

# Sand Winning and Land Degradation: Perspective of Indigenous Sand Winners of Wa, Ghana

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## Abstract

The study investigated the effects of sand winning by combining qualitative methods and descriptive statistics. Key informant interviews, observation, photography plus questionnaire survey targeted 50 sand winners (drivers). The findings revealed that 56% of sand winners have mined sand/gravel for at least five years, 78% do 6-10 trips of sand and 70% make 6-10 trips of gravel daily. About 96% of sand winners employed labourers from Wa and 82% employed 6 labourers per day. About 30% of the sand winners own the vehicle/truck whilst 70% drives on contract basis. Majority of the driver-respondents (52%) disagree with the proposition that sand winning degrade the land. Another 70% argued that sand winning does not make farmers unemployed. Furthermore, 74% disagree with the view that sand winning causes food shortage. Also, 76% disagree that sand winning increases mosquitoes and malaria cases. However, 84% agree that sand winning is a profitable business.

**Key words:** sand winning, land degradation, farm land, Wa, Ghana

## 1. Introduction

As a process of land degradation, sand winning destroys the soil profile, damages soil surface configuration and changes topography of the land (Mehta et al., 2007). In this regard, land degradation is defined as the progressive reduction of intrinsic quality of land or loss of biological and/or economic productivity of land resulting from natural and anthropogenic process of environmental degradation (Gyasi et al., 2006, Millennium Ecosystem Assessment, 2005). Sand winning refers to the gathering and carrying away of parts of the solid earth such as sand and gravel as raw material for construction of roads and buildings. In this context, sand and gravel consist of eroded fragments of rock formation in which the diameter of grain of sand ranges between 0.002 and 0.08 inches and that of gravel from 0.08 to 4 inches (Hull, 2001).

In Ghana, sand and gravel are derived from natural deposits. The grains of sand occur in natural form at the sea coast, riverine and savanna areas. And, granules and pebbles of gravel are derived from the earth or crushed from quarrying rock. Together, sand and gravel constitute the primary raw materials for the construction of roads, bridges, houses, factories, schools, markets and offices. The concerns of this paper begin with the recent upsurge in demand for savanna sand and gravel in Wa. The opportunities created by the increased demand are good. However, the activities of the sand winners borders on land degradation particularly with regard to collection and destruction of topsoil which supports farmers' crops and the natural vegetation.

The increases in demand for sand and gravel could be explained by several factors. The ultimate causative factor is the rapid increase in human population since the creation of the Upper West Region in 1983 as the tenth administrative region of Ghana with Wa as its capital town. The second major reason is the bitumen surfacing of Wa to Kumasi road (Kumasi is the second largest city in Ghana). In 2004, a portion of this road particularly Wa to Bole was in good bitumen surface shape. The part of the road that linked Bole and Techiman was later on covered with bitumen while the remaining portion of the road between Techiman and Kumasi was given an asphalt surfacing. The improvement of this major trunk road made cement and other constructional materials easily accessible in Wa. Thirdly, the establishment of two tertiary institutions: the Wa Campus of the University for Development Studies in 2002 and Wa Polytechnic in 2003 created periodic increases in the human population. Admission of students to the tertiary schools preceded construction of school infrastructure such as lecture halls, students and staff accommodation. Therefore, local entrepreneurs took advantage of the emergent demand for housing to provide private hostels for students and staff of the University. Finally, in 2009 Wa was re-classified as a municipality.

## 2. Materials and Methods

### 2.1 Study Area

The Upper West Region has a population of 702,110 (341,182 (49%) males and 360,928 (51%) females) which

constitutes 2.8% of the total national population with an urban population of 16.3%; 28.3% were economically active children; 72.3% economically active population engaged in agriculture, forestry and fishing; and, agriculture alone constitutes more than 70% of the work force (Ghana Statistical Service, 2012). The Upper West Region contains only 2.4% of national housing stock and 75% were made from mud bricks or earth. About 67.9% of the regional population depend on protected wells and boreholes for water, 45% use flashlight or torch, seven out of ten household depend on wood for cooking and 36% dump solid waste in the open (Ghana Statistical Service, 2012).

