

Issues of Environmental Rights in Unregulated Artisanal Small-Scale Mining in the Mpohor District of the Western Region of Ghana

Isaac Eshun^{1, *}, Pamela Ekua Payne²

¹Department of Social Studies Education, University of Education, Winneba, Ghana

²Centre for Conflict, Human Rights and Peace Studies, University of Education, Winneba, Ghana

Abstract

This study examines environmental rights issues in unregulated artisanal small-scale mining (ASM) in the communities in the Mpohor District. The pragmatist philosophy underpins this study. Mixed methods approach and concurrent triangulation design were employed in this study. The population consisted of all police officers, EPA officers, traditional leaders, assembly men and officials of the Mineral Commission within the Mpohor District. Purposive and simple random procedures were employed to select 117 participants. Structured questionnaires and semi-structured interview guide were the instruments employed for data collection. SPSS was used to analyse the quantitative data, while thematic analytical procedure of Braun and Clarke was adopted to analyse the qualitative data. Findings of this study were that unregulated ASM activities polluted most of the water bodies within the district. Also, it led to the destruction of most farmlands and removed the vegetation containing important species supporting mans' survival. Furthermore, it increased erosion and loss of viability for agricultural purposes, among other uses. More so, unregulated ASM denied residents the right to clean water, health, and arable land, displacing people from their natural residence and inflation occurring which negatively affect the wellbeing of the local population. It is recommended that government and responsible stakeholders should create protected areas designated for agricultural purpose alone in the mining communities to ensure the continuity of food crop production. Also, stringent measures should be enacted and enforced to prevent landowners in leasing their lands out for unregulated ASM.

Keywords

Artisanal Mining, Environmental Rights, Galamsey, Ghana, Human Rights, Small-Scale Mining

Received: July 18, 2021 / Accepted: August 11, 2021 / Published online: August 23, 2021

@ 2021 The Authors. Published by American Institute of Science. This Open Access article is under the CC BY license.

<http://creativecommons.org/licenses/by/4.0/>

1. Introduction

The environment is vital to the existence of humankind because the necessities of life, such as water, air and food are obtained from it [1]. The Ministry of Local Government and Rural Development [MLGRD] believe that the environment is a part of humankind [2]. According to Hayward, man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and wellbeing, and he bears a solemn

responsibility to protect and improve the environment for present and future generations [3].

The human-environment interaction, which, according to Ostergren and Le Bosse, is one of the essential facts of life, has so many implications. The environment offers infinite possibilities, of which humans make important choices based on cultural and technological development [4]. Unfortunately, some of these choices have been a driving force for environmental degradation and change. The exploration of natural resources is by no means a recent

* Corresponding author

E-mail address: isaaceshun@uew.edu.gh (I. Eshun)

phenomenon. The transition from exploration to exploitation has hitherto resulted in a catastrophic impact on the environment and society in general. Martinez categorically stated that future generation would feel the impacts of poor environmental decisions irrespective of economic growth [5]. Contribution of the mining sector to the economic development of Ghana has been widely acknowledged [6, 7]. According to Forbes, Ghana is Africa's largest producer of gold, beating out South Africa for the first time in 2019, and the sixth in the world. Ghana grabbed the top spot from South Africa after mining more than 142 metric tonnes of the precious metal in 2019 [7]. Gold accounts for 90% of the overall mining output in Ghana [8, 9]. Current estimates show that the country is doing well in gold production in Africa and the world. The recent decline in production is highly attributed to the COVID-19 pandemic which raised its ugly head in the wake of the year 2020 and hugely affecting several extractive economies in the world. The sector directly contributed 38.3% of Ghana's total corporate tax earnings, 27.6% of government revenue and 6% GDP in 2011 [8]. Since then, there has been steadily increase in employment and revenue generation from the mining of gold. These are witnessed in both the formal and the informal sector of the Ghanaian economy.

Notwithstanding, all these benefits, there are environmental challenges associated in extracting the gold mineral. The problem stems from the fact that, the right to a quality environment as it well established in international human right laws and sustainable development goals, realising it has become an issue of concern. Ghana is committed to the protection of a quality environment, as evident in the establishment of the Environmental Protection Agency (EPA). Amponsah-Tawiah and Dartey-Baah, refer to the environment as both the natural, physical surroundings and the social conditions that impact upon the physical, mental and moral development of humankind [10]. It is therefore, reasonable to assert that the enjoyment of fundamental human rights will not be complete without proper adherence to environmental rights. The concept of human rights includes civil and political rights or public liberties, economic, social, and cultural needs, particularly concerning development, the environment and self-determination [10]. It is the State's responsibility to protect and promote human rights issues among its citizens [11, 12]. The State also has to create conditions for peaceful co-existence which enable human rights to be enjoyed by every individual [12].

The Environmental Sanitation Policy (ESP) was approved by cabinet on 31st of March, 2010 and launched on the 30th of November, 2010. The overall goal of the ESP is to develop a clear and nationally accepted vision of environmental sanitation, as an essential social service and a major

determinant for improving health and quality of life in Ghana [2]. The policy is a necessary tool required to help shape all efforts in dealing with the overwhelming challenges of realizing environmental right in Ghana [2].

It appears realizing environmental rights in unregulated ASM communities in Ghana is close to dreadful. A report on the future of mining in Ghana by the Minerals Commission in 2015, stipulates environmental issues perpetuated by unregulated ASM operators. Notable among them is the contamination and destruction of water bodies, the dreadful conditions of the environment and arable farmland which is a distress to the rights of citizens in the communities. Similarly, Bach, disclosed the impacts of unregulated ASM activities to be the high rate of water pollution and land degradation [13]. The report further identified neglect of mined pits, lack of reclamation and sedimentation of rivers as the crust of the environmental rights concerns [13]. These environmental issues have rendered arable lands unviable for farming and increased the cost of water treatment in the municipality. Besides, some researchers have reiterated heavy metal contamination, unselective vegetation removal and damage of farmlands as the impact of unregulated ASM operations in mining communities [14].

Subsequently, these environmental apprehensions are assumed to aggravate the socio-economic state of residence in the mining communities. For instance, deserted excavated pits of these miners turn into breeding grounds for malaria-transmitting mosquitoes and pose a serious health threat [14]. From a human rights perspective, the social, health, and environmental impact of unregulated ASM activities have severe consequences for the affected communities. Also, ASM miners have their share, particularly for the right to life and the right to security [15]. Sarpong, on the right to life, attested to the fact that many illegal miners have died in their dugout pit as a result of walls collapsing and falling on them [15]. No wonder Hirons, portrayed unregulated ASM miners as opportunistic criminals looking to get-rich-quick and calls it a threat and menace, mainly as a result of the environmental degradation associated with its activities [14].

