



ABSTRACT

Despite artisanal small-scale mining sector serving as means of livelihood to many people especially the poor and the vulnerable in rural communities and significantly contributing to GDP, there has been great concern about the sector's potential destruction to arable farmlands. It is therefore important to evaluate the effects of artisanal small scale mining on agricultural practices in Papi and Korokpan communities in Bosso and Paikoro Local Government Areas, Niger State, Nigeria. The data used in this study were collected directly from field survey, personal interview and questionnaire. The methods of data analysis include

EFFECT OF ARTISANAL SMALL-SCALE MINING ON AGRICULTURAL PRACTICES IN PAPI AND KOROKPAN COMMUNITIES IN BOSSO AND PAIKORO LOCAL GOVERNMENT AREAS, NIGER STATE, NIGERIA

NDAGI, HAUWA; & PROF. T. I. YAHAYA

Department of Geography, Federal University of Technology, Minna, Niger State, Nigeria

Introduction

Mining, which involves the extraction of naturally occurring minerals from the earth's crust, is considered the world's second oldest and most important industry after agriculture (Amponsah-Tawiah, 2011). In Nigeria, the history of mining dates back to the 4th century with small scale mining being the main form of mineral exploration at the time, when gold was used in diverse ways by indigenous craftsmen (Hayford *et al.*, 2018).

Artisanal and small-scale mining continue to be a popular form of gold mining across developing countries, employing more people than large scale mining (World Bank, 2013). Currently small-scale mining is being practiced, in approximately 80 countries globally (World Bank, 2013). Artisanal and small-scale mining has expanded rapidly in many developing nations driven by increasing population pressure and limited alternative income sources in rural areas (Lahiri-Dutt, 2014). Artisanal small-scale mining practices are common in Africa, and many researchers have investigated their attributes. For example, Hilson (2011) provides information about the workings of the small-scale mining industry in the Ghana, and argued that initiatives have recently been taken to regularize and formalize the activities of the industry, with the intention of reducing the associated environmental impacts and land-use conflicts. Except for the recent efforts by the Ministry of Mine and Steel Development, gold mining in Nigeria is largely uncontrolled, and the majority of the operators are unlicensed (Oramah *et al.*, 2015).



digital image processing, image classification, image classification and accuracy assessment, indicators analysis and frequency-percentage. The result revealed that destruction of farmlands ranked the highest with 31.1% of the respondents, low agricultural produce ranked second with 23.2% of the respondents, destruction of farmers' livelihood income ranked third with 19.4%, contamination of water bodies with chemicals ranked fourth with 17.1% of the sampled population and lack of measures to reclaim the destroyed farmlands ranked the least with 9.2% of the sampled population. This revealed that majority of the sampled population affirmed that the major impact was destruction of farmlands in the study area which is their major source of food security. The effect of ASM on food security was measured based on three dimensions; i.e. economic, environmental and health impact of ASM on food security by the indigene engaged in it. Table 4 shows the economic impact of ASM on food security in the study areas. Regarding ASM and its economic impact, 211 (60.3%) of the respondents agreed to the fact that ASM affect the livelihood of indigenes positively while 139 (39.7%) of the respondents disagreed. In support of majority assertion, they postulated that ASM have affected their economic status positively due to increased income as a result of gold sales in short-run. The increased income has increased their purchasing power and access and utilization of food that is made available. In the long-run 103 (29.4%) respondents in study area agreed to the fact that ASM will continue to affect their livelihood positively, 247 (70.6%) disagreed and asserted that in the long-run ASM will affect their livelihood negatively. Based on the findings, the study concludes that the activities of ASM has negatively affected all dimensions of farming activities in Papi and Korokpan communities in Bosso and Paikoro Local Government Areas except economic access for non-miners. The study also concludes that the activities of ASM in the communities has negatively affected food production and has plunged majority of non-miners in the community into food insecurity and poverty. In order to reduce food insecurity in the affected two communities and the two Local Government Areas, Niger State Government in collaboration with the affected two Local Government Areas to acquire vast farming land from non affected communities, this land should be protected from miners and should be given to persons willing to farm at a very high discounted rate.

