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THE MINING INDUSTRY IN ZIMBABWE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Abstract:
Mining plays a key role in Zimbabwe's economy, contributing 5% and 23% to the country's gross domestic (GDP) and total exports, respectively. It also generates foreign currency and supplies raw materials to some industries. As a 'robber' industry, it extracts minerals from the earth without replacing them. It also creates deep shafts and ugly pits which damage the landscape. In addition it causes environmental pollution and is a threat to the tranquillity of the natural environment. Based on information that was collected in August 2017, this paper discusses various aspects of the mining industry. These include Zimbabwe's mining legislation, environmental impacts of the mining industry at global level, in the SADC region and in Zimbabwe. Problems which confront the industry as well as their possible solutions in Zimbabwe are also examined. From a sustainable development (SD) point of view, mining poses a serious danger which should be addressed at both local and national levels. Since the early years of independence (1980-1984), several Zimbabwean mines have closed down either due to mineral depletion or dis-investment. Some of them have turned into ghost towns which have led to the decay of infrastructure. Little or nothing has been done to avert this crisis. Those mines which are still operational cause immense pollution to the natural environment thereby threatening SD at the national level. However, solutions to avert this crisis are hard to come by. Currently, there is a need to promote environmental education (EE) and education for sustainable development (ESD) at the national level. In this context, efforts should be directed at the establishment of EE centres throughout Zimbabwe as is the case in South Africa.

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1. Introduction

One of the major sources of revenue in Zimbabwe is the mining sector (Munowenyu, 1996). The country has over forty minerals which include: gold, diamonds, platinum, chrome, asbestos, coal and iron ore. Mining operations date back to the colonial era. One of the major reasons for colonialism was the dream of a land of gold across the Limpopo River (Bulpin, 1968). Although this dream was never realized, soon numerous mines emerged throughout the country. Some of the mines evolved into urban settlements which have survived up to the present day. Examples include: Zvishavane (formerly Shabani), Shurugwi (formerly Selukwe) and Hwange (formerly Wankie). Others eventually closed down due to mineral depletion and dis-investment. Examples are: Kamativi, Mhangura and Vanguard which have turned into ghost towns (The Financial Gazette, 2017).

Mining operations in Zimbabwe are governed by the Mines and Minerals Act (CAP 21:05) of 1996. The Act dates back to the colonial Act of 1961 which has been revised numerous times. The closure of Mashava and Zvishavane asbestos mines has led Zimbabwe to the importation of 200 000 tonnes of asbestos fiber from Canada and Brazil every month (ZTV Morning News, Saturday 30/09/2017). In order to save foreign currency there is a need to revive production at these two mines since the mineral has not yet been depleted. The re-opening of these mines would provide employment to thousands of people as well as saving foreign currency. It would also boost the country's economy.

2. Research Methods

Two methods of data collection were used in this study. They included secondary and primary sources of information. Secondary sources included literature reviews which focused on textbooks, journals, newspapers and government documents. Literature reviews provided a theoretical foundation for the study. This was followed by the administration of questionnaires which were targeted at the Ministry of Mines and Mining Development in August 2017. It was targeted at key officials in the Ministry within Masvingo City. The resultant data was analyzed and it yielded the views which are expressed in this paper.

3. Challenges of Mining at the Global Level

According to Miller (1994), mining in the USA is governed by a law which was passed in1872. The aim of the law was to encourage the mining of gold, silver, lead, uranium and other rock minerals on public land. The law sought to encourage the rapid development of the western frontier. Under this law, any person or organization can assume legal ownership of any public land not classified as wilderness or park simply by patenting it. This involves declaring their belief that the land has valuable rock minerals. The person should spend $500.00 to improve the land for mineral development, filing a claim before paying the federal government between $6 and $12 per hectare.

Mines in the USA tend to ravage the land and dump toxic chemicals without having to reclaim the damaged environment. Some old mines in the USA have huge holes, scarred hillsides, piles of tailings and waste rock and water polluted with acids, cyanide, arsenic and mercury. The US government pays between $11 and $50 billion for cleanup operations. Although environmentalists have tried to appeal for the repeal of the law, they have not registered any success. Those who oppose them claim that the repeal of the law would push investors out of the USA. Countries which lack mineral resources such as Japan have to buy or trade for them if they don't wish to live in poverty.

On the other hand, countries which have the resources such as the USA have to subsidize their development even though such subsidies promote waste, environmental degradation and more rapid resource depletion. At the global level, there is a need to manage these finite resources more efficiently through reduced use, re-use and recycling.