Yet, unregulated ASM has continued to flourish because it serves the interest of a wide range of actors, including Chiefs, the District assemblies, some M.P.s, ministers and financial sponsors of illegal miners [16, 14]. Consequently, the government is committed to ending this menace. Despite the efforts of the government to effectively halt the activities of these unregulated miners, their operations persist [16]. Until mining communities and stakeholders participate in fighting unregulated ASM, the menace such as damage to our environment, right to safe water and safe environment would continue to hinder Ghana's development [17].

Therefore, this study sought to examine environmental rights issues in unregulated ASM in the Mpozor District of the Western Region of Ghana. The study was guided by this research question—What are the environmental rights issues in unregulated small scale mining activities in mining communities in the Mpozor District of the Western Region of Ghana? The study was focused on environmental rights issues in unregulated small-scale mining in the Mpozor, Bansa and Community 9 communities. It was further delimited to the Mpozor District of the Western Region of Ghana.

2. Literature and Theoretical Review

The work is grounded on the Human Rights-Based Approach (HRBA). The first U.N. development agency to champion the HRBA in its programming is UNICEF [18]. The 1980s to the 1990s witnessed a move towards a more human-focused developmental process by UNICEF. Further, they stressed on the need to empower the vulnerable in the process of development instead of side lining of the poor [18]. However, in 1997, the then U.N. Secretary-General Kofi Annan launched a programme for reforms and called for integrating human right into all programmes and activities of the U.N. systems [18]. Subsequently, a host of developmental agencies started adopting HRBA in their activities. However, in 2003 a common understanding on an HRBA was established in U.N. which allowed U.N. bodies, governments and NGOs to apply it to their developmental project. The guide stipulates that the realization of human right should be at the core of all programmes of developmental cooperation, policies and technical assistance as stated in the UDHR and other international human rights instruments. The guide further instructed that all developmental cooperation and programming in all areas and all stages of the programming process should be guided by human rights and values derived from the UDHR and other human rights instruments. Finally, all programme of development cooperation should build capacities of duty-bearers to meet their obligation and right-holders to claim their rights [19].

A human rights-based approach is a conceptual framework based on international human rights standards to uphold and shield human rights in a developmental project [20]. Analytically, a human rights-based approach closes up the space between right holders and duty bearers through enhancing the understanding of their associations. Thus, human rights-based approach calls for the integration of international human rights standards to reinforce people's human rights in the very core of policies and developmental agendas. Jonsson further simplify HRBA as incorporating the

norms, standards and principles of international human rights law into the plans, policies and processes of development [18]. Gready, widens the scope of HRBA framework by including its dependence on national laws, public and customary norms [21]. HRBA implies using human rights as the foundation for formulating the aims for development cooperation.

Over the years, various approaches to developmental interventions were adopted. The initial approach embraced by developmental stakeholders was the charity approach, then to needs and now HRBA. All the approaches had their peculiar characteristics; the charity approach stressed the moral responsibility of the rich to the poor. The need approach highlighted on needs as a lawful entitlement. HRBA is more about identifying individual and group rights as lawful and moral claims to duty-bearers [22]. No wonder most states commitments to human rights are made more visible in applying HRBA in all stages of developmental intervention. Finland, for example, considers human rights awareness as a developmental outcome and hence incorporate human rights principles to their programme writing, preparation, implementation, monitoring and assessment of their developmental cooperation [22]. Also, HRBA authorizes people to know and claim their rights by seeking remedies when their rights are compromised [19]. It also analyses inequalities, redress discriminatory practices, abuses and unjust distributions of power that impede development progress [20].

Consequently, HRBA is an essential prerequisite for attaining good governance and reinforces the social contract between citizens and their governments [19]. That is why the government of Ghana and related agencies are relentless in curbing unregulated gold mining activities with their associated human right issues. In most cases, people's right to clean water, health and arable land violated through the activities of miners [23]. Therefore, until HRBA is used to fight this canker, the unregulated mining menace would continue to hinder Ghana's development [17].

Furthermore, HRBA is essential for sustainable development. Accordingly, all states which have ratified human rights treaties have the responsibility to implement their development programmes on human rights principles. The bottom-up order of HRBA in the course of change, strengthen policymakers to design sustainable development process on the premise of human rights and enhance human rights conditions to be supervised, assessed and safeguarded for an extended time.

Noticeably, data on Human Rights-Based Approach varies depending on the nature of the organization concerned and their area of operation. Universal principles are summarized

with the acronym PANEL-Participation, Accountability, Non-Discrimination, Empowerment and Linkage to Human Rights norms [24].

Participation deals more with the mindset, where developmental projects cooperatively involve both duty-bearers and right holders. Such a process is not enforced, but the inhabitant inputs are recognized and the developmental body serving as implementers of the process. Therefore, the residents will have a sense of ownership as they affect change in their area. Hence, the supervision, continuousness and solution to the problem recognized will be the responsibility of the community members.

Direct participation calls for the involvement of right-holder from the situational analysis and problem identification stage, to the planning and execution as well as the supervision and examination of the developmental project. The entire process calls for the right holders being able to express the concerns and given listening ears without discrimination. Conversely, there is difficulty in reaching a sound level of participation. For instance, differences in priorities of both developmental bodies and communities and power structures and discrimination can influence participation negatively.

Accountability calls on duty-bearers to account for their obligation. As HRBA empowers the right-holder to claim their rights, it also makes duty provisions-bearers to accomplish their responsibilities [24]. Discussion and collaboration among duty-bearers, right holders and other responsible actors augment accountability. No wonder Finland term accountability as the heart of HRBA [22].

Non-discrimination and equality involve accepting that all human beings are equal and are entitled to their human rights without discrimination including sex, ethnicity, age, language, religion disability among others [11]. It is on this premise that the planning and operation of HRBA require exceptional attention to people in a vulnerable position in the project so that the plan does not enhance discrimination but guarantee all individuals involved equal access to the process and benefit of the project.

Empowerment is the manner of building the capability and self-reliance of residents to assist them in claiming their entitlements as well as becoming public actors and taking charge of their lives. Individuals are empowered to be in charge of their lives by furnishing them with awareness, expertise, an attitude that widens their alternatives and self-reliance [24].

Empowerment is an essential principle in attaining development by right-holders themselves. Thus, residences feel a sense of ownership and actively participate in a project that will enhance change; because they have access to

choices, assets, and abilities to transform their lives and lead their developments.

The concept of human rights covers a wide range of meanings; they are the key to an understanding of the law, the legal system, and legal culture. It is, therefore, an indicator of the society's status and legal consciousness of its citizens. Human rights cover a total area of human existence [25]. This clearly indicates that human right has something to do with environmental right.

According to Hayward, man has the fundamental right to freedom, equality and adequate conditions of life in an environment of a quality that permits a life of dignity and wellbeing, and he bears a solemn responsibility to protect and improve the environment for present and future generations [3]. The author also maintains that the natural resources of the earth including the air, water, land, flora and fauna and uniquely representative samples of natural ecosystems must be safeguarded for the benefit of present and future generations through careful planning or management, as appropriate. Hayward, is of the view that, in recognizing the right to a healthy environment includes the enactment and enforcement of more robust and comprehensive environmental laws [3].

