



UNITED NATIONS
UNIVERSITY

UNU-LRT

Land Restoration Training Programme
Keldnaholt, 112 Reykjavik, Iceland

Final project 2018

PERCEPTION OF STAKEHOLDERS ON THE POSTING OF A RECLAMATION BOND IN THE SMALL-SCALE MINING SECTOR IN GHANA: A CASE STUDY OF PRESTEA HUNI VALLEY DISTRICT OF THE WESTERN REGION

Nana Esi Assiredua Aidoo

Environmental Protection Agency
P.O. Box 1, Tarkwa – Western Region, Ghana
nana.aidoo@epa.gov.gh/esi.aidoo@yahoo.com

Supervisor

Sjöfn Vilhelmsdóttir
University of Iceland
sjofn@hi.is

ABSTRACT

The small-scale mining sector in Ghana contributes greatly to the country's economy, yet it is also associated with negative environmental impacts, such as land degradation and water pollution. This is because most miners in the sector have shifted from the mining methods used during the colonial time, which involved the use of simple or hand-held equipment, to the use of highly technological equipment for the extraction of the minerals. A reclamation bond has been continuously deployed in the large-scale sector to promote sustainability and ensure reclamation of the mined site in their operation. Introduction of the reclamation bond for the small-scale mining sector would help curb the extensive degradation caused by these activities. Based on these issues, this study assessed the perception of stakeholders on the introduction of a reclamation bond for the small-scale mining sector for three communities in the Prestea Huni Valley District of the Western Region of Ghana. Based on interviews with concession owners and representatives of regulatory institutions and the miners' association in the district, the study's results indicated that introducing reclamation bonds would ensure compliance in the sector, enforce miners to practice concurrent reclamation sustainably and mitigate some negative environmental impacts. The findings suggest that the reclamation bond fee must be moderated when introduced, to enable miners to comply. In addition, payment of the bond must not be full payment at the initial stage of operation, but rather as the mine progresses. To achieve this, miners must be well trained and educated about the reclamation bond. There is the need for government assurance to the miners on how the funds will be refunded to them after a successful reclamation.

This paper should be cited as:

Aidoo NEA (2018) Perception of stakeholders on the posting of a reclamation bond in the small-scale mining sector in Ghana: A case study of Prestea Huni Valley District of the Western Region. United Nations University Land Restoration Training Programme [final project]

<http://www.unulrt.is/static/fellows/document/aidoo2018.pdf>

TABLE OF CONTENTS

1. INTRODUCTION.....	1
1.1 Background to the study	1
1.2 Justification of the study	2
1.3 Artisanal and small-scale mining (ASM) operations	2
1.4 Reclamation and reclamation bond	4
1.5 Goal and objectives	4
2. METHODS.....	5
2.1 Description of the study area	5
2.2 Data collection and analysis	6
2.2.1 Ethical considerations	8
2.2.2 Limitations	8
3. RESULTS.....	8
3.1 Background information on the respondents in the concession owners' group	8
3.2 Miners support for the introduction of a reclamation bond in the small-scale mining sector.....	11
3.3 Estimated cost of reclaiming an acre of a mine site	13
3.4 Key informants' opinions on the feasibility of posting reclamation bonds in the small-scale mining sector	14
4. DISCUSSION	15
5. CONCLUSION AND RECOMMENDATIONS	18
ACKNOWLEDGMENTS.....	20
LITERATURE CITED	21
APPENDICES.....	24
Appendix I.....	24
Appendix II.....	27

1. INTRODUCTION

1.1 Background to the study

Artisanal small-scale mining (ASM) operations in Ghana date back as far as the colonial era, and were popularly known as *Galamsey*, literal meaning ‘gather and sell’. These operations involved the use of simple equipment associated with localized or limited environmental impacts/effects (Owusu-Nimo et al. 2018). Current ASM activities and operations involve the use of high technology and equipment, chemical usage (mercury) for the extraction, and require a widespread use of set-ups/structure that cause continuous disturbance and pollution to the environment (Aryee et al. 2003).

The extraction of the minerals (gold, bauxite, manganese, diamond, clay, etc.), generally, leads to deforestation and stripping of huge volumes of overburden materials to access the ore. This process of mining goes a long way to destroy the landscape and ecosystem and has major environmental impacts. To curb this impact, reclamation is to be considered at the initial stage of the permit acquisition. Reclamation activities commence as the mine progresses or has been exhausted. A reclamation plan is factored at the initial stage of the activity/or the permit stage, to mitigate some environmental impacts associated with the mining activities (Arbogast et al. 2000). Mining operations in Ghana, whether large or small, must have a reclamation plan for their operation.

A reclamation bond is a surety bond that checks the performance of a mining activity or operation after the activity is completed. It ensures that the mined area is returned to its pre-mined state/condition (Lima et al. 2016). In Ghana, reclamation bonds have been continuously deployed over the years in the large-scale mining sectors to promote sustainability in their operations, but this has not been enforced in the small-scale sector.

The increasing small-scale mining (SSM) activities in Ghana are associated with excessive environmental degradation factors. Introducing reclamation bonds for the small-scale sector will help ensure more effective land reclamation of mined sites in the small-scale mining sector. Several research studies have been conducted on protecting the environment and the mining communities from these mining activities in Ghana. But none of these studies have focused on the posting of reclamation bonds in the small-scale sectors to help in achieving restoration. Small-scale mining operations cover all regions of the country, yet the research studies relating to their activities have focused on the effect of small-scale gold mining on livelihoods and agricultural productivity (Hoadley & Limpitlaw 2004; Hoedoafia et al. 2014). There has, however, been a study conducted in Malaysia assessing a rehabilitation fund payment mechanism for small-scale mining operations (Nawi 2017). The study reviewed different models for regulating a rehabilitation fund and methods of collecting the fund were tested and weighted in four different countries: Canada, the USA, Australia, and Ghana. The methods tested were: Upfront Full Payment; Upfront Partial Payment; Pay as You Go; and No System. The method recommended for the small-scale mining operations was the Pay as You Go system (Nawi 2017).

The environmental law in Ghana addresses reclamation in *Regulation 23*, which stipulates funds for reclamation of mining sites. Regulation 23, however, does not apply to the small-scale mining sector.

1.2 Justification of the study

The gravity of exploitation of the natural resources is gaining momentum in Ghana. If immediate mitigative measures are not put in place, the overall effects will be devastating for the next generation. The government of Ghana, through the Ministry of Lands and Natural Resources, announced in April 2017, a temporary ban on small-scale mining activities in the country. The ban also brought about the suspension of the issuance of a new license to prospective small-scale mine operators. The ban is to help the government to adopt new regulations for compliance in the small-scale mining sector that are aimed at guaranteeing more sustainable use of the natural resource and reverse the land degradation which has been associated with small-scale mining operations. Following the ban, the Government adopted the Multilateral Mining Integrated Project (MMIP) in June 2017 to address the environmental challenges associated with small-scale mining sector through the Ministry of Lands and Natural Resources (MMIP Appraisal Document) (Government of Ghana 2017).

The MMIP project seeks to regulate small-scale mining activities in the country through the reclamation of degraded lands and dredging of water bodies, to deal with the issues holistically and to introduce reforms that will firmly deal with all the illegal and unsustainable practices so far associated with the small-scale mining activities.

This study was undertaken to assess the perception of stakeholders in the SSM sector on the posting of reclamation bonds, focusing on the Prestea Huni Valley in the Western Region of Ghana, a major hub of the country's mining activities. The study's findings will serve as a pilot base for the enforcement of reclamation bonds in the SSM sector, and as such they can contribute to the development of Ghana's National Environmental Policy. These are the vital ideas which will be employed by the government to direct actions, particularly in the current MMIP, including decision making, legislation, regulation, and enforcement.

1.3 Artisanal and small-scale mining (ASM) operations

Artisanal and small-scale mining (ASM) has several definitions in different countries. According to Hentschel et al. (2003), ASM is normally identified as the type of mining activities by different groups or an independent working extensively by hand or with simple equipment, often in the informal sector of the national economy. Small-scale mining in Ghana is mostly carried out by one person or a group of people with the maximum concession size of 25 acres (Mcquilken & Hilson 2016). The small-scale mining activities in Ghana were regularized in 1989 (Amankwah & Anim-Sackey 2004). The enactment of this law took into account registered (formal) and unregistered (informal) small-scale mining activities (Amankwah & Anim-Sackey 2004). These activities are associated with significant socioeconomic growth, increased gold output nationally, and a high level of employment in Ghana (Wilson et al. 2015). Following the early 1990s gold boom, was an influx of people from different parts of the country in search of jobs and other forms of livelihood at the various mining communities in Ghana (Hilson 2003). Due to this, the intensity and scale of small-scale mining activities have increased, with their attendant health, safety and environmental hazards (Hoedoafia et al. 2014). Most of the country's natural resources, for instance, have been badly exploited, specifically by the mining sector. Mining activities, formal and informal, have increased and traveled beyond their bounds, leading to the excessive environmental degradation and other health and risk factors experienced by the miners themselves (Hoedoafia et al. 2014). Agricultural and forest lands have been badly affected by the loss of soil nutrients and organic matter, limiting the value of the natural resources available for food production (de Moura et al. 2016). This can

lead to food insecurity, and as such jeopardizes the attainment of Goal 2 of the Sustainable Development Goals (SDGs), which states: “End Hunger, achieve food security and improve nutrition and promote sustainable agriculture”. Mining in Ghana is essentially one of the causes of unceasing degradation of land in the country. These mining activities generally lead to deforestation in order to access the minerals (gold, bauxite, manganese, diamond, clay, etc.). Mined-out pits, especially at the small-scale level, are also abandoned, which become death traps within the mining communities. Moreover, the mining activities have also caused significant water pollution, resulting in some water treatment facilities of the Ghana Water Company being shut down due to either the dwindling of water resources because of heavy siltation, or due to the high cost associated with the treatment for potable water (Ghana Water Company n.d.).

