses postulated. The result of the first analysis showed that there is a significant social impact associated with sand and gravel mining in Nsugbe, while the second analysis revealed that there is a significant economic impact associated with sand and gravel mining in Nsugbe. The work showed that sand and gravel mining activities impacted significantly on the environment, leaving behind so much social and economic scars that the government needs to look into.

Keywords: Gravel, Sand and Environment.

1. Introduction:

The environment all over the world suffers daily from one form of impact or the other as a result of the numerous activities engaged in by man [2] These different activities tend to affect one or more aspects of the environment positively or negatively, thus leading to various forms of environmental enhancement or degradation, as the case may be. One of the ways by which man impacts his environment is through mining activities, [11]. The mining industry is one of the oldest industries in the world and its importance to human development becomes evident when one considers the naming of the pre-historic ages after mined products – "stone age", "Bronze age" and "iron-age" [4]. Mining is majorly an engineering and geological practice that deals with the design of the optimum ways of extracting mineral resources that are part of the earth's crust. Mineral resources can be broadly defined as elements, chemical compounds, or rocks concentrated in a form that can be extracted to obtain a useable commodity [11, 8].

Hence, mining on the whole, is said to be the extraction of valuable mineral resources or other geologic materials from the earth. It can also be said to be an act or process of extracting minerals of economic importance from their natural environment and transporting them to points of processing and use [7]. Sand and gravel are among the most extensively used materials for construction work, buildings, glass making, road-base foundation and coverings, and concrete fill. In other cases, they are used to fill buildings and other construction foundations. [10 & 6]. Experience has shown that sand and gravel are crucial resources from extractive industries that make enormous contributions to economic development efforts including the production of concrete mortar and plaster [3]. It has been reported that approximately 75 million tones of sand and gravel are used annually in Washington D.C [In USA] alone and that in the European Economic Community (EEC) sand and gravel serve as the basis for building and construction projects.

Mining in Nigeria was dated as far back as the eighteenth (18^{th}) century according to [1]. Sand and gravel mining involves open-pit mining, strip mining and quarrying [11]. While open pit mining removes hill top soils creating large holes or pits, quarrying involves the extraction of ornamental stone blocks, or recovery of sand, gravel and crushed stones for production of road base, cement concrete and macadam.

Although, there is no documentation on the inception of sand and gravel mining in Anambra State, it is believed that this activity, is as old as civilization in the state. Before the introduction of block houses, the people dug sand to build their houses (i.e. mud houses), thus sand excavation. With the expansion and growth of our societies, more extensive sourcing for construction materials was intensified. The Most notable sources of excavated sand and gravel in Anambra State include Ekwulobia, Nsugbe, Awka and Umunya as observed by [Onwuka,2008]. Mining activities all over the world,

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including Nigeria, have contributed immensely in improving the economic, social and environmental aspects of man in areas where minerals are mined, [12]. These positive contributions to the economic, social and environmental aspects of mining areas are seen in form of increase in income, increased employment, provision and maintenance of social amenities/utilities.

Anambra State, which is located in South Eastern, Nigeria lies within latitudes $6^{o}45^{1}$ and $5^{o}40^{1}$ N and Longitudes $6^{o}35^{1}$ and $7^{o}21^{1}$E. The studies made by [3] showed that the state covers an area of 4,416 square kilometers and it is situated on a rolling flat land on the eastern plains of the River Niger. The State has Onitsha and Nnewi as its two main commercial centres.

The study area is characterized by long wet season and short dry season. Temperature is high with mean daily and annual temperature of 28^{o}C and 27^{o}C respectively. The atmospheric humidity is also high but its figures vary over 80 percent in the wet season and generally below 60 percent in the dry season [3]. The study area is also characterized by heavy precipitation. According to [11], the mean annual precipitation is 1524mm with a relative humidity of the atmosphere of 80 percent at dawn. The land is covered with vegetation except in areas where there are bare vegetation due to excessive cultivation, urbanization and bad farming practices. The trees have luxuriant foliage. The presence of climbers and epiphytes forming complex tangles is common place. The forests with graded tops and continuous canopy of wide leaves are typical where human activities are limited.

Mining activities all over the world, including Nigeria, have contributed immensely in improving the economic, social and environmental aspects of man in areas where minerals are mined, [12]. Many people including some local dwellers therefore resort to the business of mining sand and gravel for sale to earn a living. Having realized this vital economic avenue, most community leaders and traditional rulers take to selling out some community lands within their domains to miners.

This is so because the people derive their livelihood and ensure their survival from the natural resources available and accessible to them [5]. The need to survive, both individually and as a group, affects peoples' perception and use of land resources and consequent interaction with the environment. It is to this effect that this study assesses the socio-economic impact of sand and gravel mining in Nsugbe, Anambra State, Nigeria.