Opponents argue that any prospective advantages outweighed by problems such as the low likelihood of effectiveness redundancy with other rights negative implications for democracy, the excessive focus on individual's adverse effects on other rights anthropocentrism and the creation of false hopes. There is an absence of discussion on realizing the right to a healthy environment and its anticipated effects; either positive or negative. The debate has taken place in the absence of any empirical evidence about the actual effects of constitutionalizing environmental protection [26]. Hayward, in one of the leading texts on this subject, discounts the possibility of conducting such an assessment because of methodological difficulties [3]. Hunter et al., write that, constitutional environmental rights probably halted some environmental deterioration in some countries, although empirical studies are lacking. This clearly shows why environmental rights should be infused and followed strictly in the mining industry in Ghana.

Baidoo described mining as an operation where the earth is dug out to extract natural minerals. Mining activities go on in almost every part of the world, and it is the world's second-oldest industry and one of the largest industries in the world [27]. It is a crucial component of the world's economic development. The trade of mineral commodities is vital for international trade [10]. The long-existing role of mining in the economic development of the country is impressive and well established. Ghana's colonial name of "Gold Coast"

reflects the mining sector and particularly, the gold trade. The country has a known past of gold mining, with almost 80 million ounces of gold produced when the first gold mining activity was documented [10].

This notwithstanding, the issue of illegal mining in Ghana has been debated upon and is seen in general as highly negative with the illegal miners irresponsibly using mercury in their gold extraction with no concern for the communities' health, wellbeing and the environment. The sentiments are often that the small-scale miners destroy the investment potential that the country can generate from the large-scale mining companies [13, 28]. It is because governmental policy processes are with insufficient stakeholder participation. However, in the academic sphere, there is the notion that what is needed to deal with the galamsey sector is an integrated approach which should actively involves the mining communities [13]. Since the early 2000s, there has been an influx of Chinese gold miners to engage in small-scale mining (locally known as galamsey). Galamsey which is seen as the exploitation of mineral deposits through the use of necessary equipment and involving low levels of production with minimal capital investment and by law reserved for only Ghanaians [29].

The influx of Chinese miners to Ghana has mainly been driven by high gold prices, increasing cultural cooperation between Ghana and China, and the largely informal nature of small-scale mining in Ghana, which enables easy entry by locals and foreigners into the business [29]. Before the arrival and involvement of Chinese miners in this industry in Ghana; the sector was characterized by informal and illegal activities where Ghanaians in mining communities usually extracted gold without a license, using basic methods [30]. In collaboration with local actors, however, the Chinese miners have imported more sophisticated machines that have gradually replaced the rudimentary methods and implements used by their Ghanaian counterparts. Given the prohibition by law on foreigners' engagement in small-scale mining in Ghana, the continued engagement by Chinese in the industry has attracted considerable interest from scholars and analysts, whose debates are according to the following four main arguments. The first and most common debate asserts that formal state institutions are weak or under-developed, and thus are unable to regulate the mining activities [30]. Secondly, some scholars have argued that there is a lack of political will to fight illegal Chinese businesses, ostensibly because politicians and high ranked government officials also benefit from such illicit activities [27]. Thirdly, state and local actors (such as chiefs and landowners) with varying agencies connive with the Chinese miners, by sheltering the latter from statutory regulatory authorities in Ghana [30]. Ghanaians thus provide crucial local information such as how

to navigate certain terrains and local laws. Consequently, the Chinese miners, with their modern technology, extract the minerals and share the proceeds with their local counterparts [31]. Lastly, others blame the phenomenon of illegal small-scale mining on excessive bureaucratic processes involved in procuring a mining license in Ghana, which often encourage shortcuts among actors to circumvent legal procedures [31].

While these arguments are significant in explaining the rapid growth in the illicit small-scale mining business, the ongoing discussions have not captured all the dynamics of the subject matter. For instance, there are also emerging arguments linking the rapid increase in artisanal and small-scale gold mining to acute lack of jobs and accompanying poverty nationwide. Illegal mining is prevalent in most African communities where minerals are found, and Ghana is not an exception. Mining is said to be illegal when it is practised without a permit or in unapproved areas like the forest reserves, game reserves, or near water resources even with a secured permit [29]. Illegal mining has been given a lot of media publicity and has created public concern on the perceived extensive damage it has caused to forest cover. It is estimated that about 300 000 to 500,000 Ghanaian artisanal miners work without an official license or illegally and the have contributed about \$461.1 million to Ghana's economy since 1989 [32]. Thus, a significant contribution to mining revenue is made by the artisanal and small-scale mining sector whose operations are mostly classified as illegal [33].

Illegal mining activities are artisanal and are also small-scaled with no legal support. Artisanal mining broadly refers to mining by individuals, groups, families or cooperatives with minimal mechanization, often in the informal sector of the market [29]. According to the World Bank Group (2001), small-scale mining is mostly a poverty-driven activity, typically practised in the poorest and most remote rural areas of a country by a mostly itinerant, poorly educated populace with few employment alternatives. Despite ASM being a livelihood sustaining activity, is characterized by a lack of or very reduced degree of mechanization. A low level of occupational safety; exploitation of marginal and minimal deposits, which are not economically exploitable by mechanized mining; low productivity; low levels of income; lack of social security; insufficient consideration of environmental issues; and working illegally [29].

The activity of illegal mining which to a greater extent are not regulated and operate on a small-scale basis in the community, leads to environmental severe havoc and destruction. The most method employed is surface mining of which strip mining is one form. The miners uncover the minerals by removing the underlying vegetation cover, rocks, and other strata. Also, enormous quantities of the vegetation cover are gouged out, inverted, and buried, converting the

natural terrain into raw, bare, lifeless spoil banks [34]. Consequently, more enormous portions of the vegetation cover in the mined areas lose their properties to be used for any other purpose [35].

The major causes of illegal mining are, in most cases, economic factors. Although it has been pointed out that not all artisanal miners are illiterate or poor, poverty is identified as one of the main causes of illegal mining [36, 37]. Financial difficulties compel distress people to engage in illegal mining. Most people, especially from mining communities, see artisanal mining as the only viable livelihood option available [38].

Unregulated ASM activities have several implications on agriculture, human health, and movement (migration), environment, and others. Generally, agriculture is the dominant activity carried out where mining operations occur and serves as a principal livelihood for surrounding communities. However, the excessive spillage of chemicals such as cyanide and mercury affect crops and health threats to farmers resulting in unproductive farmlands [39]. The destruction of vegetation and farmlands by miners affect food security. This drives farmers from sustainable livelihood into other alternative income-generating businesses [40].

The economic aspect, although high proportions of idle youths find solace at such a mining site, the negative effect on food security is enormous [41]. Fertile expanses of land that are devastated and rendered uncultivable for an extended period of years deny the farmers' access to such scarce land, hence a general decrease in food production. Even after the mine has been abandoned and re-cultivated, the residual changes in soil physics and chemistry were still available [33].

