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EFFECTS OF SAND MINING ACTIVITIES ON LAND IN AGRAIAN COMMUNITIES OF OGUN STATE, NIGERIA

Aromolaran Adetayo K.
Department of Agricultural Extension and Rural Development, University of Agriculture, Abeokuta, Nigeria.
Email: garomolaran@yahoo.com

ABSTRACT

This study examined the effects of sand mining activities of rural people on agricultural land in Ogun State, Nigeria. A multi-stage sampling technique was used to select 240 respondents from 24 rural communities in the state. Data on personal characteristics, livelihood options and their peculiarities were collected using interview guides. Soil samples were also collected and analysed to evaluate possible chemical degradation level. Results showed that 67.9 percent of the respondents were male, 65.4 percent were married with a mean age of 47.9 years and 36.7 percent had primary education. Most of the respondents ranked sand mining and gravel mining as very severe; 74.2% and 71.6% respectively, among livelihood activities affecting land. Changes observed due to sand mining included soil nutrient depletion (78.8%), low yield (72.2%), gully on farmland (70%) and diminished vegetation cover (66.7%). The soil analyses from sand mining sites showed that the mean of total nitrogen was low (0.08%), calcium was low (3.6cmolkg^{-1}) and sodium was low (1.1cmolkg^{-1}). Conversely, sites where sand mining were not intense showed that total nitrogen was medium (0.18%), calcium was medium (4.3 cmolkg^{-1}) and sodium was high (1.4) cmolkg^{-1}. There were significant differences between calcium deterioration at sand mining sites and non-sand mining sites Imeko and Ijebu-igbo (t = 17.80 and 13.00 $p < 0.05$).There were significant differences between sodium deterioration at sand mining sites and non-sand mining sites Opeji and Ijebu-igbo (t = 25.00 and 5.00 $p < 0.05$) Conclusively, sand mining contribute to land degradation in agrarian community by destroying the soil surface and structure as well as declining the nutrient status of agricultural land. It is recommended that trees and shrubs that could help regenerate degraded land and prevent erosion should be planted, educating the rural people on alternative livelihood activities that are less degrading the agricultural land.

KEYWORDS: Sand mining, degradation, livelihood activities, agricultural land, soil nutrients

INTRODUCTION

In Nigeria, most rural people engage in agricultural activities as means of livelihood. They cultivate and harvest crops and by so doing, removes some of the nutrients from the soil without replenishment. They make land to suffer nutrient depletion and become unusable for further farming. At least 12 million rural dwellers engaged also in other livelihood activities that rely heavily on natural resources for parts of their livelihood which include animal rearing, mining of sand, gravel, rock mining and tree felling. Through these activities, over-cultivation, overgrazing, deforestation and over excavation occurred over time (IFAD, 2002).

Mining of sand and gravel on agricultural land is one of the alternative livelihood activities of the rural people in Nigeria which is now becoming an environmental issue. There is increase in demand for sand for construction and other purpose as communities grow because construction at present requires less wood and more concrete, which sprout a demand for low-cost sand. Mining of sand on farms and fallow agricultural land is becoming common and this is having noticeable impacts on the soil structure, vegetation and local wildlife in the rural areas.

Viswanathan (2002) reports that the possible ecological impact of the indiscriminate sand mining and threats to the livelihoods of local communities include the depletion of groundwater; lesser availability of water for industrial, agricultural and drinking purposes; destruction of agricultural land; loss of employment to farm workers, and damage to farm roads and bridges.

Sand mining is widespread, highly unregulated, uncontrolled and is being carried out at an alarming rate. The gravity of the situation beyond the affected communities and the region at large is enormous and posses a threat not only to the environment but also to food security. Chiefs and land owners gave out land for monetary gains and caring less about the effects of the mining activities on the people and the environment. (Imoru, 2010)

Although sand mining contributes to the construction of buildings and development, its negative effects include the permanent loss of sand in areas, as well as major habitat destruction. Sand mining is regulated by law in many places, but is still often done illegally (Wikipedia, 2011). In view of anecdotal account of the effect of sand mining activities on agricultural land and inadequate empirical records to establish the extent of chemical degradation at sand mining sites, this research was conducted, guided by the following specific objectives:

- describe the personal characteristics of the respondents in the study area.
- identify and rank the livelihood activities affecting land in the study area.
- examine the changes on agricultural land due to sand mining activities.
- determine chemical degradation status of soil at sand mining sites.