The total population of Wa Municipality has risen from 98,675 in 2000 to 119,387 (57,985 (49%) male and 61,402 (51%) female) in 2006. By 2010 there were 107,214 persons with 52,996 (49%) males and 54,218 (51%) females. Two years on in 2012, the population of Wa Municipality increased to 127,284 (61,826 (49%) male and 65,458 (51%) female) (Ghana Statistical Service, 2012, Wa Municipal Assembly, 2012). The Municipality engulfs a number of hitherto isolate communities traditionally managed under different chiefdoms. Eight major towns which are yet to merge with Wa include Busa, Charia, Boli, Kpongu, Kperisi, Mengwe, Goripie and Kolpong.

The geographic location of Wa Municipality lies within latitudes 9°50'N and 10°20'N and longitudes 9°40'W and 10°15'W. It occupies a total surface area of approximately 234.74 km<sup>2</sup> (Aduah and Aabeyir, 2012). In relative terms, Daffiama Bussie Issa District lies to the North, Sawla-Tuna-Kalba District to the south of Wa Municipality while Wa East and Wa West Districts share east and west borders respectively.

Wa Municipality comes under the tropical continental or interior savanna climate. Specific elements of this climate include single rainfall regime which occurs within May-October with annual rainfall of 1,000 – 1,500 mm. The highest monthly temperature is 36 °C in March and the lowest of 27 °C in August. Relative humidity of 70-90 percent occurs within the raining season and reduces to 20% during the long dry season when Wa Municipality falls under the influence of the north-east trade winds (harmattan) (Dickson and Benneh, 1988). The vegetation is a wooded savanna with a mosaic of grasses of different heights and many trees typically of the Guinea savanna. Common trees include *Vetillaria paradoxa* (shea), *Parkia biglobosa* (dawadawa), *Afzelia africana*, *Daniellia oliveria* and *Azadirachta indica* (neem) (UNDP, 2010). The edaphic features exhibits pH value between 6.0-6.8, organic matter 0.5-1.3%, total nitrogen 0.01-0.07%, available P 2.0-7.4 mg/kg soil and available Ca 52-152 mg/kg soil. About four soil types occur which include calcic vertisols (16.6% of the municipality), dystic leptosols 1.2%, ferric lixisols 67% and lithic leptosols 15.2% (UNDP, 2010).

## 2.2 Study Methods

The study methodology blends qualitative with quantitative methods. The Q-square approach was geared towards provision of insiders' account of sand winning (qualitative) through observation, key informant interviews of community members, informal discussions and photography. It was combined with the administration of questionnaire (quantitative). The quantitative approach via descriptive statistics such as frequencies, percentages and cross tabulations is used to describe insiders' view of sand winning. The study targeted drivers of sand winning vehicles who were the main actors of the activity. A convenient sample size of 50 drivers was used for the interview and questionnaire data sourcing. Statistical Package for Social Sciences (SPSS) 18.0 was used to analyze quantitative data.

## 3. Results

The ages of study respondents were as follows: 20-29 years (36% [28 drivers]), 30-39 years (46% [23 drivers]), 40-49 years (12% [six drivers]), 50-59 years (4% [two drivers]) and 60 years plus (2% [one driver]). The driver-respondents were categorized into the following educational levels: no formal education (44% [22 drivers]), primary school (26% [13 drivers]), middle/Junior High School (14% [seven drivers]), secondary/Senior High School (10% [five drivers]) and Polytechnic institution (6% [three drivers]). About 92% (46 drivers) were married and 8% (four drivers) had never married. In terms of religion, 90% (45 drivers) belonged to the Islamic faith while the remaining 10% (five drivers) professed Christianity.

The price of sand/gravel depends on the size of the bucket of the vehicle/truck. There are two sizes: one that carries a single load and the other double load. The cost of a single load of sand is GH¢60.00<sup>1</sup> and double load is GH¢120.00. The gravels is fixed at GH¢140.00 and GH¢280.00 for single and double load respectively.