In most situations, the mined lands are degraded, which has a long-term loss on the ecosystem and overburden the land surface. Land degradation also directly affects losses of soil, organic carbon nutrients, and regulation and indirectly affects the loss of productivity and wildlife habitat. The 1992 Earth Summit has considered threats to sustainable development posed by land degradation and the 2002 World Summit on Sustainable Development also stressed on that. However, the response has been crippled [42].

Activities of mining and its consequences were recorded as degrading to the land and other resources significantly. The excessive removal from the mine area accounts for the reduced rain forest and fertile topsoil for cultivation. Also, among mining operations, blasting, or sophisticated machines results in destruction and generating of waste [43].

In Ghana, most lands are classified as low fertility and are subject to degradation. Factors influencing the degradation

include population, increased urbanization, and climate change. All these notwithstanding, galamsey seems to add to the problem. To sustain and restore crop production, proper soil management, and other natural policies should be enrolled to protect and preserve the land from destruction.

Boadi et al., estimated the influence of illegal mining operations within the Offin shelterbelt forest reserve in Ghana and its impacts on the livelihoods of fringe communities. They noted that, within five years, illegal mining had degraded 2.5 km² (4.4%) of the total area of the forest reserve and had destroyed cocoa farms and water sources. As a result, farming among respondents reduced from 90 per cent to 76 per cent after illegal mining [44]. The study also observed that the relatively high cost (US\$ 6424.1) involved in flushing out and the subsequent return of such miners pose a threat to sustainable forest management.

Mancini and Sala, in their systematic review, also noted that land competition could arise when mining projects are developed, endangering the wellbeing of the local population and leading to their impoverishment [45]. They noted that almost 30 per cent of the scrutinized studies report of land expropriation, displacement, and resettlement of local communities. Again, they observed that mining could reduce the amount of arable land for the rural population, which implies a negative impact on livelihood and consequent food insecurity [45].

Other studies have documented how illegal mining activities impact lives and the environment as a whole [46, 44]. Tom-Dery, investigated the effect of illegal small-scale mining operations on vegetation cover of arid Northern Ghana using Simpson's reciprocal diversity index. They noted that mining significantly affected vegetation cover [47]. In their further analysis, it was found that the Simpsons reciprocal diversity index of tree species at the mined area was 8.33 as compared to 10.8 for the unmined area. For shrub species, the Simpsons reciprocal diversity index was 8.33 for the mined areas while that of the unmined was 10.2. Additionally, the low mean density of 2.4 for individual trees per 100 m² and 5.6 individuals per 100 m² was recorded in the mined and unmined areas, respectively [47]. This implies that, should such activities be left unchecked, the vegetation containing important species supporting mans' survival will go extinct.

Mensah, Mahiri, Owusu, Mireku, Wireko, and Kissi, also focused on the mining activities' impact on the environment in Prestea in the western region, Ghana. They noted that significant rivers in the area such as Ankobra and Asesree, which used to serve as the primary sources of water for domestic purpose in the surrounding townships are heavily polluted by mining activities [46]. In the same vein, they found out that the mining operations, especially, the illegal

small-scale mining are carried out on the environment without appropriate environmental safeguards and standards. The process releases contaminated water into the surrounding environment, thus polluting nearby rivers, soils and vegetation [46]. Also, they observed that increased clearing of vegetation for mining areas have adversely altered the hydrological regimes and patterns in the Western Region of Ghana. As a result, important soil organisms have been destroyed. Stable soil aggregates disrupt and eventually deprive the soil of organic matter and low levels of macronutrients and soil fertility necessary for plant growth and crop production [46].

In Ghana, the main environmental problem caused by small scale activity is mercury pollution from gold processing and mercury amalgamation method, which is primarily dependent on since it is cheap and dependable regardless of all the policies and institutions [33]. Notwithstanding, the great benefit earned from gold, the extreme environmental degradation in most mining communities in Ghana is a significant threat that certainly cannot be overlooked [46]. Galamsey operations are highly practised in the rural part of Ghana. Since their activities are illegal, gold extraction begins mostly in the evenings. The results of their activities are enormous in the environment, such as the loss of farmlands [49].

Artisanal miners degrade vast expanses of forest, digging trenches and upturning of vegetation, which turns land bare and exposes to erosion [33]. It is estimated that 15,000ha of land are potentially affected by mining [50]. Excavated lands and trenches are later unsuitable for any other purpose instead it becomes a breeding area for malaria-causative mosquitoes [33]. The impact is seen on the cracks and collapsing of buildings due to blasting to reach the targeted mineral deposit [41]. Deforestation involves cutting down trees and plantations, permitting galamsey operators to extract the minerals. The high risky nature of the job has led to fatalities in the mine sites due to uncovered pits, bad weather and at times the ground caving on the miners. Generally, galamsey operators are not educated and ill-informed about the procedural approach to mining activities in the country, making them deficient on the health threats that pose to them [41].

In Ghana, most of the accessible rainforests are shrinking partly due to mining activities, and the situation is not different from illegal mining [33]. From the country's original forest cover of 8.2 million hectares at the beginning of the 20th century, only an estimated 1.6 million hectares remain. The deforestation rate is 2.0% leading to an annual loss of around 135,000 ha. With the dependence on the forest as a source of livelihood to local people, protection of the remaining natural forests may be a challenging goal to

achieve given socio-economic constraints associated with mining [33].

The mining sector is a very instrumental segment of the extractive sector. Still, it has one of the terrible environmental consequences, especially among illegal mining, and having adverse effects on the livelihood and survival of resident communities [52]. Several illegal miners are dead as a result of their mining activities, and this continuous trend is a threat to society [53]. Additionally, the natural environment, which was somehow stable and safer in the past, has been threatened as a result of illegal or unregulated mining and all sort of extraction activities [54].

In as much as mining operations add to the people in mining communities, the adverse effects of health are immeasurable. A mineral deposit in the soil does not guarantee the wealth of miners [55]. The nature of mining operations is to exploit; therefore, it exploits not only the land but also the human resource involved. The earth is mined for minerals, which in all its forms threaten, with diverse effects on human health in both large and small-scale mining. Understanding the long-term implications of ASM on the mining communities will help improve and mitigate the harm associated with the unregulated activities associated with its operations.

3. Methodology

The pragmatist philosophy underpins this study. Pragmatism arises out of actions, situations and consequences rather than antecedent conditions [56]. Pragmatism, therefore, reinforces the mixed methods approach to research and uses pluralistic approaches in acquiring knowledge. This research uses the qualitative and quantitative paradigms (mixed method) to explore environmental rights issues in unregulated ASM. Johnson and Onwuegbuzie, argue that mixed methods research uses a method and philosophy that attempt to fit together the insights provided by qualitative and quantitative research into a workable solution [57]. The philosophical perspective of the pragmatic approach is relevant for this study because it ensures methodological congruence in the investigation of the research questions and hypotheses, as well as the choice of methods for data collection and analysis.