It was hypothesized that there was no significant difference between degradation at sand mining and non sand mining areas.

METHODOLOGY

Study Area

The study was conducted in Ogun state in southwest Nigeria. It lies between longitudes 2^0 45′ E and 3^0 55′ E and latitude 7^0 01′ N and 7^0 18′ N. It covers a land area of approximately 16,406226 square kilometres and is bounded on the west by the Republic of Benin; on the south by Lagos state and the Atlantic Ocean, on the east by Ondo state, and in the north by Oyo and Osun states. Ogun state is characterized by 1000mm to 2599mm annual rainfall in the northern and southern parts respectively. The vegetation in Ogun ranges from derived savannah to rainforest. Its natural resources comprises forest reserves, rivers, rocks mineral deposits and extensive fertile soil suitable for cultivation. These resources encourage the rural people of Ogun state to engage in livelihood activities such as farming, lumbering, sand mining, charcoal making, gravel and rock mining, making Ogun state the appropriate location for this study.

Sampling Procedure and Sample Size.

Ogun State comprises of four agricultural zones according to Ogun State Agricultural Development Programme (OGADEP) namely: Abeokuta Zone, Ikenne Zone, Ilaro Zones, and Ijebu Ode Zone. The multi-stage sampling technique was used to get a total 240 respondents. The four agricultural zones were purposively involved in the study due to prominent of sand mining activities in many of the rural communities in of the zones. Two blocks were selected out of the available 4 blocks per zone using simple random sampling technique. This indicates that a total of 8 blocks were involved in the study. Three rural communities were selected from each of 8 blocks purposively to make a total of 24 rural communities included in the study and 10 respondents who were involved in sand mining business were selected using purposive sampling technique.

Also, soil samples were collected at 60 cm depth at the sand mining sites on agricultural land and in contiguous location of non sand mining sites at the same depth in each of the selected rural communities. The soil samples were subjected to the chemical analysis to determine chemical degradation. It was limited to the following parameter:

- Acidification (Al-saturation)
- Sodication-exchangeable sodium
- Salinity- electrical conductivity
- Nutrient level – NPK
- Exchangeable bases.

These tested parameters were necessary and important because they constitute the essential chemical nutrients required for proper plant growth and productivity and verification of these parameters revealed extent of chemical nutrient deterioration in sand mining and non sand mining sites.

Measurement of Variables

- The land related livelihood activities were measured from the respondents' indicated responses, using the ranks: 1 = "not severe", 2 = "severe" and 3 = "very severe".
- The observable changes on agricultural land due to sand mining activities were identified by asking the respondents to the list changes they observed.

- The extent of chemical degradation of soil samples from sand mining sites and non sand mining sites were measured by comparing the values of the following soil chemical parameters at both sites (i.e. sand mining and non-sand mining sites): Acidification (Al-saturation), sodication – exchangeable sodium, salinity- electrical conductivity, nutrient level (NPK) and Exchangeable bases.

Data Analysis

Descriptive statistics involving the use of frequencies, percentages and mean were used for presenting data on personal characteristics of the respondents. Soil chemical analysis was conducted on the soil samples collected from sand mining and non-sand mining sites to reveal the levels of degradation that had occurred at the two sites. The results were determined using major soil chemical parameters such as: Total Nitrogen percentage (TN %), Available Phosphorus (AVP), pH, Exchangeable acidity, %Aluminium saturation and Conductivity. T–Test analysis was carried out to ascertain for differences between the degradation in sand mining sites and non sand mining sites.

RESULTS AND DISCUSSION

Personal Characteristics of the Respondents

Table 1 shows that 67.9 percent of the respondents were males while 32.1 percent were females. Although women also engaged in sand mining activities, it is obvious that it is majorly a ‘man-business’, due to its tedious nature, requiring more physical strength than what a woman could handle. Most (65.4%) of the respondents were married and 36.7% were educated up to the primary level. Gordon and Craig (2001) holds the opinion that education increases the skill levels required for some rural non-farm activities and besides, it contributes to increased productivity or may be an employment – rationing device. This justifies the influx of these less educated people in the business, which requires little or no formal education to embark upon.