Labour characteristics of the drivers and the young men who filled the vehicles/trucks with sand (sand loaders/labourers) are as detailed. About 30% (15 drivers) own the vehicle/truck which transports the sand/gravel

<sup>1</sup> GH¢1.00=\$2.25 as at 26/11/2013

whiles the majority (70%), that is, 35 drivers drive the vehicles on contract employment basis. The contract drivers received GH¢ 5.00 – 20.00 per trip (69% [24 drivers]), GH¢ 10 – 70 per day (8% [three drivers]) and GH¢ 200.00 – 350.00 per month (23% [8 drivers]).

The drivers employ young men as sand loaders/labourers. Initially, pick axe is used to loosen the sand-bearing earth. Then, shovels are used to collect the sand and thrown into the bucket of the vehicle/truck. One driver (2%) uses five labourers, 41 drivers (82%) use six labourers, five drivers (10%) depend on seven labourers and three drivers (6%) use eight labourers.

The source of labour for sand loading is an employment avenue for the male youth. About 48 drivers (96%) employ labourers from Wa and two drivers (4%) use labourers from the communities where the sand is mined.

The number of loads of sand/gravel carried per driver is indicative of amount of money made as well as the physical harm caused to the land. Three drivers (6%) go 1-5 trips of sand per day, 39 drivers (78%) do 6-10 trips and eight drivers (16%) convey 11-15 trips. In the case of gravels, 12 drivers (24%) move 1-5 trips per day, 35 drivers (70%) transport 6-10 trips and three drivers (6%) make 11-15 trips.

The history of sand winning activity is indicated by the numbers of years the drivers have engaged in sand winning. About 28 drivers (56%) have worked between one and five years in the sand winning industry, 16 drivers (32%) have worked for 6-10 years, four drivers (8%) have between 11 and 15 years of sand/gravel winning experience and two drivers (4%) have being carrying sand/gravel for well over 21 years.

The nature of real estate development in Ghana and Wa in particular is shown by the patronage of sand and gravel. About 22 drivers (44%) sell the sand and gravel to private/individual house developers, three drivers (6%) trade with construction contractors and 25 drivers (50%) sell to both private house developers and contractors.

Figure 1 shows sites for sand winning activities. About 22 communities are presently used as sites for collecting and carrying away constructional sand. Many drivers prefer sand from Tanina followed by Kongpaala, Jang, Danko and Sing. Sand from Nakore comes third and the rest follows in that order.

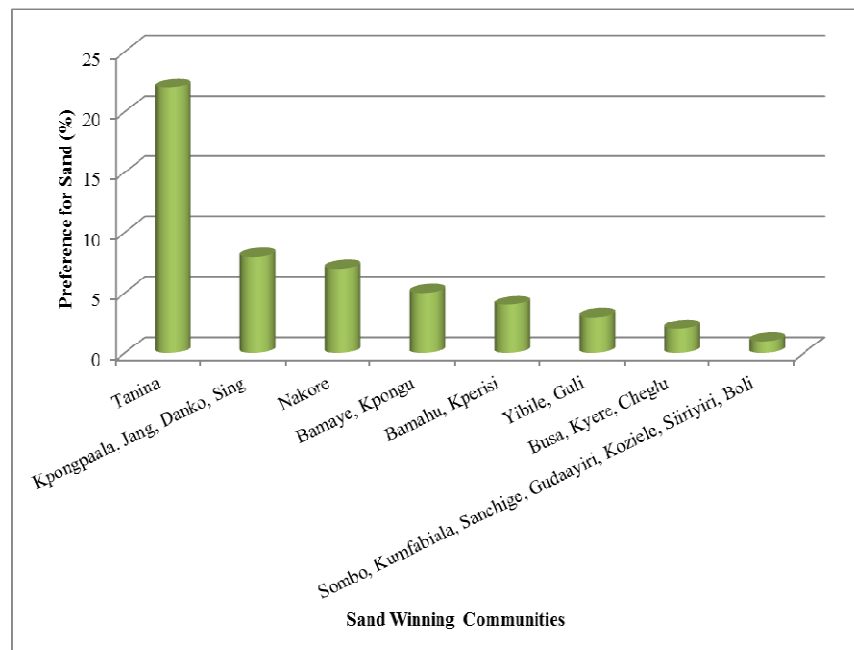


Figure 1 Sand Winners Preference for Sand of the Various Communities/Sites

Figure 2 portrays communities where constructional gravels are mined. Presently, gravel is fetched from about 25 communities. Again, the most preferred community is Tanina, the second most preferred gravel is carried from Kpongou, Nakore maintains the third position whiles the rest follows suit.