Despite the many problems that the ASM activities pose, they are a source of livelihood for many people within the mining area. The industry (both legal and illegal) creates millions of jobs for people living in the district, including women. Apart from the number of people directly involved in the activities, a substantial number of groups are also indirectly involved in providing some commercial activities in the mining area and the community, mostly food vendors, the supply of equipment, and fuel (Teschner 2012).

The mining sector in Ghana accounts for 5% of the country’s gross domestic production (GDP). Minerals amount to 37% of the country’s total exports, of which 90% of the total mineral exports is gold (Mcquilken & Hilson 2016). Ghana is one of the largest gold producers in the world; in Africa, it is the second largest. Gold production from the ASM sector sums up to 34.3% of the country’s gold production (Mcquilken & Hilson 2016). There are about 15 large-scale mining companies operating in Ghana, and over a thousand registered and unregistered small-scale operations across the country (Ghana Environmental Protection Agency 2016).

According to the Small-scale Gold Mining Law of Ghana – 1989 (PNDC 218) section 21, small-scale gold mining operations means “the mining of gold by a method not involving substantial expenditure by an individual or group of persons not exceeding nine in number or by a co-operative society made up of ten or more persons”. This implies that small-scale operators are required to operate under the Minerals Commission concession or on a concession suitable for small-scale operations (Hilson 2001). Section 83 of the Minerals and Mining Act 2006, (Act 703) states: “A license for small-scale mining operation shall not be granted to a person unless that person (a) is a citizen of Ghana (b) has attained the age of eighteen years”.

The operations of small-scale mining are done in either surface or underground operations. Surface mining is preferred and common in Ghana. This is because the mineral deposits are closer to the soil surface which requires less intensive work to access (Amponsah-Tawiah 2011). ASM operations require diverse means for extraction of the minerals depending on the ore deposit (Wilson et al. 2015). Mining methods deployed by most small-scale miners in Ghana are gravity concentration methods (Eshun 2005), including: sluicing, panning, open and strip methods (Aryee et al. 2003). Panning, which is a common practice in the mining process, involves separating of gold by gravity from other specific gravels in the water with the use of a pan (Eshun 2005). The sluicing method is by excavating the ore stockpile into a sluice box with water at high pressure to wash the ore to separate the gold material from other sediments, a process like this mostly leads to high recovery of the gold (Vieira 2005). Strip mining is also achieved, mostly in hilly areas. In Ghana, the method of dredging, which is conducted within water bodies, is illegal. Although strip mining is the most preferred method in the country, it is known to cause a high level of environmental impacts as compared to the other forms of mining

(Aryee et al. 2003). Mercury is the common chemical used by the miners; gold recovery by the small-scale miners is by direct smelting where mercury is amalgamated with gold to facilitate the recovery of the gold (Vieira 2005).

1.4 Reclamation and reclamation bond

Reclamation is the act of converting a degraded land to some degree of its previous condition after use or after any activities (Asiedu 2013). According to Lima et al. (2016), reclamation is mostly referred to as restoration and rehabilitation which helps in the mitigation of land degradation caused by poor land practice. Land reclamation is identified as the establishment of a sustainable economic land use system (Asiedu 2013). Reclamation activities counter the issue of degradation in terms of most physical aspects, including soil quality (Lima et al. 2016). In most cases, land degradation is the driving force of land reclamation. Both factors are mostly driven by some economic and social causes (Asiedu 2013), which are the result of human processes that demonstrate the worth the community or the country as a whole place on the land they live on and depend on (Arbogast et al. 2000). Land degradation is curable if reclamation or restoration activities are done concurrently, especially with the ASM sector (Asiedu 2013).

The Environmental Assessment Regulations 1999 section 23-page 9 addresses reclamation: “An undertaking in respect of which a reclamation plan is required shall be required to post reclamation bond based on approved work plan for reclamation”. As the law requires, a concessioner is expected to post a bond financially to serve as a surety bond to cover the cost of environmental damage at the site during or after the operations. In case of a default where a regulatory agency or body is not satisfied by the reclamation works carried out by the concessioner, the amount of the bond will be used to finance the reclamation activities. If reclamation is deemed complete by a regulatory body, a closure certificate is issued for the releasing of the bond.

A reclamation plan includes a lot of factors, including the pre-mined condition of the land or area; the procedure and timelines for the reclamation activity to commence; and reclamation or a surety bond (Rosasco et al. 2016). Reclamation bonds exist in different forms, such as letters of credit, cash, surety bonds or trust funds. These bonds, however, vary but an enforced bond should be accepted by all stakeholders and the regulatory bodies for effectiveness and sustainability (Ferreira & Suslick 2001). There are some types of land use projects that require the enforcement of reclamation bonds, and surface mining is no exception since their operations exhibit some degradation and pose a threat to the environment (Cheng & Skousen 2017). Mine reclamation bonds are mostly deployed in countries where mining operations are active in ensuring restoration of the mined area (Cheng & Hu 2009).

1.5 Goal and objectives

The overall aim of this study was to assess the feasibility of posting a reclamation bond in the small-scale mining sector in Ghana. This will be achieved by:

- ✓ Assessing small-scale miners’ support for the introduction of reclamation bonds in the Prestea Huni Valley District, Ghana.
- ✓ Examining the perception of stakeholders in the small-scale mining sector in the Prestea Huni Valley District, Ghana, on the feasibility of introducing and posting reclamation bonds.

- ✓ Estimating the average cost per acre to reclaim a mined site in the Prestea Huni Valley District, Ghana.

2. METHODS

2.1 Description of the study area

The Prestea Huni Valley District (PHD) is one of the 22 districts/municipalities in the Western part of Ghana. It is located at about 33 km east of Tarkwa and covers about 1,376 km². It lies within the south-western equatorial zone (Western Regional Co-ordinating Council n.d.) (see map in Fig. 1). Bogoso is the capital of the district with a population of 159,304 according to the 2010 population and Housing Census. The PHD is ethnically diverse, due to the high level of mining activities that have attracted migrants from different parts of the country. It falls within the tropical forest zone with high trees ranging from 15-40 meters and experiences the highest rainfall patterns from March to July (Ghana Statistical Service 2014). PHD is mainly a major district for gold mining in both large and small-scale operations. This has meant that quite a lot of companies provide mining support service to the companies. Exhaustive mining activities have brought about high environmental degradation in some parts of the district. Most water bodies that flow within the district have declined due to high siltation, and most agricultural lands, particularly cocoa farms, have been taken over by the ASM operators.

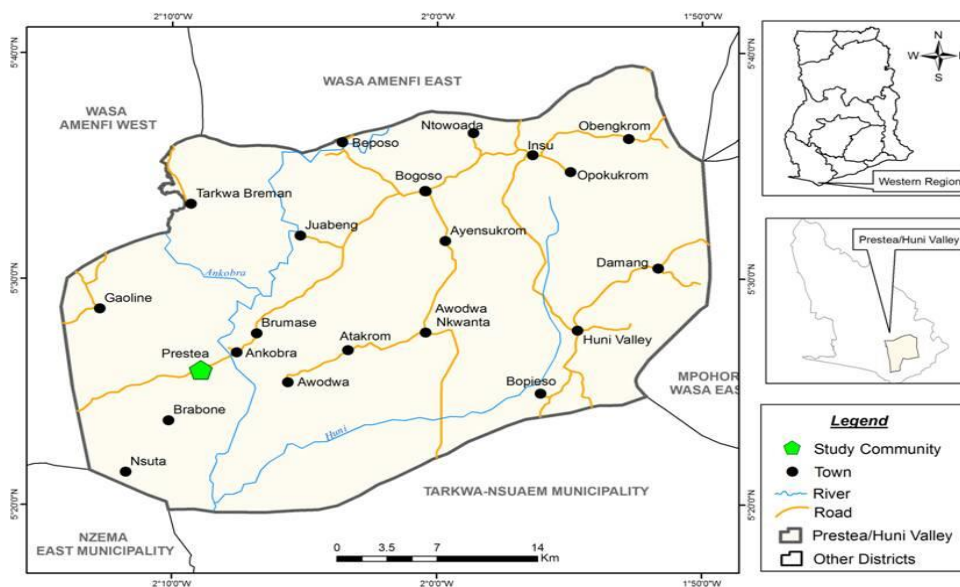


Figure 1. A map of the Prestea Huni Valley District showing study community. (Source: Mensah et al. 2015)

The district has a large deposit of other raw materials like kaolin and quartzite rocks, occupied by about five large-scale surface mining companies and over hundreds of small-scale mining activities, both surface and underground. Figure 2 shows the development of small-scale mining activities in the district.