The concurrent triangulation design was employed for the study. This design is most appropriate and suitable for the study since the questionnaire and interview are the principal instruments used for the collection of data. The concurrent triangulation design under the mixed-method approach was then adopted as a means of data analysis and presentation. Creswell, posits those researchers who are new to this approach most often think of it as just a combination of quantitative and qualitative data [56]. Though this might be

true to some extent, he adds that in the concurrent triangulation mixed-method design, a researcher separately collects quantitative and qualitative data, analyses them and then compares the results to see if it agrees with each other concerning a given phenomenon [56]. Using the mixed method research approach for a study provides strengths that offset the weakness of both quantitative and qualitative research approaches and provides more comprehensive evidence for studying a research problem than either quantitative or a qualitative research approach alone [56]. Both quantitative and qualitative research have weaknesses. Quantitative research is weak in understanding the context or setting in which data is collected. Qualitative research may include biases and does not lend itself to statistical analysis and generalization. The mixed method approach, however, offsets these weaknesses by allowing for both exploration and analysis in the same study. It provides results that have a broader perspective of the overall issue or research problem.

The population consisted of all police officers, EPA officers, traditional leaders, assembly men and officials of the Mineral Commission within the Mpohor District, who numbered five hundred and seventy (570). Probability and non-probability sampling procedures were used to select the sample in this study. Simple random sampling technique was used to select the participants for the quantitative aspect of the study. The reason for using simple random sampling was to remove biases. A total of one hundred participants were selected for the study. Purposive sampling was used to select participants for the qualitative aspect of the study. A total of seventeen participants were selected from the total population to partake in this aspect. The technique was chosen for the fact that it allows the researcher to attain enough information about the problem under investigation [58]. Yin, pointed out that a sample should be large enough so that the validity and reliability of the data are achieved and proposes a sample of 30% of the population as being reliable [59].

The research instruments employed in gathering the data for the study were questionnaires, interview guides and focus group discussions. The questionnaire instrument was pre-tested in Juaboso District in the Western North Region of Ghana. Johnson and Christiansen, assert that it is always acceptable to pre-test a questionnaire before administering to eliminate ambiguities and errors in data collection and to ascertain the validity and reliability of the instruments [60]. The feedback received was used to improve on the instrument by making the right corrections and adjustments in the final write-up to increase the level of validity. With this, Kothari (2008) described validity as the degree to which results obtained from the analysis of the data represent the phenomenon under study [61]. Reliability of the questionnaire was determined through internal consistency of

items. Cronbach's alpha coefficient was computed with an outcome of 0.76 which indicated that the instruments were reliable. Trustworthiness of qualitative instruments were also done to ascertain dependability and credibility.

SPSS was used to organize the quantitative data collected from the respondents into manageable data. It was done using simple percentages. The analysis was based on the research questions. Information on the questionnaires was corrected by scrutinizing the data items before coding them. This procedure helped in pinpointing items which were wrongly responded to, mistakes in spelling and empty spaces left by the respondents. The coded information was to enable data entry into the computer to permit statistical analysis. The analysis of data was significant for the reason that it brought out the features, interpretations to enable description, and the generalization from the study [56]. The interview data were thematically analysed. In doing so, the raw data were transcribed. Transcription is the process of transforming interview notes and audio recording into texts [60]. Thematic analysis is the process that identifies, analyses and reports the occurrence of themes in the data collected from the research areas. According to Braun and Clarke, thematic analysis follows six necessary steps, namely:

- 1) Familiarizing with the data through thoroughly reading the transcriptions. This help the researchers to have in mind what exactly is in the data.
- 2) Generation of initial codes. Putting labels or descriptions on a list of ideas developed from the transcription as already read by the researchers.
- 3) Searching for themes. Related codes are organized under different themes.
- 4) Reviewing the themes. The themes developed are reviewed for their relevance and legitimacy of being called themes.
- 5) Defining and naming themes developed. Defining the overall content of the themes and the message it carries in it before producing a report
- 6) Producing a report [62].

Given the above considerations, the interview of each participant was checked and presented concerning the research questions. The qualitative analytical processes were strictly adhered to. In reporting the information collected, some direct quotations were used.

Ethically, participants' confidentiality was ensured by destroying all the questionnaires and transcriptions after the work. Participants' anonymity was ensured by not disclosing any respondents name against the information given.

4. Results and Discussions

The first section under this part is the demographic characteristics of participants. The demographic characteristics of respondents are as follows:

The sex distribution of the study revealed that out of the total number of 117 respondents involved in the study, 75(64.1%) of them were males, whilst 42(35.9%) were females. The result depicted more males were involved in the study than females.

Age of participants revealed that out of the total number of 117 respondents, 18(15.4%) were between 20 - 29 years, ages between 20 - 39 constituted 2(33.1%), whilst ages between 40 - 49 were found to be 45(38.5%). The Table further revealed that ages between 50 - 59 and those above 60 was disclosed as 12(10.3%) and 15(12.8%) respectively. This alludes that majority of the respondents involved in the study were between ages 40-49 brackets.

Occupation of respondents revealed that 10(8.5%) of the total participants were students, 9(7.7%) were unemployed, whilst 22(18.8%) were government sector employees. The Table

again pointed out that 27(23.1%) of the respondents were private employees, 34(29.1%) of them were self-employed, whereas 15(12.8%) were pensioners. This illustrates that private employees constituted majority of the research respondents.

Educational level of respondents revealed that, 24(20.5%) of the respondents had completed the basic education, 36(30.8%) had attained the SHS certificate, whilst 57(48.7%) of them have completed tertiary institutions. This is a clear picture that majority of the respondents involved in the study have attained certificate from tertiary institutions.

The second section sought to examine the environmental rights issues in unregulated artisanal small scale mining activities. This research question guided the study-*What are the environmental rights issues in unregulated small scale mining activities in mining communities in the Mpohor District?* Questionnaires and interviews were conducted to examine the environmental rights issues in unregulated ASM activities in Mpohor District in the Western Region of Ghana. The respondents' views are presented in Table 1.

Table 1. Environmental Rights Issues in Unregulated Artisanal Small Scale Mining Activities.