Table 1: Personal Characteristics of the Respondents.

Variables	*Mean*	*Mode*
Age (in years)	47.89years	60.8% 31-50 years
Sex		67.9% male
Education Status		36.7% Primary education
Household Size	8 persons	64.5% 5-9 persons
Length of Residence	23.20 years	57.9% 21- 40years
Marital Status		65.4 % Married

The mean age of the respondents in the study area was 47.9 years. This indicates that most of the respondents were within the working age and thus are economically active. This agrees with Fabusoro (2005), whose report stated that the mean age among rural households in Ogun State was 49 years. The respondents had lived in the study area for an average of 23years; this gave them the opportunity to describe the sand mining activities, its intensification and the resultant observable changes on their agricultural land due the mining activities which is common in the study area. Their length of residence also contributes to enrich their knowledge of the study area and approves them to effectively describe the prevailing livelihood activities that are land related during the period of their stay in the area.

Rural Livelihood activities affecting Agricultural land in Ogun state.

The livelihood activities that affected land in the study area were listed by the respondents and they were ranked based on their severity. Sand mining was ranked to be the most severe by 74.2 percent of the respondents and 71.6% of the respondents were of the opinion that gravel mining activities were also ‘very severe’. This is probably because sand and gravel excavation has direct impact on the agricultural land where the activities were intense in the study area. According to Byrnes *et al.* (2004), extraction of sediment from offshore sites may result in modifications to physical processes of the land in such sites. Therefore, the observation of the respondents based on the modification of the physical soil structures at sand and gravel mining sites could be their reason for ranking them ‘very severe’.

Rock mining activities by Quarry dealers were carried out on the agricultural land in the study area and it was ranked ‘severe’ by 52.1% of the respondents. This activity obstructs farming activities in such locations, either the land is fertile or not. Although the rural people usually return to cultivate such lands after the quarry sites have been abandoned, the cumulative effect of rock remnant disintegration have toxic effects on crops planted thereby affecting yield of the farmers.

Aside forcing them out of their farms, quarrying has other negative impacts such as noise pollution, air pollution, damage to biodiversity and habitat destruction, amongst others, which obviously made the rural people to rank it as ‘severe’ among those activities affecting their agricultural land. The finding of this study agrees with Okafor (2006) who opines that quarrying activities cause significant impact on the environment like many other man-made activities. It also corroborates with Anand (2006) and Mabounje (2008) who opines that the biggest negative impacts of quarrying on the environment is the damage to biodiversity and quarry carries the potential of destroying habitats and plant species. Air pollution generally and especially dust from quarry sites are known to be responsible for vegetation injury and crop yield loss and thus become a threat to the survival of plants (Iqbal and Shafig, 2001).

Sand dust production was another land-related livelihood activity, which the respondents ranked to be ‘severe’. The dust from this activity does not only affect the agricultural activity of the rural people, it pollutes air as well as affects their health. Guach (2001) reported that dust from mining 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 air pollution is not only a nuisance (in terms of deposition on surfaces) and possible effects on health, in particular for those with respiratory problems, but dust can also have physical effects on the surrounding plants, such as blocking and damaging their internal structures and abrasion of leaves and cuticles, as well as chemical effects which may affect long-term survival.

Most (73.4%) of the respondents agreed that the severity of sand dust production was high, corroborating Osha’s assertion that discharge dust 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). Charcoal making as a livelihood means was ranked ‘very severe’ by only 12.5% of the respondents. It implies that the rural people supported charcoal making despite the fact that it involved the felling of trees from the forest. In the charcoal-making process, bushes were cleared; trees and shrubs were felled, sliced and then set on fire to produce the charcoal. Meanwhile, the cleared land is made available for farming activities and the ashes produced fertilizes the soil. These derived benefits could be their reason for ranking it ‘not severe’.

The effect of continuous farming was ranked ‘very severe’, probably due to the low yield experienced on their farms. Continuous farming without replenishment causes deterioration of soil nutrient status. Sanchez and Jama (2002) reported that cultivated soils with no major chemical limitations would become deficient in nitrogen which is a major soil nutrient, under continuous cropping systems without nutrient inputs to supplement for the deficiency.

Table 2: Ranking of Livelihood Activities Affecting Agricultural Land.