Figure 2. Surface small-scale mining operation in the district. (Source: Gilbert & Albert 2016).

2.2 Data collection and analysis

The study was aimed at assessing the feasibility of posting a reclamation bond in the small-scale mining sector in the study area. To achieve this aim, the study focused on assessing the perception of stakeholders on introducing reclamation bond in the small-scale sector in Ghana by conducting interviews with selected stakeholders. A total of 27 stakeholders were interviewed using two sets of questionnaires composed of structured, semi-structured and open-ended questions. The stakeholders were split into two categories: small-scale miners/concession owners and representatives of regulatory institutions and the Miners' Association. The study's participants in the latter group are regarded as *key informants*. Following Bernard (2006) key informants are respondents that have a special knowledge, roles, or influential status in the field of the research topic or are somehow related to the topic.

To assess the perception of concession owners, three communities within the PHD were selected: Bepoase, Prestea, and Bonsa-Abawye. The first set of questionnaires was administered to 21 small-scale concession owners within the selected communities, seven in each community. The second set of questionnaires was administered to six key informants from regulatory institutions and the Miners' Association. Concession owners were selected using simple random sampling but adjusted for gender purposes. The questionnaire for the 21 concession owners was comprised of questions on the respondents' support for the introduction of a reclamation bond in the small-scale sector, their view on the condition of the land in the mining areas, and on the estimated cost to reclaim an acre of a mined area. The questionnaire for key informants was administered to leaders of The Miners' Association; officers of the Environmental Protection Agency (EPA); Water Resources Commission (WR), Minerals Commission (small-scale department); and the PHD-Assembly officer. They were purposely selected to gather information on the feasibility of introducing a reclamation bond in the small-scale sector. The gender distribution of respondents is presented in Table 1.

Table 1. Gender distribution of respondents.

Name of Institution/Community	Male	Female
Bonsa-Abawye	5	2
Prestea	7	-
Bepoase	3	4
Small-scale Association	2	-
EPA	1	-
Minerals Commission	1	-
Water Resources Commission	1	-
District Assembly	1	-

Questionnaires included both closed and open-ended questions which were framed based on the study objectives. Open-ended questions were deployed where responses to some questions were boundless, and closed questions were applied where responses were restricted. Two officers from the EPA conducted the interview and translated the questions into the respondents' (miners') local language where needed, for a better understanding as the interviews progressed. The interviews were conducted between June 27 – July 9, 2018, to a total of 27 respondents, comprising 21 males and 6 females. The study's two questionnaires are presented in Appendices I and II.

The questionnaire for small-scale concession owners was pre-tested on a different small-scale operator within the Prestea area, which helped in making some modifications to make the data gathering more effective. The data collection also involved some voice notes to assist in comparing to the filled questionnaires. Open-ended questions were coded in three different themes, e.g. land degradation (erosion and loss of forest cover), water pollution and loss of farmlands. The literature was reviewed to provide a background for the study and to compare its findings. Data were processed and analyzed using Microsoft Excel 2010 software and descriptive method, supported by information from the miners. The results presented in tables and graphs (bar and pie charts) are based on the number of times a theme may occur. Figure 3 shows an interview with one of the key informants.

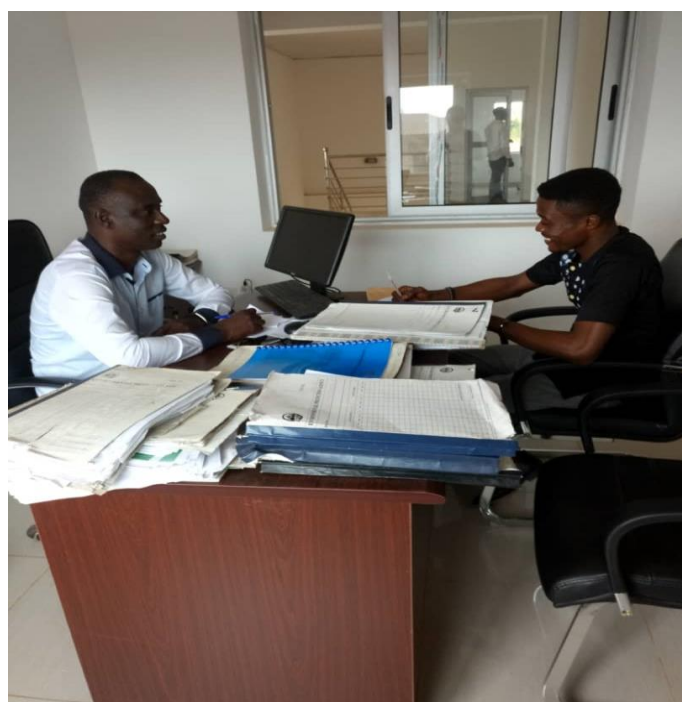


Figure 3. Interview with EPA officer. (Photo: L. Tweneboah, July 2018).

2.2.1 Ethical considerations

The consent of respondents was sought before interviews were conducted and the rationale for the study was clearly stated to its participants. The concession owners (miners) were assured anonymity, confidentiality and respect for privacy. Adequate arrangements in terms of place and time were made with them before the day of the interview. They were asked their opinion of recording the interview, but most of them objected to the recording.

2.2.2 Limitations

Some factors inhibited the successful implementation of this study. However, the results of the study were not compromised, amongst those locating the interviewees. The difficulty in locating the interviewees did not change the communities selected but rather changed the identified interviewees. It was quite difficult to contact respondents and even if contacted, they didn't always accept being interviewed. Despite all these challenges, the number of targeted respondents were met as per the sampling size.

3. RESULTS

Out of the 21 sample respondents (the concession owners), 13 respondents answered all the questions in the questionnaire. Eight respondents did not complete the estimated cost questions, implying that they either had carried out concurrent mining on their site, or because they had not been in operation for some time, as the survey was done after the government had placed a ban on small-scale mining activities for a year (since April 2017). A review of the data showed that there was no variation in the responses between the three communities, and therefore the results from interviews with concession owners are presented as one group.

3.1 Background information on the respondents in the concession owners' group

Information on participants' socioeconomic backgrounds in the concession owners' group is reported below in Figures 4 – 7. The respondents' ages were reported after sorting into five age groups, as can be seen in Figure 4. All but one of the concession holders was older than 40 years old. Most respondents were within the age group of 40-49 years.

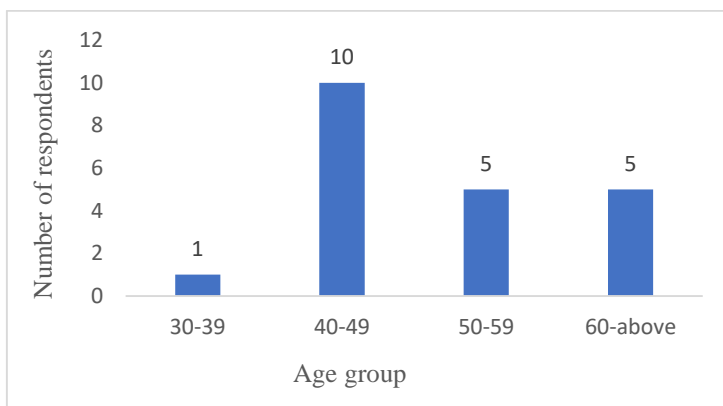


Figure 4. Age of respondents broken down into five age groups (n = 21).

The great majority of the participants in the concession owners' group were males, or 15 males and 6 females as can be seen in Figure 5.

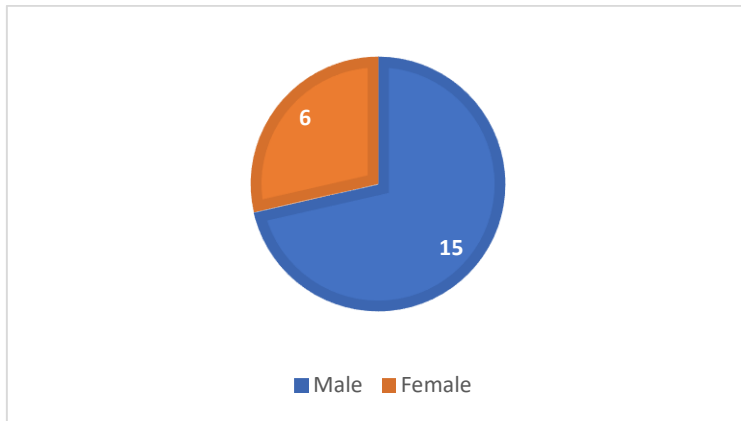


Figure 5. Gender distribution of respondents (n = 21).