Statements	A		SA		U		D		SD	
	F	%	F	%	F	%	F	%	F	%
1. Unregulated ASM causes pollution of most of the water bodies	52	44.4	40	34.2	1	0.9	20	17.1	4	3.4
2. Unregulated ASM causes destruction of most farmlands which can lead to famine.	55	47.0	52	44.4	0	0.0	1	0.85	9	7.7
3. The trenches caused by ASM result in all sorts of accidents within the district making it challenging to move freely especially at night	31	26.5	56	47.9	2	1.7	8	6.8	20	17.1
4. Land in areas surrounding illegal mines have been rendered bare and susceptible to increased erosion and loss of viability for agricultural purposes, among other uses.	45	38.5	65	55.6	0	0.0	5	4.3	2	1.7
5. Destruction of vegetation and farmlands drives farmers from sustainable livelihood to rather an alternative income generating businesses.	43	36.8	46	39.3	1	0.9	10	8.5	17	14.5
6. Unregulated ASM removes the vegetation containing important species supporting mans' survival	42	35.9	37	31.6	0	0.0	16	13.7	22	18.8
7. Increased clearing of vegetation for mining adversely alters hydrological regimes whilst important soil organisms have been destroyed depriving the soil of organic matter.	43	36.8	50	42.7	2	1.7	8	6.8	12	10.3

Source: Field work (2020)

Key: A=agree; SA= Strongly Agree; U= Undecided; SD = Strongly Disagree; D=Disagree

Table 1 spelt it out that majority of the respondents, 92(78.6%) either agreed or strongly agreed that unregulated ASM results in the pollution of most of their water bodies, 24(20.4%) of the participants either disagreed or strongly disagreed to the statement, whereas 1(0.9%) of them was indecisive. This suggests that ASM render water bodies unsafe for drinking and for other agricultural purposes in the study area. In support of this, key informant No. 1 articulated that:

Most of the water bodies within the district are sources of drinking water for most of the villagers but are being polluted as a result of ASM making it unsafe for people to drink.

Another key informant supported that:

It is an eye sore when one decides to go around places where there are ASM activities going on and see how the water bodies are polluted. Especially inhabitants from the neighbouring villages whose source of drinking water is a stream are suffering as a result of this illegal mining. (Key informant No. 2).

Key informant No. 3 commented that:

I have witnessed many cases of several health implications especially those living in ASM communities.

Similar result was found by Mensah et al., which focused on the impact of mining activities on the environment in Prestea in the Western Region of Ghana. They noted that major rivers in the area such as Ankobra and Asesree, which used to serve

as the main sources of water for domestic purpose in the surrounding townships, were heavily polluted by mining activities [46]. In the same vein, they found out that the mining operations especially that of the illegal small-scale mining are carried out on environment without appropriate safeguards and environmental standards. This in the process releases contaminated water into the surrounding environment, thus polluting nearby rivers, soils and vegetation [46].

In addition, majority of the respondents 107(91.4%) either agreed or strongly agreed that, ASM results in the destruction of most of their farmlands which can lead to famine, 10(8.6%) of the respondents thought differently whilst none of the respondents was indecisive. This means that unregulated ASM has resulted in the destruction of farmlands in the Mpohor District.

To buttress this point, a Key informant No. 4 commented that:

The activity involves the removal of the topsoil and that is the portion which is rich in nutrients that can support plant growth.

Another Key informant supported that:

Food is scarce and expensive at many of the places where there are ASM activities because the land no longer supports agriculture and even if so, productivity is low (Key informant No. 5).

Furthermore, it came into light that most of the respondents 87(74.4%) either agreed or strongly agreed that the trenches dug results in all sorts of accidents within the district making it challenging to move freely especially at night, 28(23.9%) of the respondents either disagreed or strongly disagreed to the assertion whereas 2(1.7%) of the respondents were indecisive. This alludes that the trenches made contributes to all sorts of accidents especially at nights among the study population. In support of this, a key informant asserted that:

There is no way an accident cannot occur especially when one is walking at places where ASM is going on because the trenches itself is scary (Key informant No. 1)

Another Key informant purported that:

I have witnessed many cases on how people fall into the trenches dug. Some of the cases even lead to the death of the individual (Key informant No. 4).

Key informant No. 6 said that:

There are numerous reported cases on the manner in which the ASM trenches injure people in one way or the other. I have witnessed someone got drowned as a result of accidentally falling into a mining pit full of water.

Moreover, the Table established that majority of the respondents 110(94.1%) either agreed or strongly agreed that land in areas surrounding illegal mines has been rendered bare and susceptible to increased erosion and loss of viability for agricultural purposes among other uses, 7(6.0%) of the respondents either disagreed or strongly disagreed to the statement whilst none of the respondents was indecisive. This means that unregulated ASM or galamsey makes a land bare leading to erosion rendering it unsuitable for agricultural purposes. In support of this, one community leader spelt out that:

ASM renders a piece of land bare to all types of water erosion which in turn does not support agricultural activities thereafter.

Another Key informant articulated that:

The way these ASM miners operate is not in a satisfactory manner. The entire process on the leads to erosion which in turn makes it infertile for the cultivation of crops (Key informant No. 3).

Similarly, Hilson, found out that Artisanal miners' clear vast expanses of forest, digging trenches and upturning of vegetation which turns land bare and exposes to erosion make it unsuitable for any agricultural purpose [33].

It was further revealed from the Table that majority of the respondents 89(76.1%) either agreed or strongly agreed that destruction of vegetation and farmlands drives farmers from sustainable livelihood to rather an alternative income generating businesses, 27(23.0%) of the respondents thought differently, whilst 1(0.9%) of the respondents was indecisive. This assertion suggests that ASM deprives the soil of its fertility which in turn allows farmers in the Mpohor District to divert into other businesses in order to earn a living. In support of this, a Key informant No. 5 pointed out that:

Since most of the people living in places where ASM goes on are farmers and the action leads to the depletion of the land, the inhabitants' resort to other businesses they seem to be lucrative since their productivity has reduced.

Another Key informant commented:

Most of the farmers within the ASM communities work as labourers at those mining sites because their lands are depleted and they have to earn a living (Key informant No. 2).

Key informant argued that:

How can we the farmers survive? Our farmlands have been ravaged by these Chinese involved in ASM which in turn have affected our income which make us migrate to other towns in order to earn a living. A lot of farmers within my area have diverted into other businesses as a

result of the mining activities going on in my area.

This finding connotes with Hayes and Wagner, who concluded that the destruction of vegetation and farmlands by miners affect food security and also drives farmers from sustainable livelihood to rather an alternative income generating businesses [40].

Additionally, majority of the respondents, 79(67.5%) either agreed or strongly agreed that unregulated mining removes the vegetation containing important species supporting mans' survival, 38(32.5%) either disagreed or strongly disagreed to the statement whilst none of the respondent was indecisive opining that ASM leads to the extinction of soil fauna and other important species that man depends on for his living. To buttress this, Key informant No. 6 purported that:

The manner in which ASM miners carry out their activities result in the removal of vegetation and soil fauna.

Another Key informant also commented that:

Most of the lands used in ASM are vegetation which consists of several species that supports man but the action leads to all sorts of vegetation loss which affects man (Key informant No. 1).

The finding corroborates with Tom-Dery's research outcome that mining significantly affected vegetation cover. In the further analysis, it was found that the Simpsons reciprocal diversity index of tree species at mined area was 8.33 as compared to 10.8 for the un-mined area. For shrub species, the Simpsons reciprocal diversity index was 8.33 for the mined areas while that of the unmined was 10.2. Additionally, low mean density of 2.4 individual trees per 100 m² and 5.6 individuals per 100 m² was recorded in the mined and un-mined areas respectively [47]. This implies that, should such activities be left unchecked, the vegetation containing important species supporting mans' survival will go extinct.