Livelihood Activity	*Percentage Raking Based on Effect on Land*		
	Very Severe (%)	Severe (%)	Not Severe (%)
Charcoal Making	12.5	19.2	68.3
Tree Felling for Sale/Charcoal	59.6	29.6	10.8
Sand Mining	74.2	17.9	7.9
Gravel Mining	71.6	19.2	9.2
Bush Burning for Hunting	42.9	38.8	18.3
Sand Dust Production	33.6	39.8	26.6
Quarry	44.2	52.1	3.7
Continuous Farming	70.6	15.5	13.9
Pot Making	25.0	30.0	45.0
Stone Digging	52.0	28.0	20.0

Source: Field Survey (2010)

Observable Changes on Agricultural land due to Sand Mining Activities.

Entries in Table 3 reveals that 70 percent of the respondents observed that there were too many ditches and gully on their farmlands mainly due to mining activities going on in the area. These ditches make cultivation difficult; especially ploughing and harrowing, it exposes the root of crops and causes tree crops to fall. 52.1% of the respondents reported that more stones now appear on the soil surface and make the top soil to be more of gravel while 72.2% observed that there was low yield from sites where sand mining were being practised. 78.8 percent of the respondents pointed out that there was decline in soil nutrient in such sites, while 50.4 percent indicated that the physical structure of the soil is destroyed due to sand mining activities. This concurs with Rosenberg (2007) who posited that loss of productive land obviously affects farming and rural communities. As the land degrades, more fertiliser, machinery and supplementary feeds are needed and the cost of production increases. Small-scale, subsistence farmers are often unable to meet the extra costs and even large-scale, commercial farmers can find that farming becomes impossible.

Majority (66.7%) of the respondents noticed that vegetation cover had diminished and 36.7 % observed that there was loss of forest trees. This implies that during the process of excavating sand and gravel from the mining sites, they deforest the location to create space for mining activities. Since the soil surface is cleared and dug, it further encourages erosion. 40.8 percent of respondents indicated that erosion occurrence was one of the changes observed due to sand mining activity of rural people. This agrees with Charlier and De Meyer (2000) who reported that erosion has increased in many locations as a consequence of human activity which encouraged increased frequency of flooding and deterioration of ecosystems. Most (74.2%) of the respondents observed that there was increase in relative farm-homestead distance. Farm lands were now far away from the village centres since the nearby agricultural lands have been degraded and can no longer adequately support agricultural production. The farms have thus been shifted to fallow grounds for better production. This poses difficulty in the movement of farm produce to the village or market centre, thereby increasing the price of farm produce in the market, because of the extra transportation cost incurred.

Aside the reduction in the size of land available for agricultural purposes (as indicated by 67.1 percent of the respondents), the sales value of such lands at the mining sites declined drastically. This makes it difficult either to use such land for farming activities, or dispose it in order to acquire fertile land. The cumulative effect of the sand mining activities does not only affect the agricultural activities on the land, but also has severe impacts on the construction of roads, bridges and buildings. Large tracts of revenue land is rapidly getting cleaned up, besides innumerable trees are facing the axe and the land which was used for sand mining is becoming futile now which was once used for cultivation. (Hedge, 2011)

Table 3: Changes on Agricultural Land due to Sand Mining Activities (N = 240)

Changes Observed	*Frequency**	*Percentage (%)*
Loss of forest trees	88	36.7
Diminished vegetation cover	160	66.7
Exposure of soil surface	107	44.5
Appearance of many stones on the soil surface	125	52.1
Gully on farmland	168	70.0
Soil nutrient depletion	189	78.8
Destruction of organic matter	160	66.7
Destruction of soil structure	121	50.4
Soil erosion occurrence on the farm	98	40.8
Low yield	173	72.2
Soil compaction due to frequent tipper entry to the farms	86	35.8
Reduction of agricultural land	161	67.1
Water fills up the ditches and it leads to erosion	86	35.8
The soil becomes more loosen and cannot hold plant well	100	41.7
Increase in distances between farms and residence	178	74.2
Decline in sale value of the land	169	70.4

*Note: Multiple responses

Chemical Degradation Status of Sand Mining Sites.