Participants' level of education was reported according to four levels. All 21 respondents had at least some form of basic education (junior high school/primary), as can be seen in Figure 6. Of the four levels, tertiary education (college/university) was most common among the miners (8), while senior high school (SHS) level was the least (3).

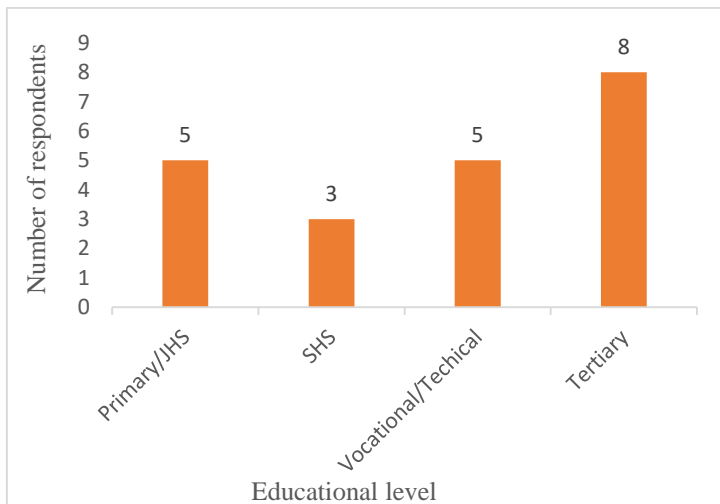


Figure 6. Educational level of respondents (n = 21).

Participants were asked how long they had been engaged in mining. As can be seen in Figure 7, responses were reported in five groups. Nine respondents had 20 years or more of experience in the SSM sector, while five said 1-5 years and another five reported 6-10 years of experience. One participant had been engaged in mining for 16-20 years.

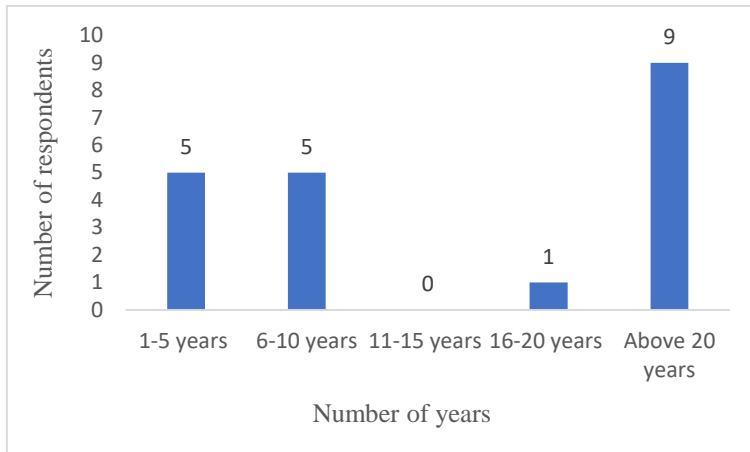


Figure 7. Number of years engaged in mining by the respondents (n = 20).

Respondents were asked about the number of mining concessions they own within the community/district. Eleven respondents had two concessions, seven had one, and three respondents reported that they had three or more concessions (see Fig. 8).

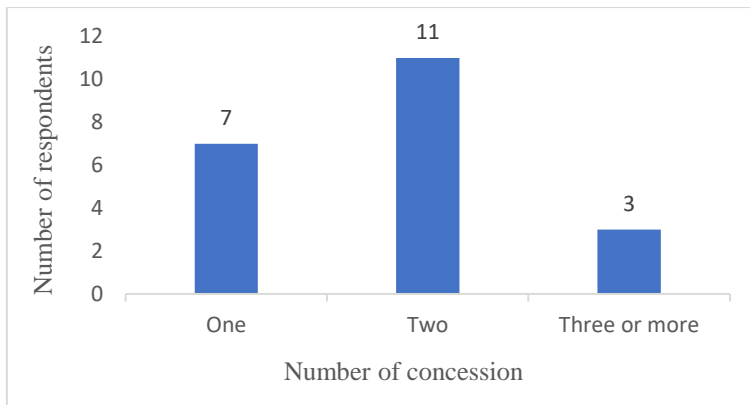


Figure 8. Number of mining concessions owned by respondents (n = 21).

Figure 9 shows the type of mining operations undertaken by the respondents. Most of the respondents were involved in surface operations, as can be seen in Figure 9. Of the 21 respondents, only one was involved in both underground and surface mine operations, and only one in underground operations.

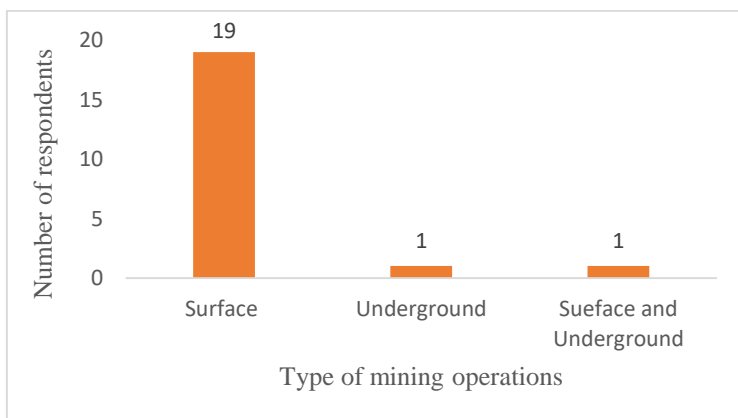


Figure 9. Type of mining operations undertaken by concessionaires (n = 21).

3.2 Miners support for the introduction of a reclamation bond in the small-scale mining sector

Participants were asked about their source of information on land reclamation, and some mentioned more than one source. As can be seen in Figure 10, the most mentioned by far was EPA as the source of information on reclamation, followed by the Minerals Commission (Mincom) and the Small-scale Mining Association.

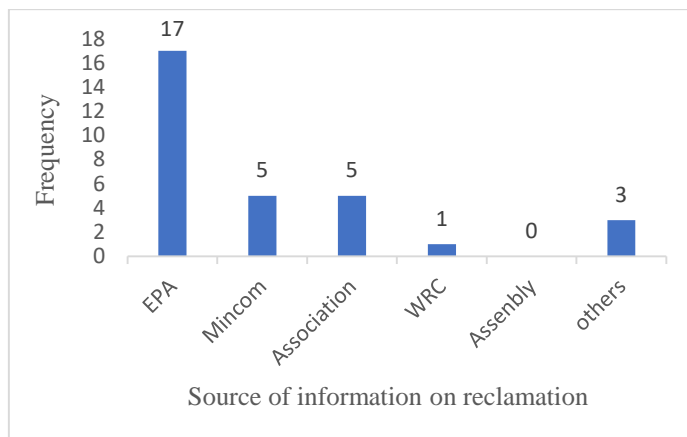


Figure 10. Respondents' sources of information on land reclamation (n = 21).

Participants were asked what they think makes the large-scale mining companies reclaim their site after mining. As can be seen in Figure 11, the majority (16) stated that the companies reclaim their site because it is mandated by law and five stated that they do so to prove to investors (shareholders) that they mine sustainably and to main a good relationship with host communities by restoring mined out areas as part of their corporate social responsibilities.

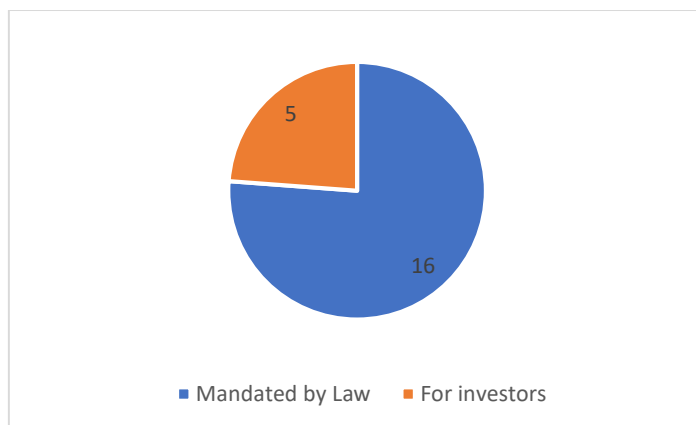


Figure 11. Reasons for large-scale reclamation activities.

The participants were asked a follow-up question on the necessity to ensure land and mine reclamation in the small-scale sector. All the respondents indicated the need to ensure land and mine reclamation in the small-scale sector to mitigate the negative environmental impacts.

Respondents were asked if there have been significant changes in the condition of the land within the community or municipality compared to previous years, with reference to the mining activities. As shown in Figure 12, 15 respondents stated that mining activities have so far had

some impact on land conditions in the community. Six respondents reported that there was no change in land conditions.