Finally, majority of the respondents 93(79.5%) either agreed or strongly agreed that increased clearing of vegetation for mining adversely alter hydrological regimes whilst important soil organisms have been destroyed depriving the soil of organic matter, 20(17.1%) of the participants thought differently whereas 2(1.7%) of them were indecisive. This purports that unregulated ASM activities affect rainfall and depletes the soil. To buttress this, Key informant No. 4 alluded that:

The rainfall pattern within places where ASM goes on has drastically reduced since their activities leads to loss of all vegetation that plays the role of transpiration.

Another Key informant supported that:

Activities of artisanal small-scale miners and the usage of

chemicals such as mercury and other oxides make significant micro-organisms in the soil to go extinct (Key informant No. 5).

This finding is similar to that of Mensah et al., who in their study observed that increased clearing of vegetation for mining areas has adversely altered the hydrological regimes and/or patterns in the Western Region of Ghana. This further leads to important soil organisms have been destroyed and stable soil aggregates disrupted and eventually depriving the soil of organic matter and low levels of macronutrients and soil fertility necessary for plant growth and crop production [46]. The foregoing implies that, unregulated ASM is debilitating against the realization of the desired environmental rights in the Mpohor District in the Western Region of Ghana. This is why HRBA can be brought on board to bridge the gap between theory and practice. HRBA can be employed in realising environmental rights when citizens are given the opportunity to participate in decision making in ASM and its short- and long-term effects on the environment.

In a nutshell, this research calls for the need for incorporating HRBA which deals with participation, accountability and non-discrimination. This would empower people in making concrete decisions that will help protect the environment in a sustainable way. That is the reason why development of cooperation should build capacities of duty-bearers to meet their obligation and right-holders to claim their rights. Human rights-based approach closes up the space between right holders and duty bearers by enhancing the desired linkage of human rights norms. Community members being aware of the effects of ASM would guide individuals to call for the need to protect and preserve the environment for posterity.

5. Conclusions and Recommendations

The extraction of minerals is of numerous benefits to the people in the Mpohor District in the Western Region. In the same vein, extracting minerals in an unlawful manner such as ASM results in various tremendous threats to the environment ranging from depriving it of its nutrients and living it bare leading to erosion. Unregulated ASM activities has led to destruction of most of the farmlands and pollution of the water bodies in the Mpohor District. Due to the rampant activities of unregulated ASM, large forest areas are now cleared and excavated in search of minerals. This has led to the loss of green vegetation and the loss of flora and fauna in the place. Land in areas surrounding ASM mines have been depleted and rendered bare. Unregulated ASM activities have several health implications especially for

those living in the mining communities. The way these ASM miners operate is not in a satisfactory manner they leave mining trenches uncovered and this sometimes injure people.

It was recommended that, stringent measures should be in place and enforced to prevent landowners from leasing their lands out for galamsey. The government can establish small organizations in these areas to notify duty bearers of any landowner leasing a land out so that they can buy and invest it into a grand agricultural production. In addition, creation of protected areas could be necessary, where areas only designated for agricultural purpose are available to ensure the continuity of cash and food crop production which not only ensures the livelihood of the local people but brings revenue to the country. In the same way, these protected areas will ensure sustainability of biodiversity.

References

- [1] Moorthy, K. K., Babu, S. S., & Satheesh, S. K. (2009). *Climate implications of atmospheric aerosols and trace gases*. Tudor Rose: WMO.
- [2] Environmental Sanitation Policy (2010). Ministry of Local Government and Rural Development, Ghana.
- [3] Hayward, T. (2005). *Constitutional environmental rights*. Oxford: Oxford University Press.
- [4] Ostergren, R. C., & Le Bosse, M. (2011). *The Europeans: A geography of people, culture, and environment*. New York: The Guilford Press.
- [5] Martinez, A. J. (2002). *The environmentalism of the poor: A study of ecological conflicts and valuation*. Edward: Elgar Publishing.
- [6] Roe, A., & Samuel, J. (2007). *The challenge of mineral wealth: Using resource endowments to foster sustainable development, Ghana Country Case Study*. International Council on Mining and Metals.
- [7] Forbes Online (2020). *Update: Top 10 gold producing countries*. Retrieved from <https://www.forbes.com/sites/greatspeculations/2021/06/23/updated-top-10-gold-producing-countries/?sh=258bacd62ce2>
- [8] Akabzaa T. (2007). African mining codes, a race to the bottom. *African Agenda*, 7 (3), 62-73.
- [9] Aryee, B. N. A. (2012). Contribution of the minerals and mining sector to national development: Ghana's experiment. *GREAT Insights*, 1 (5), 14-15.
- [10] Amponsah-Tawiah, K., & Dartey-Baah, K. (2011). The mining industry in Ghana: A blessing or a curse. *International Journal of Business and Social Science*, 2, 62-69.
- [11] Universal Declaration of Human Rights (UDHR, 1948). New York: United Nations.
- [12] Constitution of the Republic of Ghana (1992) Retrieved from <https://www.ghanaweb.com/GhanaHomePage/republic/constitution.php>
- [13] Bach, S. J. (2014). *Illegal Chinese gold mining in Amansie West, Ghana - An assessment of its impact and implications*. University of Adger.
- [14] Hiron, M. (2014). Decentralizing natural resource governance in Ghana: Critical reflections on the artisanal and small-scale mining sector. *Futures*, 62, 21-31.
- [15] Sarpong, G. (2016). *Galamsey enterprise: A threat to Ghana's Biodiversity*. Retrieved from <http://lightmagazineafrica.com/2016/09/06/galamseyenterprise-a-threat-to-ghanas-biodiversity.html>
- [16] Abdulai, A. (2017). *Competitive clientelism and the political economy of mining in Ghana*. ESID Working Paper No. 78
- [17] Andrews, N. (2015). Digging for survival and/or justice? The drivers of illegal mining activities in Western Ghana. *Africa Today*. 62(3), 10-29.
- [18] Jonsson, U. (2003). *A Human Rights Approach to development programming*. New York: United Nations Children's Fund.
- [19] Alberto, P. (2018). *Human rights and capacity building*. Cornell Pvt.
- [20] Brysk, A. (2013). *Human rights movements*. Doi: 10.1002/9780470674871.
- [21] Gready, P. (2008). Rights-based approaches to development: What is the value-added? *Development in Practice*. 18. 735-747.
- [22] Alkstal, E. (2017). *Doing development right: The Rights Based Approach - A comparative case study on NGO Accountability*. Södertörn University.
- [23] Kumah, A. (2006). Sustainability and gold mining in the developing world. *Journal of Cleaner Production*. 14. 315-323.
- [24] Gready, P., & Vandenhole, W. (2014). Failures and successes of human rights-based approaches to development: Towards a change perspective. *Nordic Journal of Human Rights*, 32(4), 291-311.
- [25] Zerkina N., Kostina N., & Pesina S. (2015). *Concept of human rights and its cognitive, discursive, contextual and historical characteristics*. doi: 10.1016/j.sbspro.2015.06.073.
- [26] Hunter, D., Salzman, J., & Zaelke, D. (2002). *International environmental law and policy*. New York: Foundation Press.
- [27] Baidoo, M. (2018). Impacts of mining on indigenous population. *Journal of Environment and Sustainable Development*, 17(9), 23-42.
- [28] Agbesi, K. M. (2017). *Galamsey menace: Causes, effects and solutions*. Retrieved from: <https://www.ghanaweb.com/GhanaHomePage/features/Galamsey-menace-Causes-effects-and-solutions/>
- [29] Botchwey, G., Crawford, G., Loubere, N., & Lu, J. (2008). *South-south labour migration and the impact of the informal China-Ghana gold rush*. UNU-WIDER 2018 Working Paper 2018/16.
- [30] Afriyie, K., Ganle, K. J., & Adomako, A. A. J. (2016). The good in evil: A discourse analysis of the galamsey industry in Ghana. *Oxford Development Studies*, 44, 493-508.