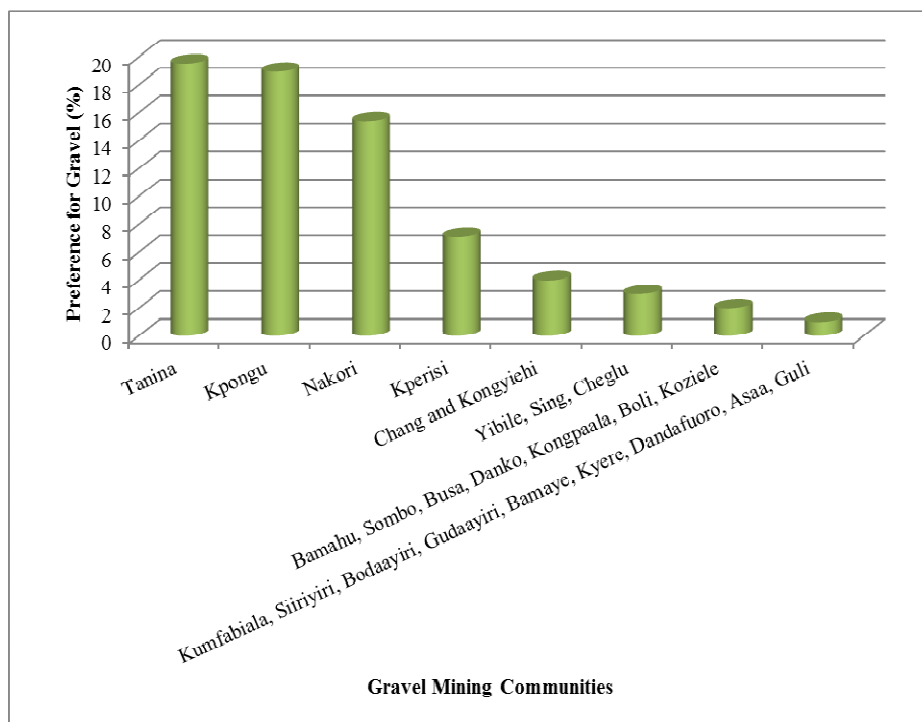


Figure 2 Gravel Miners Preference for Gravel of the Various Communities/Sites

Table 1 indicates five effects of sand/gravel winning in Wa Municipality. Many sand winners 44% strongly disagree with the view that sand winning degrade the land. Only 18% strongly agrees with this view. Also, 44% of sand winners strongly disagree that sand winning renders local farmers jobless while 16% strongly agrees. About 50% of the sand winners strongly disagree that sand winning creates food shortages and only 12% strongly agrees. Again, 46% of sand winners strongly disagree that sand winning increases mosquitoes and malaria cases while 16% strongly agrees with the proposition. However, only 8% strongly disagree that sand winning is a lucrative business which make the sand winners rich. About 62% of sand winners strongly agree that sand winning activities has made them rich.

Table 1 Sand Winners' Perspective on Effects of Sand Winning

Sand Winners Perspective on Effects of Sand Winning	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Total
Sand Winning Degrade the Land	44	8	6	24	18	100
Sand/Gravel Winning Renders Farmers Jobless	44	26	10	4	16	100
Sand/Gravel Winning Creates Food Shortages	50	24	8	6	12	100
Sand/Gravel Winning Increases Mosquitoes and Malaria	46	30	2	6	16	100
Sand/Gravel Winning has made you Rich	8	4	4	22	62	100

The results of the cross tabulation draw on the influences education might have on driver-respondents' perception on sand winning as a causative factor of land degradation (Table 2). About 11 drivers (22%) who have no formal education strongly disagree with the proposition that sand winning results in degrading the land. One graduate driver shares similar view with the illiterate drivers. Secondly, 12 drivers (24%) who have no formal education strongly disagree that sand winning makes farmers unemployed. The three graduate drivers choose to remain neutral. Thirdly, 15 illiterate drivers (30%) strongly disagree that sand winning cause food shortages. This position was generally supported by two graduate drivers. Fourthly, 12 illiterate drivers (24%) strongly disagree with the view that sand winning leads to increase in mosquitoes and malaria cases while two of the graduate drivers generally shared the same view. Finally, 15 illiterate drivers (30%) and two graduate drivers

(4%) strongly agree that sand winning has made them rich.