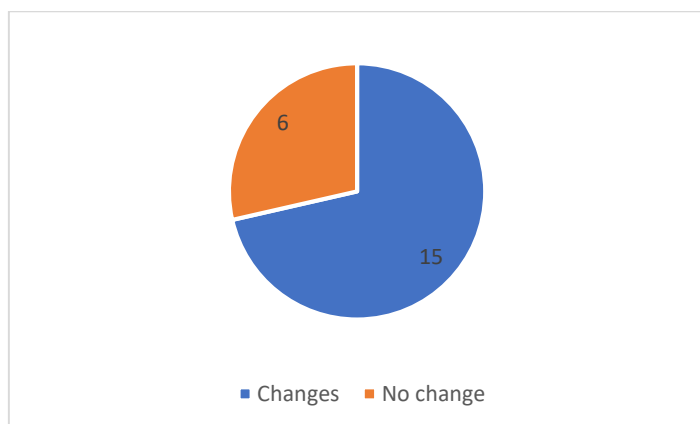


Figure 12. Perception of miners on the effect of mining on land conditions (n = 21).

The respondents who reported seeing changes in the condition of the land were asked to give their views on the state of the land in the community. The responses were reported according to the number of times an observed change was mentioned. Land degradation due to the mining activities was the most frequent change mentioned (17), followed by water pollution (4), and loss of farmlands was recorded the least (3). All 15 respondents either identified one or two of the changes stated, as shown in Figure 13.

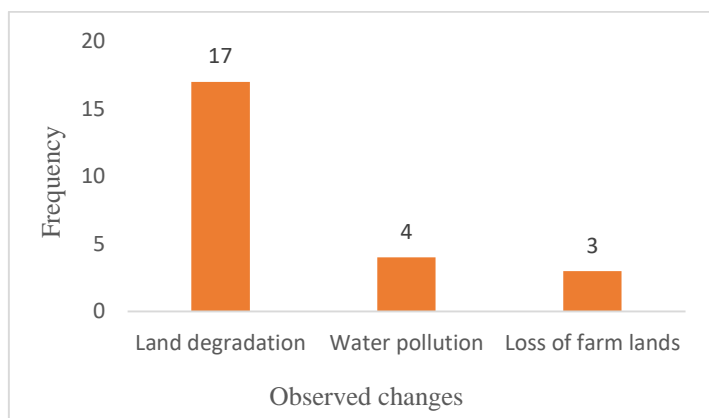


Figure 13. Observed changes in land condition by miners (n = 15).

To get a perspective of the land conditions in the community, participants were asked how they foresee the future land conditions in the municipality to be in relation to the mining activities. The majority of the respondents (17) mentioned they foresee land degradation, pollution of water bodies and loss of farmlands in the future. They further emphasized that, although some legal small-scale sites contribute to the degradation, most of these degradations are caused by the illegal miners.

The participants were asked if they have heard about reclamation bonds in mining operations. Their responses about their awareness of reclamation bonds are shown in Figure 14. The responses showed that 11 had not heard about reclamation bonds, while 10 respondents were aware of reclamation bonds.

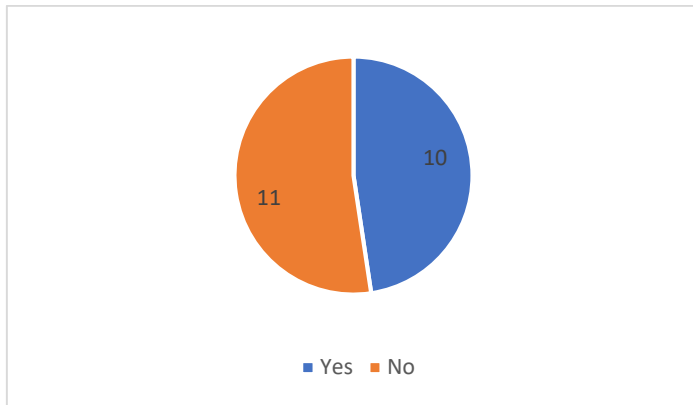


Figure 14. Respondents awareness of the reclamation bond (n = 21).

Participants were asked if they would support the introduction of a reclamation bond. Reclamation bonds were explained to the participants that had reported not having heard about them in the previous question. Then, they were asked if they would support new legislation introducing reclamation bond in the small-scale sector. As can be seen in Figure 15, a great majority of the respondents (17) expressed their support for the introduction of a reclamation bond in the small-scale mining sector, while four disagreed.

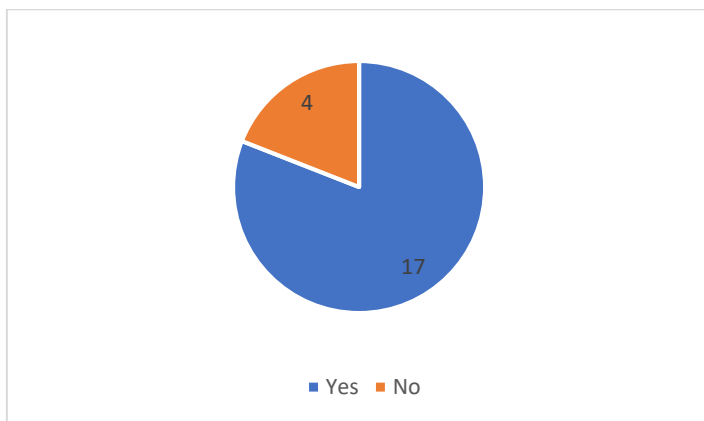


Figure 15. Respondents support for the introduction of the reclamation bond (n = 21).

A follow-up question on their support for the introduction of the bond showed that in their view, the introduction of the bond would mitigate most of the negative environmental impacts mentioned earlier (see Fig. 13).

3.3 Estimated cost of reclaiming an acre of a mine site

Participants were asked to give a cost estimate for reclaiming an acre of land from their mining sites. Figure 16 represents the estimated amount of 13 respondents based on the size of their concession. Some 12 respondents operated the surface mine and one had an underground operation. Eight respondents had a concession size less than 25 acres and five had a concession size equal to 25 acres. Based on the responses, larger concessions (25 acres) estimated a higher cost as compared to the smaller concessions (less than 25 acres).

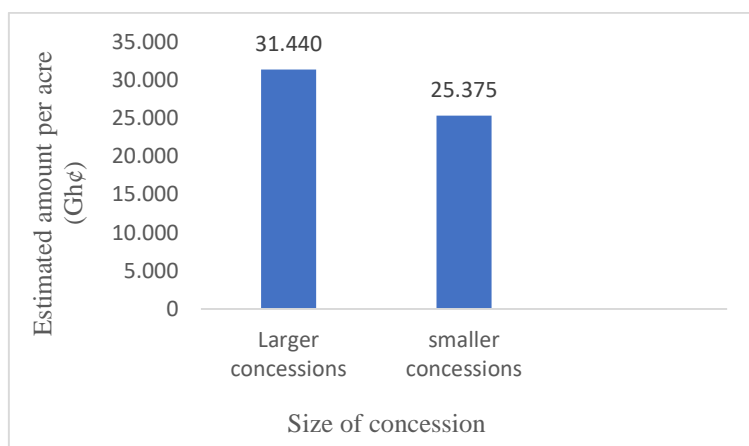


Figure 16. Estimated amount per acre by small and large concession owners (n = 13).

3.4 Key informants’ opinions on the feasibility of posting reclamation bonds in the small-scale mining sector

The results presented here are from interviews with key informants in the SSM sub-sector: representatives of regulatory bodies and of the Mining Association. To ascertain the feasibility of introducing a reclamation bond in the SSM sector, six key informants were interviewed. The focus of the interviews was on the key informants’ views regarding the feasibility of introducing a reclamation bond in the SSM sector in Ghana and on their views as to why the bond had not been enforced at the SSM sector since the regularization of the mining sector in the country. The results from the key informants’ interviews are presented below (see the key informants’ questionnaire list in Appendix II).

When asked about who is responsible for mine reclamation, all six key informants stated that miners are responsible for reclaiming the mined site after completion of the mine operation. The key informants were asked if they had been training the miners on how to reclaim their site after mining. All the respondents except the WRC officer were playing various roles in ensuring land reclamation by the small-scale miners through educating the miners about the best mining practices, the importance of mine reclamation and enforcement of the law for sustainability.

All six key informants interviewed emphasised that the SSM operators (concession owners) were mandated by law to reclaim their sites after mine completion and stated that some small-scale operators were already practicing this after closing down their mine operation.

The key informants were asked whether the activities of the SSM operations posed any challenge to the community or district. All six key informants responded that the activities of SSM pose challenges to the community and district. Strict emphasis was placed on enforcing all mining, environment and water resources regulations, as well as educating the miners on the best practices. They also suggested that introducing reclamation bonds could also go a long way to bringing about compliance in mine operations.