Keywords: Mining, Artisanal, Small-scale mining, and Agricultural Produce

Despite artisanal small-scale mining sector serving as means of livelihood to many people especially the poor and the vulnerable in rural communities and significantly contributing to GDP, there has been great concern about the sector's potential destruction to arable farmlands (Oramah *et al.*, 2015). Artisanal small scale miners compete with farmers for land thereby threatening agriculture and food security, the mainstay of the rural economy. Several studies have reported very high levels of faecal coliform, viruses and *E. coli* in water used by farmers across the country for farming activities during the time of low rainfall for agricultural production. It is therefore important to evaluate the effects of artisanal small scale mining on agricultural practices in Papi and Korokpan communities in Bosso and Paikoro Local Government Areas, Niger State, Nigeria.



Due to the scarcity of good quality water for farming purposes especially during dry season, vegetable farmers in many parts of the study area tend to use water from rivers polluted by mining activities for crop production. The persistent use of such water for farming activities could increase the concentration of heavy metals in the soil and uptake of metals by plants (Lente, *et al.*, 2014), thereby affecting the quality and safety of the food for human consumption. Similarly, most studies on water quality in mining communities were focused on the impact of mine operation on water quality for drinking and domestic use only, with little emphasis on agriculture. This paper will bridge the gap by seeking to evaluate the effects of artisanal small scale mining on agricultural practices in Papi and Korokpan communities in Bosso and Paikoro Local Government Areas, Niger State, Nigeria.

The study area is located between longitude $6^{\circ}31'08''\text{E}$ and $6^{\circ}37.31''\text{E}$ and latitude $9^{\circ}11.11''\text{N}$ and $9^{\circ}60.50''\text{N}$ of the Greenwich Meridian as indicated in Figure 1.