Soil samples collected from sand mining sites and non-sand mining sites were subjected to chemical analysis to compare the levels of degradation that had occurred at the two sites. The results were determined using major soil chemical parameters such as: Total Nitrogen percentage (TN %), Available Phosphorus (AVP), pH, Exchangeable acidity, %Aluminium saturation and Conductivity.

According to Table 4, the mean composition of soil chemical nutrients at the non-sand mining sites were greater (TN% = 0.18; AVP = 34.9; Na^+ = 1.4; Ca^{2+} = 4.3; K^+ = 3.9; Mg^{2+} = 1.9; pH = 6.5; Acidity = 2.4; %Al = 16.5 and Conductivity = 0.8) than the mean at those locations where sand mining activity was intense (TN% = 0.08; AVP = 21.5; Na^+ = 1.1; Ca^{2+} = 3.6; K^+ = 1.8; Mg^{2+} = 1.4; pH = 6.3; Acidity = 1.6; %Al =16.7 and Conductivity = 0.6). The result showed that total nitrogen was *medium* (between 0.150-0.250%) at non – sand mining sites, but low (0.05%) at the mining sites. This showed that nitrogen, one of the major nutrients in the soil, declined more at the sand mining sites compared to the non–sand mining sites, indicating chemical degradation at the mining sites.

The nutrients: phosphorus, potassium, calcium, magnesium and micronutrients that soils naturally supply to plants come from the dissolution of primary or weatherable minerals. About 36% of the tropics have soils with low (less than 10%) reserves of weatherable minerals in their sand and silt fraction, which constitute nutrient capital reserves in the Integrated Natural Resources Management (INRM) context (Izac and Sanchez, 2001).

Table 4: Chemical Degradation Analysis of Sand Mining and Non-Sand Mining Sites.

	Sand mining sites					Non-sand mining sites				
Chemical parameters	Imeko	Opeji	Ijebu-Igbo	Someke	Mean	Imeko	Opeji	Ijebu-Igbo	Someke	Mean
TN%	0.042	0.069	0.168	0.055	0.08	0.229	0.043	0.289	0.163	0.18
AV.P(mg/kg)	13.378	23.992	22.665	25.982	21.5	23.328	31.509	40.023	41.128	34.9
Na^+ $cmolkg^{-1}$	0.9	1.2	1.0	1.4	1.1	1.2	1.3	1.5	1.7	1.4
Ca^{2+} $cmolkg^{-1}$	4.2	3.6	3.6	2.8	3.6	4.7	4.4	4.2	3.8	4.3
K^+ $cmolkg^{-1}$	0.9	2.1	1.3	2.8	1.8	2.7	3.5	4.3	4.9	3.9
$Mg^{2+}$$cmolkg^{1}$	1.9	1.4	1.1	1.0	1.4	2.2	1.8	2.1	1.3	1.9
pH	6.2	6.3	6.3	6.7	6.4	6.8	6.1	6.6	6.6	6.5
Exchangeable Acidity	1.3	0.8	3.0	1.3	1.6	0.8	1.8	0.6	3.7	1.7
%Al Saturation	14.1	8.8	30.0	14.0	16.7	6.9	14.1	4.7	24.0	12.4
Conductivity	0.86	0.62	0.49	0.59	0.6	0.78	0.98	0.81	0.65	0.8

The pH range of the soil samples collected from the selected sites were mostly between 6.1 – 6.5, which implies that they were slightly acidic. The percentage Aluminium saturation of the soil samples was less than 60 percent; therefore there was no problem of aluminium build up or saturation of soluble aluminium. The pH value of soil samples tested also confirmed that there is no aluminium saturation because sufficiently strong soil acidity is required for soluble Aluminium to be toxic to most crop species. A soil pH value of less than 5.5 usually indicates this problem. This agrees with Sanchez's work; he noted that Aluminium toxicity is rare in most small holder farming areas of sub-humid and semi-arid Africa, except for parts of Rwanda, Burundi, Northern Zambia, Southern Congo, KwaZulu Natal Province in South Africa and in some sandy soils of Zimbabwe. Two-thirds of the tropics do not have enough Aluminium saturation to worry about. (Sanchez *et al.*, 1997; Sanchez *et al.*, (2003).