The key informants were asked if they supported the introduction of the reclamation bond in the SSM sector. They emphasized that introducing reclamation bonds would facilitate the practice of concurrent reclamation by mine operators and ensure reclamation of the site at the end of the mine’s lifetime. It was described by two respondents in the following way:

“The bond will serve as a form of security in any endeavor and will, therefore, compel the miners to reclaim the land after mining. The bond can also serve as a source of funding for the

government to undertake reclamation of mined lands in case of noncompliance.” (WRC officer).

“It would propel the miners to have land reclamation as a major component of their mining activities. It would also encourage the practice of concurrent mining which is mandated by law.” (Municipal Coordinating Director).

When asked if they thought the miners would support the introduction of reclamation bonds, all six key informants expressed the view that the SSM operators will support the implementation of the bond, but three respondents had these suggestions as a conclusion to their responses:

“The operators must be well trained and educated the reclamation bond. They need to be thoroughly enlightened on the issue as being almost like an insurance after which it would be refunded.” (EPA officer).

“In situations where the bond is to be introduced, it should be moderated to enable miners to pay.” (SSM Association).

“There should be much priority not only in reclaiming the land, but also rehabilitating the land for economical use.” (Mincom officer).

Responding to the question on why a reclamation bond has not already been introduced and enforced in the small-scale mining sub-sector, all key informants responded that previously small-scale mining operations were limited in scale and operations, and therefore they had no adverse impact on the environment.

The Municipal Coordinating Director had this to say:

“Previously the impacts of the SSM on the land conditions were quite insignificant until the introduction of heavy equipment into the industry.”

Participants were asked about their institutions’/organizations’ support towards the implementation of reclamations bonds at the SSM sub-sector. All six key informants responded that the current regulations at various institutions will give the necessary legal backing for the imposition of the bond. They emphasized that they have the required logistics to monitor the activities of the operators in case the bond is enforced.

The Municipal Coordinating Director had this to say:

“The state should resource the Assemblies adequately to get cadres to patrol river banks and pristine forest areas to arrest illegal miners.”

4. DISCUSSION

The study focused on finding out the perception of stakeholders on the posting of a reclamation bond at the small-scale mining sub-sector in Ghana. By this, it is assumed that posting the bond will enable the government of Ghana to regulate the activities of the sector, to minimize its negative environmental impacts. The main aim of this study was to get more insight on whether

miners would support the introduction of reclamation bonds in the small-scale mining sector in the country. One main observation that came through interviewing the miners, as well as the key informants, was that land degradation and water pollution were the considerable problems associated with the mining sector which need immediate attention.

According to the results on the respondents' age in the concession owners' group, most participants (10) were within the age group of 40-49 years. This is an indication that most participants/miners inherited the operations from their family, as family lands or properties are passed on to relatives from the age of 45 upwards. This is then consistent with the definition that an ASM operation is a family owned group or individual type of mining. With respect to gender, the majority of the respondents in the concession owners' group were male. This underscores the fact that men are more directly involved in the small-scale activities than women (Hinton et al. 2003). Women's involvement in the small-scale mining sector in Ghana is in different stages depending on the legal status or type of the mining operation. Approximately 10% of women in Ghana are concession owners (Hinton et al. 2003). In some mining companies, depending on the type of mine activities/operations, women are not directly involved in the operations. They are more often employed as cooks, bookkeepers, and such.

The results did show that all the respondents in the concession owners' group have at least basic education. The level of education coupled with the years of experience in operation is indicative of the respondents' different knowledge about the mining operations. The higher levels of education by the miners have led to highly technological operations, moving away from the colonial methods of mining with the use of simple equipment (axe, shovel, etc.) in the operations, which also indicates an increase in mining operations. This is in accordance with Aryee et al. (2003) findings that the current small-scale mining activities in Ghana involve the use of high technology and equipment for the extraction of the minerals.

Based on the results, the majority of the participants are aware of the degradation caused by their mining activities, although some also claimed that the degradation is also caused by the illegal mining operations. The current state of land conditions shows an increase in land degradation due to mining activities which is also indicated in the miners' view on future land conditions. This will be of paramount concern if mining activities are not regularized. There is an increasing number of small-scale mining activities because of the high dependency rate in terms of job creation, etc. Most participants had two to three or more concessions, reflecting the fact that small-scale mining activities are the predominant source of jobs for community members. This is in accordance with Teschner (2012), who stated that the small-scale mining sector employs millions of people for its operations. Small-scale mining sites, legal and illegal, employ thousands of people, either directly or indirectly. Or as one respondent stated: "*My site employs about 500 people from the community.*"

Responses gathered from the miners showed that, although some miners operate solely underground mine or a combination of underground and surface operations, the majority of them operate surface mines. This suggests that surface mine operations are mostly preferred by small-scale miners in the district because of the ore deposit. This is in accordance with what has been established in the literature where Amponsah-Tawiah (2011) showed that surface mining is preferred and commonly operated in Ghana because the mineral deposits are closer to the soil surface.

According to the results on miners' knowledge of reclamation processes/activities, the majority of the miners had some knowledge of reclamation; their primary source of information was from the regulators. Alternatively, all but one key informant organized or conducted various

forms of education for the miners through awareness creation, compliance, and enforcement of environmental and mining practices. This shows the extent of involvement by the stakeholders through education and other activities. Key informants mentioned that miners are mandated by law to reclaim mined areas, which is a condition in the environmental permit for small-scale mine operators. Therefore, the regulators expect the miners to ensure the reclamation of their mined site/area. It was evident from the responses of the key informants that some mining operators conduct backfilling of their mined pit and further reclaim the land at the end of the mine's life. Even though reclamation bonds are not widely/well known by the miners, half of them knew of their existence and importance in the mining sector, particularly the large-scale mining sector. A reclamation bond is being enforced at the large-scale sector based on section 23 of the environmental assessment regulations for the year 1999.

According to Lima et al. (2016), reclamation bonds are paramount for achieving successful recovery/revegetation of land: it ensures the minimization of land degradation. Thus, the introduction of a reclamation bond will serve as a check to sustainable operation among miners. It would clearly differentiate the activities of legal from illegal mining operations which will then attract more investors to the sector. It would also enhance the image of the small-scale activities in Ghana and the relations between the mining companies and the community.

Even though the majority of the respondents were in support of the introduction of reclamation bonds in the small-scale mining sector in Ghana, some were of the view that miners would not be able to make an initial deposit because they have not been in operation for a year due to the current ban in place at the sector. This suggests that the bond fee must be affordable to enable miners to be committed. There should not be a full collection of the bond fee. Miners should be allowed to pay as their mining operations progress. This supports the findings of the study by Nawi (2017), which reviewed several criteria for establishing a rehabilitation fund payment mechanism for small-scale mine operations and methods of collecting the fund. The methods tested were: Upfront Full Payment; Upfront Partial Payment; Pay as You Go; and No System. When tested and assayed in four different countries including Ghana, The Pay as You Go method was the one recommended for small-scale mining operators. Key informants' suggestions on the reclamation bond introduction showed that reclamation of mined out areas would be of priority concern to the miners to undertake when introduced:

“The bond will serve as a form of security in any endeavor and will, therefore, compel the miners to reclaim the land after mining. The bond can also serve as a source of funding for the government to undertake reclamation of mined lands in case of noncompliance.”

The type of mining operations predicts the extent of environmental impacts/effects (Aryee et al. 2003). Most preferred mining operations/activities in the community are surface mines, according to the results. This requires some extensive set-ups for operations and the use of a chemical (mercury) for extraction of the mineral. Opinion gathered on the effect of mining activities on land conditions reports that the method/type of mining had a great impact on the environment. The most mentioned impacts were land degradation leading to other associated impacts. This supports the responses from the key informants that small-scale mining activities pose challenges to the community. Most farmlands within the community have been taken over by small-scale operators, and this also showed in the responses. Miners indicated they wanted to see all small-scale sites reclaimed as agricultural lands. According to Tenkorang & Osei-Kufuor (2013), the increasing activities of small-scale mine operators has resulted in the loss of farmlands in most mining communities. Reflections on how to control/mitigate this

degradation elicited various suggestions from the key informants, including strict enforcement of all laws governing the small-scale sector and assigning time-lines for reclamation.

One of the study's objectives was to estimate the average cost per acre to reclaim mined sites in the Prestea Huni Valley District. This objective had some limitations because of the ban in place in the sector. Responses were not convincing due to the fact that the miners did not break down the required activities and cost suggestions/implication for reclamation. The breakdown would have given some indication of the type of landscape, and what has to be done at different sections of the site and including factors other than the size of the mined site, as has been pointed out in the literature, e.g. the study by Asiedu (2013), emphasising that the type of landscape must be considered when reclaiming a mining site. All but one participant operated an underground mine, as surface mining was commonly operated, as seen from the results. Eight respondents had a concession size less than 25 acres and five had a concession size equal to 25 acres, keeping in mind that the Mineral and Mining Act, 2006 Act 703, states that, small-scale mining concessions should not exceed 25.00 acres. The average estimate for larger concessionaires (25.00 acres) was GH¢31,440 and smaller concessionaires (less than 25 acre) was GH¢25,375. This suggests that the bigger your concession, the higher your reclamation cost will be, and vice versa. These results indicate that the bond calculation should be site specific.