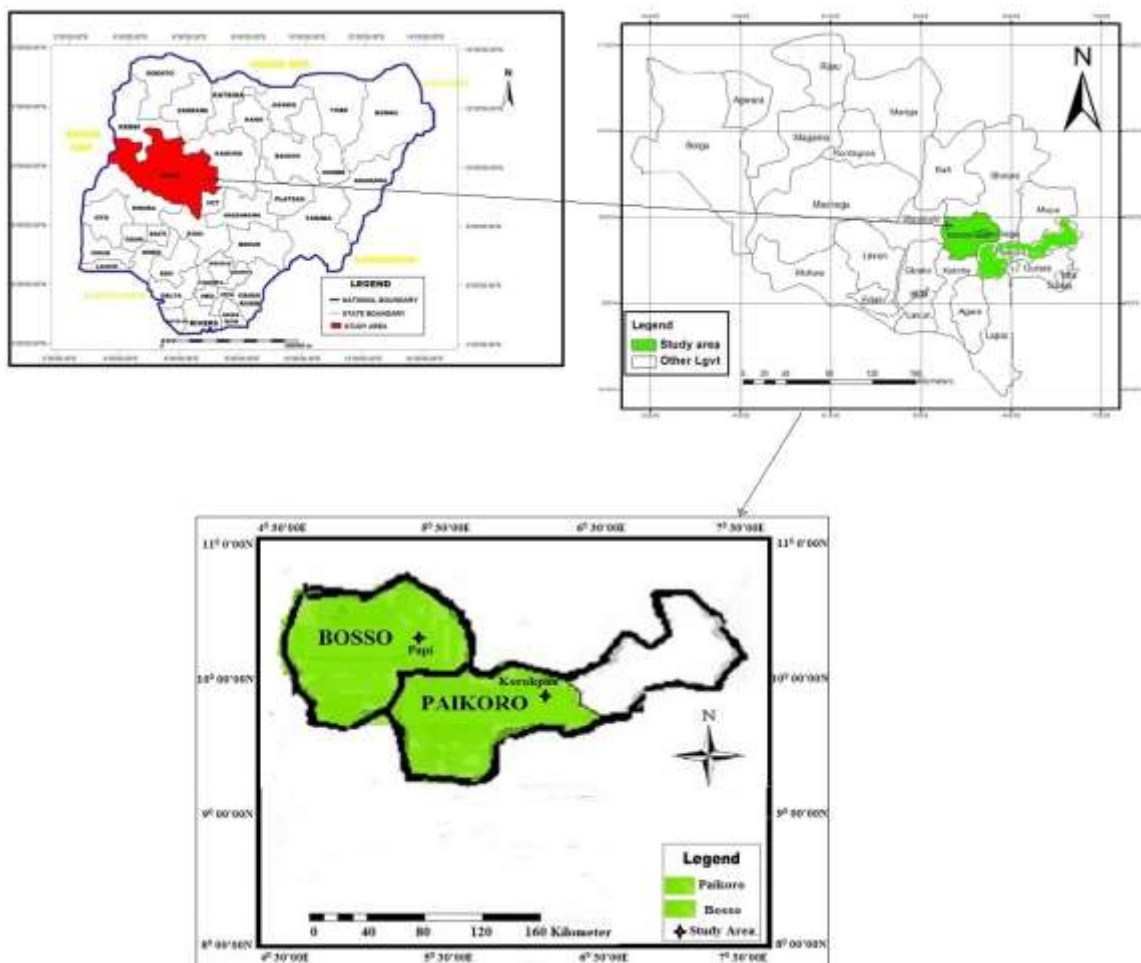


Figure 1: The Study Area (Bosso and Paikoro Local Government Areas)

Source: Niger State Geographic Information System (2022)

Materials and Methods

The types of data used for this study include primary and secondary. The primary data were collected directly from field survey, personal interview and questionnaire. This was used to achieve the stated objectives. The secondary data consist mainly of remote sensing satellite image as based map from global land cover facility and Google Earth Imagery. Other secondary



sources include journals, textbooks, newspapers, unpublished and published theses, and the internet. Secondary data sources were used to add value to this study. The methods of data analysis include digital image processing, image classification, image classification and accuracy assessment, indicators analysis and frequency-percentage.

Results and Discussion

The rapid land degradation covering the selected study areas including Minna in Figure 2 are largely due to its economic status and its proximity to Minna.