Figure 2 Cross Tabulation of Sand Winners Educational Attainment and Perceptive on Sand Winning-Land Degradation Relationship

		do you agree that sand/gravel winning degrades the land					Total
		strongly disagree	disagree	neutral	Agree	strongly agree	
level of education of respondent	no formal education	11	2	2	4	3	22
	Primary	4	1	1	4	3	13
	middle/JHS	5	0	0	1	1	7
	Secondary/SHS	1	1	0	2	1	5
	Tertiary	1	0	0	1	1	3
Total		22	4	3	12	9	50
		do you agree that sand/gravel winning renders farmers jobless					Total
		strongly disagree	disagree	neutral	Agree	strongly agree	
level of education of respondent	no formal education	12	4	1	1	4	22
	Primary	5	4	1	1	2	13
	middle/JHS	4	2	0	0	1	7
	Secondary/SHS	1	3	0	0	1	5
	Tertiary	0	0	3	0	0	3
Total		22	13	5	2	8	50
		do you agree that sand/gravel winning brings about food shortages					Total
		strongly disagree	disagree	neutral	Agree	strongly agree	
level of education of respondent	no formal education	15	3	1	1	2	22
	Primary	5	2	3	2	1	13
	middle/JHS	2	4	0	0	1	7
	Secondary/SHS	2	2	0	0	1	5
	Tertiary	1	1	0	0	1	3
Total		25	12	4	3	6	50
		do you agree that sand/gravel winning increases mosquitoes and malaria					Total
		strongly disagree	disagree	neutral	Agree	strongly agree	
level of education of respondent	no formal education	12	7	0	0	3	22
	Primary	3	3	1	3	3	13
	middle/JHS	6	1	0	0	0	7
	Secondary/SHS	1	3	0	0	1	5
	Tertiary	1	1	0	0	1	3
Total		23	15	1	3	8	50
		do you agree that sand/gravel winning has made you rich					Total
		strongly disagree	disagree	neutral	Agree	strongly agree	
level of education of respondent	no formal education	1	1	2	3	15	22
	Primary	1	0	0	6	6	13

middle/JHS	0	1	0	1	5	7
Secondary/SHS	1	0	0	1	3	5
Tertiary	1	0	0	0	2	3
Total	4	2	2	11	31	50

The farmer-land owner receives GH¢10.00 and GH¢20.00 per each trip of sand and gravel respectively from the sand winners. The land owner or representative always stood by to monitor the business. Also, the drivers pay GH¢5.00 per trip as tax to the Wa Municipal Assembly.

Plate 1 shows destruction of tree population as a result of sand winning which first destroys the roots, and then the trees fall down during storms. In addition, other biodiversity is lost and general self-maintenance of the natural environment becomes severely impaired.



Plate 1 Loss of Tree Population and other Biodiversity with Yam Farm at the Background behind the Round Farm Hut (Nakore, 20<sup>th</sup> June 2013)

Plate 2 indicates sand burrowed pit occupied by stagnant water. The water serves as breeding ground for mosquitoes and prevents farmers from accessing farms beyond that point.



Plate 2 Sand Winning Pit filled with Water which serves as breeding ground for Mosquitoes and also Prevents Farmers from accessing their Farms (Kpongpaala, 21<sup>st</sup> June 2013)

Plate 3 portrays a yam farm which borders sand winning pit. The farmer feared that after harvesting, the remaining land may not be available for farming as the sand winners will carry the topsoil away as constructional sand.





Plate 3 Sand Winning on the Left bordering Yam Plants on mounds (Farm) on the Right on the Same Piece of Sandy Land (Nakore, 20<sup>th</sup> June 2013)

Plate 4 depicts how the labourers use simple tools such as shovels to fill the vehicle/truck with sand. Sand winning just started on this piece of land. Hence, the isolated tree vegetation is still visible.