The key informants suggested that most environmental impacts associated with the SSM activities have escalated because miners/operators have shifted from the definition of ASM. The reason for this is that most miners now use technologically advanced mining equipment like excavators and other types of heavy mining equipment in their operations (Aryee et al. 2003). This is to say that, if the mining activities were to be conducted with the simple equipment, the environmental impacts associated with it would have been minimal. This also explains how the miners' educational and experience levels are shifting to the advanced way of mining. Key informants interviewed revealed their support for the introduction of the bond, saying they have the necessary logistics and capacity for monitoring the activities of the mining sector when it is introduced. This shows that the government, as stated in the MMIP, is ready and willing to take the necessary steps to ensure sustainability in the small-scale mining sector. Although the miners will support the introduction of the bond, they are concerned about the methods/forms of collecting and refunding the bond. Certain procedures must be put in place, as well as training and educating the mine operators to understand these processes.

5. CONCLUSION AND RECOMMENDATIONS

Mining is associated with a lot of environmental degradation and introducing reclamation bonds at the small-scale mining sector in Ghana can go a long way to curb the increasing extensive degradation resulting from their activities. Reclamation bonds have been introduced and accepted in some countries, particularly where mining activities are ongoing, and they are considered to be a way to minimize negative environmental impacts. For some years now, the government of Ghana has been critically concerned about the activities of both legal and illegal small-scale mining operations and is therefore deploying the best ways to curb the menace and support the small-scale mining sector to operate in an environmentally friendly manner.

This study has explored the perception of introducing reclamation bonds in the small-scale mining sector in three communities within the Prestea Huni Valley District. The majority of respondents interviewed were much aware of the ongoing degradation caused by most small-

scale activities, both legal and illegal, and their impacts on agricultural lands for current and future generations. Some respondents accepted the fact that most of their farmlands, particularly lands used for cocoa farming, are now being sold to prospective small-scale mine operators.

The majority of the respondents supported the introduction of the bond in the small-scale sector by expressing their view that the introduction of the bond will help mitigate the negative environmental impacts associated with the mining activities and help miners operate sustainably, as has been accomplished in the large-scale sector. This explains the views from the key informants on the feasibility of introducing the bond in the small-scale sector. Although they supported the introduction, they expressed concerns that the bond will not be refunded to them after the lifespan of the mine. This calls for government assurance to the miners on how the funds will be refunded to them after successful reclamation by a miner.

Considering the facts presented in the study, I would like to make the following recommendations:

- ✓ Further study into the appropriate reclamation bond and refund methods or mechanism in the small-scale sector.
- ✓ Further research is needed to appropriately estimate the cost of reclaiming an acre of mined land, considering the landscape perspective.
- ✓ A realistic bond method must be in place in the small-scale sector to facilitate acceptance to operate in an environmentally friendly manner.
- ✓ To implement regular sensitization programmes for miners.
- ✓ There should be a clear definition or redefining of small-scale mining operations/activities in terms of equipment to help assess the feasibility of the reclamation bond for the sector.

ACKNOWLEDGMENTS

It has been a period of intense learning for me, both in the scientific arena and at the personal level. Conducting this study has had a big impact on me. Firstly, I would give thanks to almighty God for the immense protection, strength and good health bestowed upon me throughout my stay in Iceland.

I convey my profound thanks to the Director and Management of the UNU Land Restoration Training Programme: Dr Hafdis Hanna Aegisdottir, Berglind Orradottir, Halldora Traustadottir, and Isabel C. Barrio for such a great programme, and to Muhammed Azfar Karim for his support during my stay in Gunnarsholt.

To my excellent supervisor Sjöfn Vilhelmsdottir, your guidance and corrective measures made this project an easy step to take. You significantly provided me with the right tools I needed to successfully complete my project.

In addition, I would like to express my thanks to all the lecturers for their valuable knowledge impacted on me. You have provided me with adequate tools to deal with issues related to sustainable land management as I progress in my carrier.

Sincere thanks to the Management and staff of the Environmental Protection Agency – Ghana, especially EPA – Tarkwa Office and officers who helped in my data collection. Heartful thanks to Mr Prosper Yaw Nkrumah (Director, Tarkwa office) and Mr Michael Sandow Ali (Director, Mining Office) for recommending and supporting me throughout the training programme.

To my great family, especially my parents, you have always supported and provided me with everything, making life worth living.

Finally, to the new friends, I made during my stay in Iceland. We were not only able to support each other by deliberating over problems and finding solutions but learned a lot about each other's country.

To all UNU 2018 fellows and everyone, I say Ayekoo and God bless us all.

LITERATURE CITED

- Amankwah RK, Anim-Sackey C (2004) Strategies for sustainable development of the small-scale gold and diamond mining industry of Ghana. *Resources Policy* 29:131–138
- Amponsah-Tawiah K (2011) The Mining Industry in Ghana: A Blessing or a Curse. *International Journal of Business and Social Science* 2:62–70
- Arbogast BF, Knepper DH J, Langer WH (2000) The human factor in mining reclamation. US Geological Survey Circular:1–28
- Aryee BNA, Ntibery BK, Atorkui E (2003) Trends in the small-scale mining of precious minerals in Ghana : a perspective on its environmental impact 11:131–140
- Asiedu JBK (2013) Technical Report on Reclamation of Small Scale Surface Mined Lands in Ghana: A Landscape Perspective. *American Journal of Environmental Protection* 1:28–33
- Bernard R (2006) Research Methods in Anthropology: Qualitative and Quantitative Approaches http://www.dphu.org/uploads/attachements/books/books_476_0.pdf (accessed 5 September 2018)
- Cheng L, Hu Z (2009) Economic-theory-based analysis of the collection standard of mine land reclamation bond and its calculation approach. *Procedia Earth and Planetary Science* 1:1275–1279
- Cheng L, Skousen JG (2017) Comparison of international mine reclamation bonding systems with recommendations for China. *International Journal of Coal Science and Technology* 4:67–79
- Environmental Assessment Regulations 1999 section 23, page 9 <http://extwprlegs1.fao.org/docs/pdf/gha78169.pdf> (accessed 21 August 2018)
- Eshun PA (2005) Sustainable small-scale gold mining in Ghana: setting and strategies for sustainability. Geological Society, London, Special Publications 250:61–72
- Ferreira DF, Suslick SB (2001) Identifying potential impacts of bonding instruments on offshore oil projects. *Resources Policy* 27:43–52
- Ghana Environmental Protection Agency 2016 Annual report. Unpublished.
- Ghana Statistical Service (2014) http://www.statsghana.gov.gh/docfiles/2010_District_Report/Western/Prestea%20Huni-Valley.pdf (accessed 14 August 2018)
- Ghana Water Company n.d. <http://citifmonline.com/2017/03/22/galamsey-pollution-destroying-water-bodies-in-ghana-water-company/> (accessed 17 August 2018)
- Gilbert D, Albert OB (2016) Illegal Small-Scale Gold Mining in Ghana: A Threat to Food Security. *Journal of Food Security*, Vol. 4, 2016, Pages 112-119 4:112-119 <http://pubs.sciepub.com/jfs/4/5/2/index.html> (accessed 4 September 2018)

Government of Ghana (2017) Ministry of Lands and Natural Resources (Mlnr) Project Appraisal & Implementation Document for the Multilateral Mining and Integrated Project (MMIP) June 2017 http://citifmonline.com/wp-content/uploads/2017/07/1_MMIP-MANUAL-OUTLINE_2017-06-26-final-2draft.pdf (accessed 25 August 2018)

Hentschel T, Hruschka F, Priester M (2003) Artisanal and Small-scale Mining. Challenges and Opportunities <http://pubs.iied.org/pdfs/9268IIED.pdf> (accessed 5 September 2018)

Hilson G (2001) A contextual review of the Ghanaian small-scale mining industry. Mining, Minerals and Sustainable Development:29 <http://pubs.iied.org/pdfs/G00722.pdf> (accessed 5 September 2018)

Hilson G (2003) Harvesting mineral riches : 1000 years of gold mining in Ghana 28:13–26

Hinton J, Veiga M, Beinhoff C (2003) Women and artisanal mining: Gender roles and the road ahead. The Socio-Economic Impacts of Artisanal and Small-Scale Mining in Developing Countries:1–29

Hoadley M, Limpitlaw D (2004) The artisanal and small scale mining sector and sustainable livelihoods <https://womin.org.za/images/impact-of-extractive-industries/women-and-artisanal-mining/M%20Hoadley%20and%20D%20Limpitlaw%20-%20ASM%20and%20Sustainable%20Livelihoods.pdf> (accessed 21 August 2018)

Hoedoafia A, Cheabu BSN, Korang V (2014) The Effects of Small Scale Gold Mining on Living Conditions: A Case Study of the West Gonja District of Ghana. International Journal of Social Science Research 2:151–164