4. Environmental Impacts Of Mining At The Global Level

At the global level, mining and processing minerals are among the most damaging of all human activities. Every year some 27 billion metric tonnes of minerals and overburden are taken from the earth's crust. The mining industry uses between 5 and 10% of energy thereby making it one of the major contributors of air and water pollution and of greenhouse gases. The exploitation of low-grade minerals causes more damage to the environment than high grade ores. In the USA mining procedures have at least six times more solid waste than all municipal garbage. These mining wastes often contain hazardous substances. The reclamation of damaged areas lies with the US government. However, in less developing countries, the situation is far worse. Some of

the negative impacts of the mining industry include: denuded forests, gouged land, soil erosion, dammed rivers, flooded land, displaced and poisoned indigenous peoples. A case in point is the smelting of copper and other non-ferrous metals which account for about 8% of human related emissions of sulphur every year. As a result, '*dead zones*' are found around the Sudbury (Ohio), the nickel shelter in Canada, the Copper Hill Smelter (Tenessee) and the Severonikel Smelter (Russia).

5. The Search for New Mineral Deposits

Since currently known deposits get depleted, the world should seek for new ones. Scientists believe that Antarctica contains large mineral deposits. However, the exploitation of minerals in this harsh environment may prove too costly (Miller, 1994). Some environmentalists believe that Antarctica should be protected against human interference. Being the coldest, driest, windiest, iciest, and most remote of the Earth's seven continents, it regulates the global climate and sea level. During winter parts of the sea freezes and the continent doubles in size. In summer, the continent shrinks when huge icebergs break off. This frozen continent draws heat out of the tropics and sends cold air and water northwards. Its cold waters drive the ocean circulation. Another possible new source of minerals is likely to be found in developing countries. Technological advances have the potential to improve mining operations. For example in 1900, the average copper mined in the USA was about 5% by copper weight. Today the figure has dropped to 0.4% and copper now costs much less. On the other hand technological improvements have increased world copper reserves by 500% between 1950 and 1980. Future advances may lead to the use of even lower-grade ores of some metals.

Several factors restrict the use of lower grade ores. It costs more to mine and process such minerals than they are worth. Since large amounts of water are necessary to extract and process minerals, the availability of fresh water is a major factor in the exploitation of mineral resources. Another important factor is the environmental cost involved. At some point, the costs of land reclamation and pollution can outweigh the current value of the mineral. The ocean is another possible source of mineral exploitation. However, the only minerals that can be mined in the sea are: magnesium, bromine and sodium chloride. Such minerals are abundant enough to be exploited profitably at present prices and with current technology. Continental shelf deposits and placer deposits provide significant sources of sand, gravel, phosphates and other minerals. On the other hand, off-shore wells supply large amounts of oil and natural gas.

Scientists also believe that the deep ocean floor may be a future source of manganese and other metals such as nickel, copper and cobalt. These metals may be sucked up from the ocean floor by pipe or scooped up from the ocean floor by a continuous cable with buckets to a ship. However, most of these deposits occur in international waters. Their developments have been postponed indefinitely because of squabbles over who owns them. The USA is notorious for environmental degradation. For example, most mining is piled near mine sites. This pollutes the air, surface water, and ground water. The US Congress has exempted mining wastes from regulation as a hazardous waste. In the less developed countries, there is even less regulation of mining procedures and wastes.

6. Challenges of Mining in the SADC Region

Mining and mineral processing are major sources of pollution within the SADC region (Chenje and Johnson, 1994). Rock and soil from mining operations is piled up in dumps which can build artificial hills. Examples are those in Mashava and Zvishavane asbestos mines. During the rain season, surface water drains the dumps carrying pollutants to agricultural land and drinking water supplies. Coal mines often cause serious air pollution. This is because coal wastes contain considerable amounts of combustible materials which can actually ignite spontaneously spreading poisonous particles and noxious gases. Dis-used gold dumps can burn for many years without being extinguished. This problem has occurred at Grootpan in South Africa and at the Maamba colliery in Zambia.

Asbestos mines pose a serious health risk to their workers. People who use asbestos products and those in the transport industry are also exposed to asbestos fibers. The same applies to those who live near asbestos mine dumps. Asbestos mine dumps are a major threat in South Africa, Swaziland and Zimbabwe. When uranium is milled for use in power plants only about 15% of the radioactivity is removed. The rest is discarded as tailings. At Rossing Uranium Mine in Namibia, radioactive dust from tailings is controlled through the application of large amounts of water and spreading natural non-radioactive material on top. The covering has to reach a depth of 30cm, which is expected to reduce the radiation emitted by about one-third. Large doses of radiation from artificial sources such as uranium dump sites are extremely hazardous to the environment and human health.

On the other hand, acidic drainage from arsenic tailings derived from gold mines at Barberton, South Africa near Swaziland has polluted nearby surface waters. Such pollutants cause weaknesses including skin lesions and skin cancers in humans. In

Zimbabwe during the 1990s two gold-roasters in Zimbabwe, one near Kadoma and another in Kwekwe, emitted about 40 tonnes of arsenic daily, although ways were underway to reduce it (Chenje and Johnson, 1994).