This work was based on two hypotheses that were postulated. The hypotheses postulated were (H_O) "there is no significant social impact associated with sand and gravel mining in Nsugbe", and (Ho) "There is no significant economic impact associated with sand and gravel mining in Nsugbe".

This study is based on the concept of sustainable development. The concept of sustainable development was an outgrowth of the Brundtland Report and is simply defined as: Development which meets the needs of the present generation without compromising the ability of future generations to meet their own needs" [12, quoted in 5].

Literally, sustainable development refers to maintaining development over time. Environmental sustainable development is the process of making sure current processes of interaction with the environment are pursued with the idea of keeping the environment as pristine as naturally possible based on ideal-seeking behaviours. The concept of sustainable development balances on three stands, namely social sustainability, economic sustainability and environmental sustainability as shown in figure 1 below. A development which considers the environment, social benefits and economic gains can be said to be sustainable.

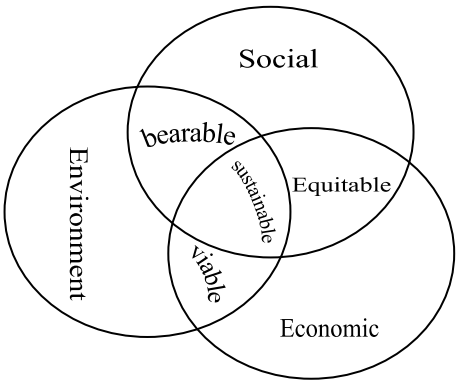

Figure 1 An illustration of the concept of sustainable development (Source: www.wikipedia.com)

Sustainability according to [7] is a process which tells of a development of all aspects of human life affecting sustenance. It means resolving the conflict between the various competing goals and involves the simultaneous pursuit of economic prosperity, environmental quality and social equity with the resultant vector being technology; hence it is a continually evolving process.

An unsustainable situation occurs when natural capital (the sum total of nature's resources) is used up faster than it can be replenished. Sustainability requires that human activity only uses nature's resources at a rate at which they can be replenished naturally.

2. Materials and Methods

This research takes a survey design/format which is descriptive in nature. In this regard, questionnaire method as well as oral interviews and field observation were employed in collecting data used in the study. The questionnaire was distributed randomly while the sample size was determined using the Yaro Yamine formula. In analyzing the data obtained from the study, descriptive statistical tools were employed.

In determining the average value of the parameters studied, for easy computation and testing of the hypotheses, the mean, which is a measure of the central tendency, was applied. In testing for the two hypothesis, the one tail/one sampled Z – test was used because of the number of samples distributed is greater than or equal to thirty (30) ($n > 30$).

3. Results and Discussion

Table 1 shows the occupational status of respondents in the study area. From the result of percentages of response, 21.0% of the population are sand and gravel miners while 29.6% of the population are motor cyclist which is the highest occupation of the sampled size. Following motor cyclist, other occupations are ranked in order of magnitude in the area as sand and gravel miners (21.0%), Farmers (17.3%), Traders (13.6%), commercial drivers (4.9%), students, restaurant keepers and artisans share the same size of 3.7% and Labourers (2.5%).

Table 2 shows the reasons why people mine sand and gravel in the study area. From the result of the percentages of response, it can be observed that 32.1% of the respondents think that people become miners because of the income they generate from the mining process. 27.2% of the respondents are of the opinion that people become miners because of the demand for sand and gravel used in building and construction. In addition, 22.2% are of the opinion that people become miners not because they want to, but because they have no other source of income. Hence they are forced into it due to bad economy. Lastly 18.05% of the respondents are of the opinion that people become miners because they get raw materials they need for their production processes.

Table 1: Occupational status of respondents

Occupational status	*No of respondents*	*% response of respondents*
Sand and gravel miners	17	21.0
Farmer	14	17.3
Motor cyclist	24	29.6
Labourer	2	2.5
Commercial driver	4	4.9
Student	3	3.7
Restaurant keepers	3	3.7
Artisan	3	3.7
Total	81	100

Source: Authors Field Work, 2012

Table 2: Reasons Why People Mine Sand and Gravel.