- [31] Odoom, I. (2016). *Beyond fuelling the dragon: Locating African agency in Africa-China relations*. Unpublished Ph.D. Thesis, University of Alberta, Edmonton, AB, Canada.
- [32] Tschakert, P. (2009). Digging deep for justice: A radical re-imagination of the artisanal gold mining sector in Ghana. *Antipode*, 41 (4), 706-740.
- [33] Hilson, G. (2001). The environmental impact of small-scale gold mining in Ghana: Identifying problems and possible solutions. *Geogr. J.*, 168, 57-72.
- [34] Greenwood, J. N., & Edwards, J. M. B. (1979). *Human environments and natural systems*. California: Duxbury Press.
- [35] Charis, D. D. (1994). *Environmental science-action for sustainable future*. Redwood City, California: The Benjamin/Cummings Publishing Company Inc.
- [36] Nyame, F. K., & Grant J. A. (2014). The political economy of transitory mining in Ghana: Understanding the trajectories, triumphs, and tribulations of artisanal and small-scale operators, *The Extractive Industries and Society*, 10 (11), 10-40.
- [37] Banchirigah, S. (2008). Challenges with eradicating illegal mining in Ghana: A perspective from the grassroots. *Resources Policy*, 33, 29-38.
- [38] Hilson, G., & Garforth C. (2012). Agricultural poverty and the expansion of artisanal mining in sub-Saharan Africa: Experiences from Southwest Mali and Southeast Ghana. *Population Research Policy Review*, 31, 435-464.
- [39] Ontoyin, J., & Agyemang, I. (2014). Environmental and rural livelihoods implications of small-scale gold mining in Talensi-Nabdam Districts in Northern Ghana. *Journal of Geography and Regional Planning*, 7, 150-159.
- [40] Hayes, K., & Wagner, F. (2008). *Artisanal and small-scale mining and livelihoods in Africa*. Retrieved from http://www.pactworld.org/galleries/defaultfile/CFC_Paper_ASM_Livelihoods_in_Africa-FINAL.pdf
- [41] Jaiye, D. (2013). The environmental implication of illegal mining activities in Nigeria: A case study of Pandogari and Barkin Ladi/Buruku surface mines in Niger/Plateau states. *IOSR Journal of Humanities and Social. Sciences.*, 13, 13-19.
- [42] Lausch, A., & Herzog, F. (2002). *Applicability of landscape metrics for the monitoring of landscape change: Issues of scale, resolution and interpretability*. Doi: 10.1016/S1470-160X(02)00053-5.
- [43] Sahu, B. H. & Dash, S. (2011). *Land degradation due to mining in India and its mitigation measures*. Singapore: IACSIT Press.
- [44] Boadi, S., Nsor, C., & Osei O. A., & Acquah, E. (2016). An analysis of illegal mining on the Offin shelterbelt forest reserve, Ghana: Implications on community livelihood. *Journal of Sustainable Mining*, 15, 10-19.
- [45] Mancini, L., & Sala, S. (2018). Social impact assessment in the mining sector: Review and comparison of indicators frameworks. *Resour. Pol.*, 57, 98-111
- [46] Mensah, K. A., Mahiri1, I. O., Owusu O., Mireku, O. D., Wireko I., Kissi E. A. (2015). Environmental impacts of mining: A study of mining communities in Ghana. *Appl. Ecol. Environ. Sci.*, 3 (3), 81-94.
- [47] Tom-Dery, D. (2012). *Effect of illegal small-scale mining operations on vegetation cover of arid Northern Ghana*. Retrieved from <https://www.semanticscholar.org/paper/Effect-of-Illegal-Small-Scale-Mining-Operations-on-Tom-Dery/00f361113e4>
- [48] Sanborn, A. C., & Yong, A. (2013). *Peru's economic boom and the Asian connection*. Universidad del Pacifico: Centre of Investigation.
- [49] Djurfeldt, G., Holmen H., Jirstrom, M., & Larsson, R. (2005). *The African food crisis: lesson from the Asian Green revolution*. New Delhi: McMillan.
- [50] Iddirisu, A. Y., & Tsikata, F. S. (1998). *Mining sector development and environment project: Regulatory framework study to assist small scale miners*. Accra: Minerals Commission Board.
- [51] Corral, M. D., & Earle, J. L. (2009). (Editors). *Gold mining: Formation and resource estimation, economics and environmental impact*. New York: Nova Science Publishers Inc.
- [52] Boateng, O. D., Codjoe, Y. N. F., & Ofori, J. (2014). Impact of illegal small-scale mining (galamsey) on cocoa production in Atiwa District of Ghana. *IJAAR.*, 2, 89-99.
- [53] Amankwah, E. (2013). Impact of illegal mining on water resources for domestic and irrigation purposes. *ARPJ Journal of Earth Sciences*, 2, 117-121.
- [54] Yunana, A. M., & Banta, A. L., (2014). Socio-economic effects of illegal mining. *International Journal of Humanities and Social Science*, 3 (3), 276-282.
- [55] Conant, J., & Fadem, P. (2008). *A community guide to environmental health*. Retrieved from https://org/prod/Community_Guide_to_Environmental_Health.html
- [56] Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods*. London: Sage Publications.
- [57] Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm. *Research Journal of Mixed Methods Research*, 14 (5), 39-52.
- [58] Hammond, M., & Wellington, J. (2013). *Research methods the key concepts*. New York: Routledge.
- [59] Yin, R. K. (2011). *Qualitative research from start to finish*. New York & London: The Guildford Press.
- [60] Johnson, B., & Christiansen, B. (2012). *Educational research: Quantitative, qualitative and mixed approaches*. Los Angeles: Sage Publications.
- [61] Kothari, C. R. (2008). *Research methodology: Methods and techniques* (2nd ed.). New Delhi: New Age International (P). Limited.
- [62] Braun, V., & Clarke, V. (2006). *Qualitative research in psychology: Using thematic analysis in psychology*. London: Routledge Inc.