T –Test Analysis

Table 5 shows that there was no significant difference between the quantity of total nitrogen percentages and available phosphate at sand mining and non-sand mining sites. Deterioration of sodium level was significantly different between sand mining and non-sand mining sites at Opeji ($t =25.00$, $p \leq 0.05$) and Ijebu – Igbo ($t = 5.00$, $p\leq0.05$). There was significant difference between calcium deterioration between the sites at Imeko and Ijebu-Igbo ($t = 17.80$ and 13.00 respectively at $p \leq 0.05$) while the difference was not significant at Opeji ($t = 10.00$, $p \leq 0.05$) and Someke ($t = 6.60$, $p \leq 0.05$). Deterioration of potassium, exchangeable acidity and aluminium saturation at sand mining sites and non sand mining sites were not significant at the various locations.

These observed differences in the quality and quantity of some of the nutrient elements at sand mining sites and non-sand mining sites in all the locations established that depletion of these nutrients were due to the mining activities going on at sand mining sites. The differences between the conductivity of the soil samples from both sand and non sand mining sites at Imeko and Someke were significant (Imeko; $t = 20.50, p \leq 0.05$, Someke; $t = 20.67, p \leq 0.05$).

Table 5: T-Test Values of Degradation at Sand Mining and Non Sanding Mining Areas

Variables	Location	df	t-value	Sig(2 tailed)	Decision
TN%	Imeko	1	1.45	0.385	NS
	Opeji	1	4.31	0.145	NS
	Ijebu-Igbo	1	3.78	0.165	NS
	Someke	1	2.02	0.293	NS
AVP(mg/kg)	Imeko	1	3.69	0.169	NS
	Opeji	1	7.38	0.086	NS
	Ijebu-Igbo	1	3.61	0.172	NS
	Someke	1	4.43	0.141	NS
Na^{2+}	Imeko	1	7.00	0.900	NS
	Opeji	1	25.00	0.025	S
	Ijebu-Igbo	1	5.00	0.126	S
	Someke	1	10.33	0.061	NS
Ca^{2+}	Imeko	1	17.80	0.036	S
	Opeji	1	10.00	0.063	NS
	Ijebu-Igbo	1	13.00	0.049	S
	Someke	1	6.60	0.096	NS
K^{+}	Imeko	1	2.00	0.295	NS
	Opeji	1	4.00	0.156	NS
	Ijebu-Igbo	1	1.87	0.313	NS
	Someke	1	3.67	0.170	NS
Mg^{2+}	Imeko	1	13.67	0.046	S
	Opeji	1	8.00	0.079	NS
	Ijebu-Igbo	1	3.20	0.193	NS
	Someke	1	7.67	0.083	NS
pH	Imeko	1	21.67	0.029	S
	Opeji	1	62.00	0.010	S
	Ijebu-Igbo	1	43.00	0.015	S
	Someke	1	133.00	0.005	S
Exchangeable Acidity	Imeko	1	4.20	0.149	NS
	Opeji	1	2.60	0.234	NS
	Ijebu-Igbo	1	1.50	0.374	NS
	Someke	1	2.08	0.285	NS
% Al saturation	Imeko	1	2.92	0.210	NS
	Opeji	1	4.32	0.145	NS
	Ijebu-Igbo	1	1.37	0.401	NS
	Someke	1	3.80	0.164	NS
Conductivity	Imeko	1	20.50	0.031	S
	Opeji	1	4.44	0.141	NS
	Ijebu-Igbo	1	4.06	0.154	NS
	Someke	1	20.67	0.031	S

CONCLUSION AND RECOMMENDATION

In recent times, sand mining activities have moved stealthily into the agricultural lands in agrarian communities, affecting agricultural production in these areas. This study established that sand mining was ranked the most severe among the livelihood activities that were land related in agrarian communities. This mining activity has contributed directly or indirectly to the deterioration of soil physical and chemical composition. The finding of the study showed that nitrogen, one of the major nutrients in the soil, as well as other soil nutrient such as available phosphorus, calcium, sodium and potassium declined more at the sand mining sites compared to the non – sand mining sites. For every truckload of sand that is removed for construction or other purposes from agricultural land, there is loss of top soil that is rich in nutrient meant to support agricultural production. The study also revealed that changes observed due to sand mining activities included low yield, gully on farmland, soil nutrient depletion and reduction in vegetation cover. If sand mining continues for some more years on these agricultural lands, the lands would become completely dry and futile for cultivation. The health of the rural people around sand mining sites is also endangered by the dust arising from sand transportation which could cause respiratory and skin related problems. It is therefore recommended that trees and shrubs that could help regenerate degraded land and prevent erosion should be planted. Enlightenment programmes on alternative livelihood activities that are less degrading to agriculture and the impact of sand mining on rural people's health and livelihood should be conducted to save our forest, agricultural production and the people. The government should make and enforce policies that prohibit illegal sand mining activities on the agricultural lands. Traditional authorities should also be empowered and monitored to implement these policies at local levels.