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7. Zimbabwe's Mining Legislation and the Quest for SD

As mentioned previously, mining operations in Zimbabwe are governed by the Mines and Minerals Act (CAP 21:05) of 1996. The Act works hand-in-hand with the Environmental Management Agency Act (CAP 20:27 Number 13) of 2002. This Act led to the formation of an Environmental Management Agency (EMA) in 2007 (Chimhowu, Manjengwa and Feresu, 2010). In general, both the Mines and Minerals Act (CAP 21:05) and EMA are geared to the promotion of SD in all their activities. The main functions of EMA include:

a) To formulate quality standards on air, water, soil, noise, vibration, radiation, and waste management.
b) To assist and participate in any matter pertaining to the management of the environment; and in particular-
    (i) To develop guidelines for the preparation of the National Plan, environmental management plans and local environmental action plans;
    (ii) To regulate and monitor the collection, disposal, treatment and re-cycling of waste;
    (iii) To regulate and ,monitor the discharge or emission of any pollutant or hazardous substance into the environment;

(iv) To keep records in the form of registers of all licenses and permits issued under the Act;
(v) To regulate and monitor the control of invasive alien species;
(vi) To regulate, monitor, review and approve environmental impact assessments;
(vii) To regulate and monitor the management and utilization of ecologically fragile ecosystems;
(viii) To regulate and monitor access by any person to the biological and genetic resources of Zimbabwe;
(ix) To recommend to the Minister the formulation of any regulations pertaining to the provisions of this Act, and
(x) To carry out any other duties and functions as directed by the Minister.

The Mines and Minerals Act (CAP 21:05) of 1996 states the procedures to be followed by a potential prospector. These include:

a) If the land is a portion of town lands, he shall give notice in writing by registered letter addressed to the local authority concerned;
b) If the land is occupied private land, he shall give notice in writing to the occupier of the land in person or by registered letter addressed to the occupier at his ordinary postal address;
c) If the land is unoccupied private land, he shall give notice in writing by registered letter addressed to the owner at his ordinary postal address
d) If the land has been declared a demarcated forest, he shall give notice in writing to the chief executive officer of the Forestry Commission established under the Forestry Act (CAP 19:05);
e) If the land has been declared a protected private forest, he shall give notice in writing to the owner of such land in person or by registered letter addressed to the owner at his ordinary postal address or if such land is unoccupied, to the mining commissioner;
f) If the land is in Communal Land, he shall give notice in writing to any rural district council established for the area concerned.

Since environmental impact assessments (EIAs) are mandatory in Zimbabwe, no mining operations can begin without an approved EIA certificate. The aim of this regulation is to promote SD in all development activities in the country. However, in spite of this regulation, illegal gold panners conduct their business without permission. Such actions are a threat to SD at the national level.

8. The Economic Benefits of Mining in Zimbabwe

Mining provides numerous benefits to the Zimbabwean economy. One of them is foreign currency. According to Chiwota and Hauge (1996), it contributes 5% and 23% to the country's gross domestic product (GDP) and total exports, respectively. Metals such as gold have earned the country millions of dollars since the colonial era. This money has been used for further development in the country. Secondly, mining creates numerous employment opportunities in the country. For example, in 1986 it employed some 55 100 people (Munowenyu, 1996). Additionally, more people were employed indirectly in other activities such as factories, shops and hospitals. As mentioned later, mining leads to the development of infrastructure such as transport and communication networks in remote areas. For example, most of the rail network was constructed during the colonial era in order to transport minerals. Later on other economic activities also took advantage of the network. Examples include the transportation of agricultural products from surrounding farms. Passengers also used rail transport for transportation from one place to another.

Mining activities create markets for various sectors of the economy. Mines supply industries with the necessary raw materials. For example, Buchwa Mine in Mberengwa used to supply the Zimbabwe Iron and Steel Corporation (ZISCO) with the much-needed iron ore while Hwange provided coal for the blast furnace. Mining operations also lead to the creation of urban settlements. As noted later numerous mines in Zimbabwe have evolved into urban settlements since the colonial era. Although some of them later closed down and became ghost towns, the role of the mining industry in the urbanization process in Zimbabwe is un-questionable. In addition, mining promotes international trade thereby contributing to the gross national product (GNP). However, in spite of the above benefits the mining industry has caused numerous negative impacts on the environments as the next section seeks to show.

9. Impacts of Mining on Sustainable Development in Zimbabwe

Sustainable development dates back to 1987 when the Brundtland Commission Report was published (WCED, 1991). SD refers to a form of development, which seeks to meet the '*needs of the present without compromising the ability of future generations to meet their own needs*' (WCED, 1991: 8). SD has at least three dimensions, namely ecological, economic and social (Moffat, 1992). While ecological SD focuses on the biophysical aspects of the environment, the economic dimension deals with issues of production

and profitability. On the other hand, social SD addresses such issues as: poverty, inequality and injustice, which prevail in some societies.