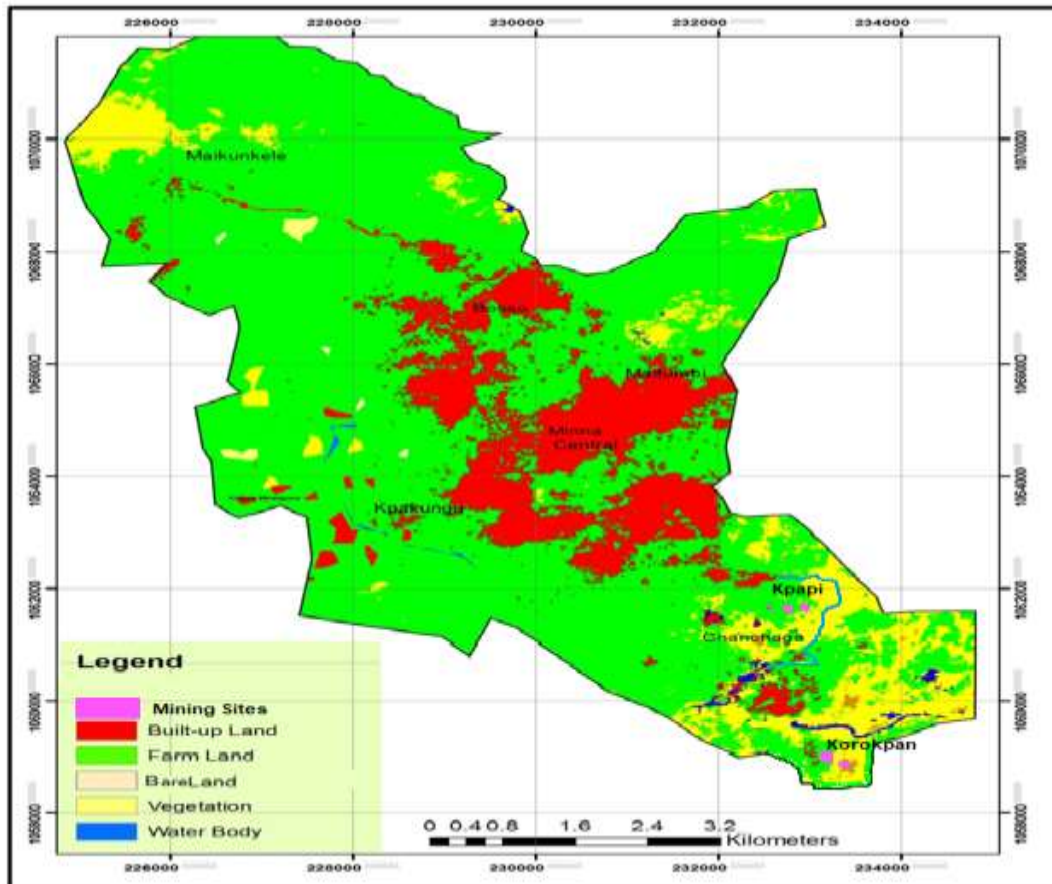


Figure 2: Land use and land cover of the study area, 2013

Source: Author data analysis, 2022

The landmass of the study area is 73km². From Table 1, built-up area covered 29.8km² (41.4%), farm land covered 23.1km² (32.1%), mining sites covered 0.4 km² (0.5%) vegetation covered 10.6km² (14.7%), bare land covered 3.2km² (4.4%) and water body covered 5.3km² (7.4%) in 2013. From the land use and land cover change map of the study area in Figure 3, the land use/land cover has changed and the percentage of each class is presented in Table 2.

Table 1: Land use and land cover of the study area, 2013

Land use	Area coverage (km ²)	Percentage (%)
Built-up area	29.8	40.8%
Vegetation	11.2	15.3%
Mining sites	0.4	0.5%



Total	73	100%
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Source: Author data analysis, 2022

As revealed in Table 3 of the study, 343 (98%) of the sampled population affirmed land degradation in the study area due to artisanal small-scale mining while 7(2%) said the land is not under going degradation. The shows that majority of the land in the study area are under-going degradation due to artisanal small-scale mining (gold mining).

Table 3: Presence of Land Degradation in the Study Area

Communities	Strongly Agree	Agree	Disagree
Kpapi	83	48	2
Korokpan	122	90	5
Total	205 (58.6%)	138 (39.4%)	7 (2%)

As shown in Table 4 of the study, destruction of farmlands/arable lands ranked the highest with 34.4% of the respondents, destruction of community's sources of water ranked second with 21.1% of the respondents, creating of uncovered pits ranked third with 19.1% of the respondents, contamination of water bodies with chemicals ranked forth with 14.3% of the respondents and destruction of biodiversity and the natural forest ranked the least with 11.1% of the respondents. This revealed that the major indicator of land degradation in the study area was destruction of farmlands/arable lands.

Table 4: Indicators of Land Degradation in the Study Area

Indicators	Frequency	Percentage (%)
Destruction of farmlands/arable lands	120	34.4
Creating of uncovered pits	67	19.1
Destruction of biodiversity and the natural forest	39	11.1
Destruction of community's sources of water	74	21.1
Contamination of water bodies with chemicals	50	14.3
Total	350	100

Source: Field Work (2022)

As shown in Table 5 of the study, destruction of farmlands ranked the highest with 31.1% of the respondents, low agricultural produce ranked second with 23.2% of the respondents, destruction of farmers' livelihood income ranked third with 19.4%, contamination of water bodies with chemicals ranked forth with 17.1% of the sampled population and lack of measures to reclaim the destroyed farmlands ranked the least with 9.2% of the sampled population. This revealed that majority of the sampled population affirmed that the major impact was destruction of farmlands in the study area which is their major source of food security.