REFERENCES

Anand, P.B. (2006). Waste management in Madras revisited. Environment .Urbanization, 11(20): 161-176.

Byrnes, M.R., Hammer, R.M., Thibaut, T.D., and Snyder, D.B., (2004). Potential Effects of Sand mining on Physical processes and Biological communities offshore New Jersey, U.S.A. *Journal of Coastal Research,* 20(1), 25–43.

Charlier, R.H. and De Meyer, C.P., (2000). Ask Nature to protect and build-up beaches. *Journal of Coastal Research*, 16, (2), 385-390.

Fabusoro, E. (2005). Analysis of Socioeconomic and Spatial Factors in Livelihoods Diversification in Ogun State Nigeria, Unpublished Thesis University of Agriculture Abeokuta.

Gauch, H.G. (2001). Multivanate Analysis in Community Ecology Cambridge University Press, p. 85.

Gordon, A and C. Craig, (2001) Rural Non – farm activities and poverty alleviation in the sub sahara Africa. Policy Series 14, Chatcham, UK, NRI.

Hedge, M. (2011). Sand mining swallowing revenue land, trees posted by Sunoasis Writers Network

IFAD (2002). Tackling Land Degradation and Desertification, World Summit on Sustainable Development, Environment and Meeting GEF-IFAD Partnership Johannesburg.

Imoru, A. (2010,February 17). The Impact Of Gravel, Sand Mining On Communities n Northern Region. The Advocate, posted by Rural Media Network (Rumnet) 2010 Edition.

Iqbal, M.Z., Shafig M. (2001). Periodical Effect of Cement Dust Pollution on the Growth of some plants. Turkey Journal of Botany, 25: 19-24.

Izac, A.M.N. and Sanchez, P.A., (2001). Towards a Natural resource Management Paradigm for International agriculture: the example of Agro forestry Research. Agricultural Systems 69, 5– 25.

Mabogunje, A.L. (1980). The Debt to Posterity: Reflection on a National Policy on environmental Management N.P.O. Sada and T. Odemerho (ed). Environmental Issues and Management in Nigerian Development p. 6669

Okafor, F.C. (2006). Rural Development and the Environmental Degradation versus Protection: In P. O. Sada and T.Odemerho (Eds.), Environmental Issues and Management in Nigerian Development,. pp. 150-163.

Osha, O.L. (2006). Information Booklet on Industrial Hygiene. Revised Edition. U.S. Department of Labour OSHA/OICA Publications, Occupational Safety and Health Administration, Washington, USA, pp. 23-35.

Pedro, A. S., Cheryl A. P., Stanley W. B., (2003). Fertility capability soil classification: a tool to help assess soil quality in the tropics Geoderma 114 (2003) 157– 185.doi:10.1016/S0016-7061 (03)00040-5

Rosenberg, E. (2007). Land Degradation,(Article Type: Overview) www. *enviropaedia.com.*

Sanchez, P.A., (1997). Changing tropical soil fertility paradigms: from Brazil to Africa and back. In: Moniz, A.C.,*et al.*, (Eds.), Plant– Soil Interactions at Low pH. Brazilian Society of Soil Science, Piracicaba, SP, pp. 19– 28.

Sanchez, P.A., Jama, B.A.,(2003). Soil fertility replenishment takes off in East and Southern Africa. In: Vanlauwe,B., Sanginga, N., Merckx, R. (Eds.), Integrated Nutrient Management in Sub-Saharan Africa. CAB International,

Viswanathan, S. (2002, May 11). Mining Dangers. *Frontline India's National Magazine*, 19(10).

Wikipedia, (2011). Sand Mining. Wikimedia Foundation. Inc.

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