Plate 4 Fresh Land Where Sand Winning has just began with the Sand Loaders/Labourers loading the First Trip while the Land Owner's Son sit under a Tree to monitor the Business (Nakore, 20<sup>th</sup> June 2013)

## 4. Discussion

### 4.1 Summary of Results

The main aim of this study was to investigate the perspective of indigenous sand winners on land degradation resulting from sand winning activities. The study findings clearly show that the majority of local sand winners (52%) do not consider their activities as degrading the land. Another 70% argued that sand winning does not render farmers unemployed. Furthermore, 74% of the driver-respondents rejected the proposition that sand winning causes food shortage. Moreover, 76% disagree with the view that sand winning increases mosquitoes and malaria cases. However, 84% agree that sand winning is a profitable business. The views of illiterate drivers generally agree with that of graduate drivers on the effects of sand winning. Tanina stands out as a community which possessed the most preferred sand and gravel. The study also shows that sand and gravel are largely patronized by private individuals (44%) who construct their own houses through the use of local artisans. Although 4% of the driver-respondents have engaged in sand winning for over 21 years, the majority of drivers (56%) have between one and five years involvement. The majority of the drivers (78%) transport 6-10 trips of sand and (70%) convey 6-10 trips of gravel daily. Sand winning activities create employment for the male youth mainly in Wa (96%) and 82% of drivers employ six young men per day. Also 70% of drivers were contract

workers as they did not own the vehicle/truck. The contract drivers operated under three different wage or remuneration regimes. They earned the maximum of GH¢20.00 per trip, GH¢70.00 per day or GH¢350.00 per month. In terms of bio-data of the driver-respondents, 90% were Muslims, 92% married, 44% had no formal education and 36% fell within 20-29 years.

#### **4.2 Explanation of Results**

The sand/gravel winning is generally considered as an illegal business by Ghana's Environmental Protection Agency as well as an environmental nuisance by community members of the mining sites. The study results thus represent a defense of the sand winning business activity by the main actors.

The sand/gravel winning business operates under informal sector conditions such as free entry and exit, small-scale, unregistered, unregulated by relevant state institutions, requirement of small start-up capital, reliance on local manual labour and small local market. Sand/gravel is categorized as industrial mineral by Ghana's Mineral Act, 2006 Act 703 (Government of Ghana, 2006). Prospective investors require mineral rights. Largely, qualification for mineral rights is skewed in favour of large and until recently medium scale companies. Consequently, the minerals' sector runs a dualistic system of formal operators regulated by Ghana's Minerals Commission and the informal local merchants who 'gather them and sell' (galamsey) (Owusu and Dwomoh, 2012). Generally, activities of small-scale artisanal mining either for gold and diamond or sand and gravel are considered as environmental constraints which pose serious threat of land degradation (Government of Ghana, 2010). Therefore, Government of Ghana is empowering the EPA to regulate and impose fines on illegal sand winning (Government of Ghana, 2010). The medium-term national development policy framework 2010-2013 required of Municipal Assemblies to reforest degraded sand mining areas, locate appropriate areas for sand winning and make by-laws to regulate sand winning (Government of Ghana, 2010). Also, chiefs and community leaders are empowered by the environmental policy to play active role in the general environmental governance.

Although, the affected communities agree to the illegality of the activity of sand and gravel winning, their major concern is the environmental nuisance associated with the activity. To the women, the burrowed pits collect water during the raining season and serve as breeding grounds for mosquitoes and consequently increases in malaria cases. The stagnant waters prevent farmers from accessing their farms as there were no means to cross the water. The youth worry over the dusty environment created by moving vehicles/trucks on the non-bitumen surface roads. The noise made by the vehicles adds to the environmental nuisance. The many farmers who own no land loss their cultivated areas to sand winning.