Table 5: Impact of ASM on Agricultural Practices

Impact	Frequency	Percentage (%)
Destruction of farmlands	109	31.1
Low agricultural produce	81	23.2
Lack of measures to reclaim the destroyed farmlands	32	9.2
Destruction of farmers' livelihood income	68	19.4
Contamination of water bodies with chemicals	60	17.1



Total	350	100
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The effect of ASM on food security was measured based on three dimensions; i.e. economic, environmental and health impact of ASM on food security by the indigene engaged in it. Table 4 shows the economic impact of ASM on food security in the study areas. Regarding ASM and its economic impact, 211 (60.3%) of the respondents agreed to the fact that ASM affect the livelihood of indigenes positively while 139 (39.7%) of the respondents disagreed. In support of majority assertion, they postulated that ASM have affected their economic status positively due to increased income as a result of gold sales in short-run. The increased income has increased their purchasing power and access and utilization of food that is made available. In the long-run 103 (29.4%) respondents in study area agreed to the fact that ASM will continue to affect their livelihood positively, 247 (70.6%) disagreed and asserted that in the long-run ASM will affect their livelihood negatively.

Table 6: The economic impact of ASM on food security in the study areas

Criteria	Responses	Positively	Negatively	Total
Short-run	How does ASM affect your economic status	211(60.3%)	139(39.7%)	350 (100%)
Long-run	How will ASM affect your economic status in the long-run	103(29.4%)	247(70.6%)	350 (100%)

Source: Field Work (2022)



Plate I: Gold mining site in Kpapi community

Plate I revealed gold mining activity in Kpapi community and shows how the miners degrade the land extensively which affect agricultural practice negatively.

As revealed in Table 7 of the study, the adaptation strategies include alternative livelihoods capable of supporting household, degraded land reclamation, proper monitoring and punishment of miners that go against the law, provide stiffer laws for farmlands protection and creation of buffer zone for gold mining sites in the study area. Provision of stiffer laws for farmlands protection ranked the with 36.3%, alternative livelihoods capable of supporting



household ranked second with 22.6%, proper monitoring and punishment of miners that go against the law ranked third with 18%, creation of buffer zone for gold mining sites ranked fourth with 14.5% and degraded land reclamation ranked the least with 8.6% of the sampled population. This revealed that major adaptation strategy was provision of stiffer laws for farmlands protection in the study area.

Table 7: Adaptation Strategies

Options	Frequency	Percentage (%)
Alternative livelihoods capable of supporting household	79	22.6
Degraded land reclamation	30	8.6
Proper monitoring and punishment of miners that go against the law	63	18
Provide stiffer laws for farmlands protection	127	36.3
Creation of buffer zone for gold mining sites	51	14.5
Total	350	100

Source: Field Work (2022)

Conclusion

The study discovered that the activities of ASM has negative effects on food production in the selected two communities. Most farmers have abandoned farming to engage in mining, farm lands are used for mining hence farmers and potential farmers do not have access to arable lands to carry out farming activities and farming lands have become infertile due to deposition of chemicals in the soil by miners. These has negatively affected crop yield and the quality of food produced in the selected communities. Based on the findings, the study concludes that the activities of ASM has negatively affected all dimensions of farming activities in Papi and Korokpan communities in Bosso and Paikoro Local Government Areas except economic access for non-miners. The study also concludes that the activities of ASM in the communities has negatively affected food production and has plunged majority of non-miners in the community into food insecurity and poverty. In order to reduce food insecurity in the affected two communities and the two Local Government Areas, Niger State Government in collaboration with the affected two Local Government Areas to acquire vast farming land from non affected communities, this land should be protected from miners and should be given to persons willing to farm at a very high discounted rate. Persons willing to farm should also be supplied with funds and agric inputs at a discounted rate. This will create motivation for people to engage in farming and thereby increase food production in the communities and the affected Local Government Areas.

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