Why do People Mine	*No of respondents*	*% response of respondents*
Forced Labour	18	22.2
Use as raw material	15	18.5
Use as construction material	22	27.2
Income generation	26	32.1
Total	81	100

Source: Authors Field Work, 2012

Table 3 represents the percentage responses on the negative social impacts as a result of sand and gravel mining in Nsugbe. The table contains ten variables whose responses are displayed on the 5-point likert scale. It shows that among all the variables on social impacts of sand and gravel mining, only two (increased crime rate and prostitution) that the respondents show disagreement as negative social impacts caused/brought about by sand and gravel mining. On the other hand, majority of the percentages of responses on the other eight variables of loss of cultural heritage, intense migration over population, change in settlement pattern, community conflicts, disruption of land tenure system illiteracy and loss of interest in education are heaped on the side of strongly agree and agree. This is equally in line with what was observed at the study area. The mining operation is a means of livelihood and can support a

lot of households, which means that people from different places are attracted to the area. The intense migration of people eventually leads to other externalities like over population and loss of cultural heritage. In addition, because sand and gravel mining is a viable venture, it will induce change in settlement pattern, community conflicts, disruption of land tenure system, illiteracy and loss of interest in education. But it tends to discourage social vices like prostitution and crime in the entire area since sand and gravel mining is itself an income generation avenue.

Table 4 shows the distribution of percentage response on the economic impacts as a result of sand and gravel mining in Nsugbe. Residents of Nsugbe who responded on the economic impacts identified increase in income, loss of farmland, urbanization and inflation in the prices of items as economic impacts of sand and gravel mining activities on their surroundings apart from industrialization. As shown in the table, most of percentage of the responses on the variables were on the sides of strongly agree and agree scale except in industrialization where the percentage of responses of strongly disagree and disagree options are majority/greatest. In the same vein, the economic impacts of mining are well pronounced in the study area. From Table 4, the variable (intense migration) can be related to urbanization in this table. Both are interlinked, since urbanization can never set in without the migration of people into a locality. And what will drive people to move into any location are sources of income like sand and gravel. This, in conjunction with urbanization will increase pressure on available land, leading/causing land unavailability for farming purposes and inflation on the prices of items. Visual observation in the area reflected this very well in the table with respect to industrialization. There are no evidences of industrial growth in the area probably because most sands/gravel mined for production processes are taken to other places.

The result of the analysis for hypothesis one is shown in table 5 below. Consequently, the discussion is based on the table.

From Table 5, the mean values of all the variables are greater than 3.00 except those of increase in crime and prostitution, which are 2.901 and 2.667 respectively. Consequently, the null hypothesis is rejected for all the variables, except increase in crime rate and prostitution. This is because their P-values and mean values (increase in crime rate and prostitution) are not significant while those of other variables are. These results give this study a great credence since they back the reality on ground. Intense migration into the study area will definitely overwhelm the population. Over population will eventually induce change in settlement pattern, loss of cultural heritage and disruption of land tenure system. These variables are interdependent and interlinked in the ways they work. Increase in the number of people in the area results to acculturation of the indigenous people. Also due to the revenue/income generated from mining activities, young people tend to lose interest in education, which can equally give them an alternative source of income should the mining business becomes non-profitable. This helps to increase illiteracy among the inhabitants. Mining processes are carried out on land not in vacuum, so as pressure/demand for available space multiply, changes will occur in the originally established land tenure system of the area, and settlement pattern will change. Both of them will surely, result to people going into virgin lands or sanctuaries (places reserved by indigenous people for their rituals and deities), thus leading to the loss of the peoples' cultural heritage. Also, in other areas of culture like marriage, communication/language, dressing etc they may be affected.

Ordinarily, as more population is experienced in the area, there ought to be a relative increase in crime and social vices. But it is obvious that the area does not witness such things, at least for now, may be because lack of money which in most cases, lead many people to such attitudes, is now being checked by the mining activities in the area. This is true because a walk around the study area revealed that the standard of living of the dwellers has improved. Therefore the alternative hypothesis that there is a significant social impact associated with sand and gravel mining in Nsugbe is accepted.

The result of the analysis for hypothesis two is shown in Table 6. Consequently, the discussion is based on the table.

Table 3 Percentage Responses on Negative Social Impacts Resulting from Sand and Gravel Mining

Social impacts	*Strongly disagree*		*Disagree*		*Undecided*		*Agree*		*Strongly agree*		**Total**	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Loss of cultural heritage	8	9.9	11	13.6	12	14.8	23	28.4	27	33.3	81	100
Crime rate	13	16.0	25	30.9	14	17.3	15	18.5	14	17.3	81	100
Over population	12	14.8	11	13.6	13	16.0	23	28.4	22	27.2	81	100
Change in settlement pattern	7	8.6	19	23.5	7	8.6	28	34.6	20	24.7	81	100
Community conflicts	11	13.6	13	16.0	12	14.8	20	24.7	25	30.9	81	100
Disruption of land tenure system	12	14.8	14	17.3	10	12.3	25	30.9	20	24.7	81	100
Intense migration	16	19.8	10	12.3	9	11.1	26	32.1	20	24.7	81	100
Prostitution	17	21.0	29	35.8	10	12.3	14	17.3	11	13.6	81	100
Illiteracy	14	17.3	10	12.3	11	13.6	28	34.6	18	22.2	81	100
Loss of interest in education	11	13.6	13	16.0	12	14.8	24	29.6	21	25.9	81	100

Source: Authors Field Work, 2012

Table 4 Percentage Response on the Economic Impacts As A Result of Sand and Gravel Mining in Nsugbe.