The driver-respondents claim that land that contains much gravel is not suitable for farming. However, the same argument does not hold for sand which is fetched mainly from riparian and low lying sites. The sand winners believe that the farmer-land owners are duly compensated or remunerated for the use of the land. Therefore, the money received replaces the opportunity cost of not using the land for farming. The land owners consider the compensation as quick money that comes without sweat. However, the other farmers who benefit from the land through farming do not have a share in the compensation. The land is owned through inheritance via the first male child of the deceased land owner. Other family members could farm on the land but the decision to use it for sand winning or out-right sale is made by only the land owner. In each instance, the many family members or friends who use the land for farming become the losers. The wives of the land owners even complain about this phenomenon.

In order to keep themselves in business, the sand winners fail to realize any effect of their activity on the environment and on the communities. They advance reasons to explain that elsewhere in other communities where there are no sand/gravel winning, there are mosquitoes and malaria cases.

The sand and gravel winning business operates on cash and carry basis. Therefore, as soon as the private individual house developer or construction contractor receives the materials, the corresponding amount of money is paid to the driver. The money is distributed accordingly between the driver, labourers (sand loaders) and owners of vehicle and land. The Municipal authority benefits through the levy collected at check points on the main roads.

This recent sand/gravel business boom has come as a result of population increases and requirement for accommodation and office space for business. Also, many of the roads in the Upper West Region have not received bitumen surfacing. Therefore, there is always the need to re-surface the roads with mixture of sand and gravel at the end of the rainy season. Construction of new roads to communities which hitherto used foot paths provides another reason for sand/gravel winning. The magnitude of the problem that sand winning poses to the



natural environment of Wa and its surroundings is the number of trips (6-10 on the average) that 78% of the drivers make in a day for sand and 70% of drivers for gravel.

Presently, there is no rehabilitation or reclamation of degraded areas. This makes the destruction done to the land appears to be permanent.

The defense push forward by the sand winners does not reflect their levels of education since the graduate (polytechnic/tertiary school) drivers share the same opinion with the illiterate drivers. The low level of driver education is as a result of the Islamic Religion which barred its followers to attend school which were mainly run by Christians. Therefore, the 44% (22 drivers) who had no formal education were all Muslims. The employment created by sand and gravel winning benefits mainly the youth of Wa Township. The communities that host sand/gravel winning sites do not benefit from youth employment as expected.

#### **4.3 Linkages of Results to Other Studies**

Mehta et al. (2007) disagree with the sand winners on the account that sand winning do not lead to land degradation. It does, however, the authors recommended that sand winning should be permitted as agriculture could bounce back on the burrowed pit, off course after the pits have been reclaimed. Aromolaran (2012) also found that sand winning contributed to both physical and chemical land degradation and recommended for alternative livelihoods that do not adversely affect agriculture. In the present study, the price per trip of sand/gravel remained constant irrespective of distance between mining site and the buyer. Hull (2001) showed that in the Ohio State of the USA, cost increases with distance covered. Also, the author encouraged the use of land for sand winning and recommended that the burrowed sand pits could be converted into beautiful landscapes such as golf courses and buildings as well as wetlands for lakes and ponds for fishing, boating and swimming.

#### **5. Conclusion**

During the past decade, sand/gravel winning has become a lucrative business in the Upper West Regional capital, Wa. However, the activity is unregistered and unregulated by relevant state institutions who generally consider sand/gravel winning as illegal business. The present study investigated the perspective of sand winners in order to get a good understanding of the insiders' account of the activity. The major actors are defensive of their business and do not agree that sand winning causes land degradation, renders farmers unemployed, results in food shortage and increases mosquitoes and malaria cases. However, they agree that sand winning is profitable and has made the sand winners financially better off. Although, many farmers loss their farm lands, other farmers who own land benefit by receiving commission on the money from every truck load of sand/gravel carried from their lands. In view of the high demand for sand for concretization of development infrastructure and the desire of sand winners to take advantage to make more money as well as the laissez-faire approach of relevant state institutions towards the business, the study concludes that agricultural livelihoods would have to give way to other livelihood activities. The rapidly urbanizing regional capital, Wa would have to depend on its hinterland for food supply. Instead of agriculture, the sand winning communities could derive livelihoods from local tourism as the sand winning sites could be converted into gardens and parks, golf courses, fish ponds and swimming pools.

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