Lima AT, Mitchell K, O’Connell DW, Verhoeven J, Van Cappellen P (2016) The legacy of surface mining: Remediation, restoration, reclamation and rehabilitation. Environmental Science and Policy 66:227–233

Mcquilken J, Hilson G (2016) 16618IIED - Artisanal and small-scale gold mining in Ghana. Evidence to inform an Action Dialogue - pubs.iied.org

Mensah AK, Mahiri IO, Owusu O, Mireku OD, Wireko I, Kissi EA (2015) Environmental Impacts of Mining : A Study of Mining Communities in Ghana. Applied Ecology and Environmental Sciences 3:81–94

Minerals and Mining Act, 2006 Act (703) <http://extwprlegs1.fao.org/docs/pdf/gha85046.pdf> (accessed 21 August 2018)

de Moura EG, Gehring C, Braun H, Junior A de SLF, Reis F de O, Aguiar A das CF (2016) Improving farming practices for sustainable soil use in the humid tropics and rainforest ecosystem health. Sustainability (Switzerland) 8:1–21

Nawi S (2017) a Study of Rehabilitation Fund Payment Mechanisms https://qspace.library.queensu.ca/bitstream/handle/1974/23796/Nawi_Salmiah_201712_MAS_c.pdf?sequence=2 (accessed 21 August 2018)

Owusu-Nimo F, Mantey J, Nyarko KB, Appiah-Effah E, Aubynn A (2018) Spatial distribution

patterns of illegal artisanal small scale gold mining (Galamsey) operations in Ghana: A focus on the Western Region. *Heliyon* 4 <http://isiarticles.com/bundles/Article/pre/pdf/148852.pdf> (accessed 23 August 2018)

Rosasco P, Sdino L, Magoni S (2016) Reclamation Costs and their Weight in the Economic Sustainability of a Project. *Procedia - Social and Behavioral Sciences* 223:209–216
Small-scale Gold Mining Act, 1989 P.N.D.C.L. 218 https://asgmresearch.weebly.com/uploads/3/0/1/6/30160743/small-scale_gold_mining_act1989.pdf (accessed 21 August 2018)

Tenkorang EY, Osei-kufuor P (2013) The Impact of Gold Mining on Local Farming Communities in Ghana The Impact of Gold Mining on Local Farming. *Journal of Global Initiatives* 8:25–44

Teschner BA (2012) Small-scale mining in Ghana: The government and the galamsey. *Resources Policy* 37:308–314

Vieira R (2005) Mercury-free gold mining technologies: Possibilities for adoption in the Guianas: 1–8 <https://www.cbd.int/financial/monterreytradetech/guyana-montech.pdf> (accessed August 19, 2018)

Western Regional Co-ordinating Council n.d. www.wrcc.gov.gh (accessed 25 May 2018)

Wilson ML, Renne E, Roncoli C, Agyei-Baffour P, Tenkorang EY (2015) Integrated assessment of artisanal and small-scale gold mining in Ghana — Part 3: Social sciences and economics. *International Journal of Environmental Research and Public Health* 12:8133–8156

APPENDICES

Appendix I



Questionnaire/Interview Guide for small-scale miners (concession owners)

This questionnaire seeks to collect data on the perception of small-scale mines on the posting of reclamation bonds at the small-scale sector in Ghana and the average cost estimate to reclaim an acre of a mined area. This is for a research work at the United Nations University in Iceland. Information given will only be used for academic purpose, therefore your responses will be treated confidentially.

NB: Officers, Please, tick or write the responses in the space provided.

Section A: Bio data of respondents.

Mining Community.....

1. Name of respondent (optional).....
2. Age 1= 20-29 () 2= 30-39 () 3= 40-49 () 4= 50-59 () 5= 60 and above
3. Respondent's sex 1= Male () 2= Female ()
4. Education level 1=Primary/JHS 2= SHS 3= Vocational/Technical 4= Tertiary
5. Number of household unit 1= 1-5 2= 6-10 3= above 11
6. Any other source of income apart from the SSM 1= Yes () 2= No ()
If yes, 1= farming 2= business 3= government worker 4= other (please specify)
7. Are you a native of the community/Municipality? 1= Yes () 2= No ()

Section B: Small-scale miners (concession owners) support to the introduction of the reclamation bond at the small-scale mining sector in Ghana.

8. Name of Small-scale mining (SSM) site.....
.....
9. Size of the concession 1= <25.00arce 2= 25.00arce
10. Do you have another (SSM) concession(s) 1= Yes () 2= No ()
11. If Yes, number and size of the concession(s)
Number(s): 1= 2 2= more than 2 **size:** 1= <25.00arce 2= 25.00arce

12. Type of mining operation.

1= surface mining 2= underground

13. Number of years in the small-scale mining industry 1=1-5 years 2= 6-10 years

3= 11-15 years 4=16-20 years 5= above 20 years

14. Do you know about mine/land reclamation 1= Yes () 2=No ()

If Yes, how did you get to know about it. Can you elaborate in few words about mine/land reclamation 1= EPA 2= Minerals Commission 3= Small-scale association 4= Water Resource Commission 5= The Assembly? 6= others specify.....

15. What do you think makes the large-scale mining companies reclaim their site after mining?

1= Mandated by law

2= For investors (Shareholders)

3= others (Please specify)

16. Do you think it is necessary to ensure land restoration (mine reclamation) in the SSM sub sector? 1= Yes 2= No

17. Have you heard of reclamation bonds 1=Yes () 2=No ()

From which source 1= EPA 2= Minerals Commission 3= Water Resources Commission 4= Small-scale mining Association 5= other, please specify.....

18. Do you support this law (reclamation bond) to be introduced at the small-scale sub sector 1= Yes () 2= No ()

If yes, how do you think it will work at the SSM sector?

If no, why will it not work in the SSM sector

19. Have there been any significant changes in the land conditions (in terms of mining activities) now as compared to previous the years within the Community/Municipality 1= Yes () 2= No ()

If Yes, what are the changes.....

.....

.....

Section C: Estimate cost of reclaiming an acre of a mined site/concession

20. Number of pits on your site 1= one 2= two 3= more than two

21. Have you done any backfilling activities at your site 1= Yes () 2= No ()

22. How would you like to see your site after you have completed the mining activities?

- 1= Agricultural land
- 2= Forest land
- 3= Degraded land
- 4= Backfilled but not revegetated
- 5= Other, please specify

23. In your own view, can you please give a cost estimates and activities an SSM operator would conduct in reclaiming an acre of a mine area.

Activity	Estimated cost

24. In your own view what do you think about the future of the land conditions in the municipality in relation to the mining activities in the Community/Municipality

.....

.....

.....

.....

25. Any other information you would like to add up or ask.....

.....

.....

.....

THANK YOU FOR YOUR TIME!!!

Appendix II



**UNITED NATIONS
UNIVERSITY**

UNU-LRT

Land Restoration Training Programme

Questionnaire/Interview Guide for key informants

This questionnaire seeks to collect data on the feasibility of posting reclamation bonds at the small-scale mining sub-sector in Ghana. This is for a research work at the United Nations University in Iceland.

NB: Officers, Please, tick or write your responses in the space provided.

Section A: Information of the respondent

1. Name of respondent.....
2. Name of Institution.....
3. Position
4. Number of years in the institution.....

Section B: Feasibility of posting reclamation bonds at the small-scale sector in Ghana

5. Who is responsible for mine reclamation? 1= miners 2= miners and government
3= other pls, specify.....
6. What is the role of your institution in land reclamation?
.....
.....
7. Are small-scale miners mandated by law to reclaim the site after mining 1= Yes 2=No
8. Are you aware of any SSM site(s) that has/have been completely reclaimed in your Municipality? 1= Yes 2= No
9. Do you train miners on how to reclaim the site after mining? 1= Yes 2=No
10. Do the activities of the SSM pose any challenges to the community/Municipality? 1= Yes 2= No

11. In your own view, what do you think can be done to solve some of the problems in the SSM sector?

.....
.....

12. Do you support reclamation bond to be introduced at the SSM sub sector? 1= Yes 2= No

13. Can you give any reasons(s) for your response to question 12?

.....
.....
.....

14. Will your office provide the necessary support for implementing the posting of reclamation bond at the SSM sub sector? 1= Yes 2= No

15. Does your institution have the logistics and capacity for monitoring the activities of SSM sub sector if the bond is introduced/posted? 1= Yes 2= No
If No, what logistics does your institution need

.....
.....

16. In your opinion, will the small-scale miners support the posting of the bond at the SSM sub sector? 1= Yes 2= No

17. Do you think the legislative will give the necessary legal backing for imposition of this bond? 1= Yes 2= No

If No, what can be done.....

.....

18. In your opinion, why have reclamation bonds not been enforced at the SSM sub-sector?

.....
.....
.....
.....

19. Any other information you would like to add up or ask

.....

.....

.....

.....

THANK YOU FOR YOUR TIME!!!