Economic impacts	*Strongly disagree*		*Disagree*		*Undecided*		*Agree*		*Strongly agree*		**Total**	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Increases in income	15	18.5	10	12.3	8	9.9	26	32.1	22	27.2	81	100
Loss of farmland	7	8.6	21	25.9	6	7.4	27	33.3	20	24.7	81	100
Urbanization	11	13.6	11	13.6	12	14.8	21	25.9	26	32.1	81	100
Inflation in the prices of items	10	12.3	12	14.8	9	11.1	28	34.6	22	27.2	81	100
Industrialization	20	24.7	24	29.6	8	9.9	12	14.8	17	21.0	81	100

Source: Authors Field Work, 2012

Table 5: Z-Test For Negative Social Impact Of Sand And Gravel Mining

Test of mu = 3.000 vs mu not = 3.000

The assumed sigma = 1.43

Variable	*N*	*Mean*	*StDev*	*SE Mean*	*Z*	*P*
cultural	81	3.617	1.338	0.159	3.89	0.0001
crime ra	81	2.901	1.357	0.159	-0.62	0.53
over pop	81	3.395	1.402	0.159	2.49	0.013
settleme	81	3.432	1.322	0.159	2.72	0.0067
comm. co	81	3.432	1.422	0.159	2.72	0.0067
land ten	81	3.333	1.405	0.159	2.10	0.036
intense	81	3.296	1.470	0.159	1.86	0.063
prostitu	81	2.667	1.351	0.159	-2.10	0.036
Illitera	81	3.321	1.404	0.159	2.02	0.044
Interest	81	3. 383	1.384	0.159	2.41	0.016

Source: Authors Computation from Field Work, 2012

Table 6: Z-Test for Economic Impact of Sand and Gravel Mining

Test of mu = 3.000 vs mu not = 3.000

Variable	*N*	*Mean*	*StDev*	*SE Mean*	*Z*	*P*
Econ1	81	3.370	1.470	0.159	2.33	0.020
Econ2	81	3.395	1.339	0.159	2.49	0.013
Econ3	81	3.494	1.415	0.159	3.11	0.0019
Econ4	81	3.494	1.361	0.159	3.11	0.0019
Econ5	81	2.778	1.500	0.159	-1.40	0.16

Source: Authors Computation from Field Work, 2012

From table 6 above, the mean values of all the variables including increase in income, urbanization, inflation in prices of items, loss of farmlands are above 3.00, unlike that of industrialization which is 2.778. Similarly, their P-values are all less than 0.05, unlike that of industrialization which is greater than 0.05. So, to this effect, the null hypothesis is rejected for all the variables, except industrialization. Hence, we conclude and accept or state the alternative hypothesis "that there is a significant economic impact associated with sand and gravel mining in Nsugbe". The economic impacts include increase in income, loss of farmland, urbanization, and inflation in prices of items.

This result/finding did not dispute the fact that mining operation around the world including Nsugbe is an occupation. It sustains individuals and cooperate organizations. It has been a source of income to the people who indulge in the activity. Subsequently, their income from sand and gravel mining processes are spent in their ambient environment thereby contributing to the general increase in income of the entire people. Since sand and gravel are valuable minerals used for many purposes their demands are high, so people from within the community and near by places sought for the commodity.

4 Conclusions

This study was focused on the assessment of the socio-economic impacts of sand and gravel mining in Anambra State, using Nsugbe as a case study. A questionnaire was administered to respondents to gather the data used. The tests revealed that there is a significant difference in the social components resulting from sand and gravel mining activities. It also revealed that there is a significant difference between the economic variables resulting from sand and gravel mining activities.

From these results, it can be concluded that sand and gravel mining activities have had serious impacts on the social and economic lives of Nsugbe people of Anambra State, Nigeria. This implies that sand and gravel mining activities impact on the environment significantly, and have left behind a lot of social and economic scars on the land as well as on the inhabitants of the area.

Poverty induces a variety of behaviours that can promote environmental degradation, and that in nearly all societies, poverty is a function of income and other factors such as health, education, access to goods and services etc. It is therefore pertinent to posit here that for sand and gravel mining activities to reduce in the study area, a very serious environmental education and alternative means of livelihood for the inhabitants of the area needs to be provided.

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