According to recent research findings, mining has the potential to employ 45 000 people in Zimbabwe (*The Financial Gazette*, 12 September, 2017). It also contributes millions of dollars to the country's gross domestic product (GDP). As mentioned previously it provides raw materials to some industries. Mining has also contributed in the development of road and rail infrastructure in Zimbabwe. However, the mining industry is notorious for the generation of a lot of waste materials which pollute the environment. For example, the use of mercury in gold mining pollutes rivers and other sources of fresh water. Mining operations also pollute the atmosphere and the surrounding vegetation. For example, before the closure of Buchwa Mine, clouds of dust polluted the surrounding areas, vegetation and houses giving them a brownish color. Gold panning by members of the informal sector leads to the siltation of major rivers such as the Save, Runde and Ngezi Rivers. In addition, mine explosions pose noise pollution to surrounding communities. Finally, mining operations destroy some habitats leading to the migration of some wild animals and the disappearance of some plant species.

The mining industry generates a lot of waste materials which pollute the environment (Chenje and Johnson, 1994). Mining operations pollute the atmosphere and the surrounding vegetation. As mentioned before, gold panning has led to the siltation of major rivers and dams in the country. The generation of noise pollution poses danger to some citizens (Mapira, 2014a). Mines also create ugly and dangerous environments through pits and shafts which threaten human beings, livestock and wildlife. They also damage the aesthetic quality of the land. In the past some mines have closed down without carrying out the necessary reclamation of former mine environments. A good example is that of Buchwa Mine in Mberengwa (Mapira and Zhou, 2006). For this reason, the consequences of mining often leave an un-forgettable footprint on the environment.

In order to ensure the sustainable exploitation of minerals, several actions can be taken in the country. For example, the use of mercury in gold mining operations should be discouraged. Alternative methods of gold extraction should be found. Gold panning has been a threat to many rivers in Zimbabwe. This is due to the lack of mechanisms to control the operations of informal gold panners. In areas where mine explosions are rampant, members of the surrounding communities should be provided with ear protectors in order to save them from experiencing ear damage. Before mines close down ugly pits and mine shafts should be closed as a form of environmental reclamation. Before Buchwa Mine closed down in 1996 plans were underway to reclaim

damaged environments. However, this was never done and the problem of damaged environs has remained up to the present day.

10. Challenges Confronting the Mining Industry in Zimbabwe

Several challenges have confronted the mining industry in Zimbabwe. For example, the problem of dis-investment by transnational corporations (TNCs) in the early 1980s resulted in the closure of some mines leading to the emergence of ghost towns. Examples include Kamativi Tin Mine, Vanguard (asbestos), and Mhangura (copper). Mine closures have also led to massive unemployment and destitution especially among former mine workers from neighboring countries such as Malawi and Mozambique. Mine closures have also led to the decay of infrastructure and abandoned buildings. In an effort to solve this problem the Zimbabwean government turned Buchwa Mine into a police camp in 1997 (Mapira and Zhou, 2006).

Another challenge is that of accidents which occur at the working place. Examples are: rock falls, collapsing shafts and gas explosions underground. A case in point is the Hwange Mine Disaster on the 6th of June in 1972 which claimed over 400 miners (*ZTV, Evening News* 12 September, 2017). A further challenge is that of outdated equipment and shortage of foreign currency to import modern machinery. Other challenges confronting the mining industry include political uncertainty which undermines investments into the industry. A good example is the indigenization policy in Zimbabwe which tends to discourage foreign investors. Since native Zimbabweans lack the necessary capital, little or no investment is likely to occur in the country. This explains why ZISCO closed down and efforts to revive it have been fruitless. Credible investors are hesitant due to the country's glaring political risks.

Another problem is that of erratic power supply. Zimbabwe lacks adequate power for industrial growth. Since it relies heavily on imported power, occasionally industries are subjected to load shedding, a scenario which undermines production at the workplace. Unless this issue is addressed, industrial operations in the country remain under threat. Zimbabwe is a land-locked country with no direct access to the sea. Consequently, it relies on its neighbors for the transportation of its products to over-seas markets. The problem is compounded by an outdated and inefficient rail transport system. However, the government is looking for investors to revitalize the system. Due to outdated equipment, there is a rise in the cost of production in the country. There are also constraints in the supply of services.

The lack of liquidity in the financial sector is another challenge. This is compounded by difficulties in raising long-term capital investment. Zimbabwe's

relations with western donor countries such as Britain and the USA have remained poor for several decades. There is a need to mend such relations if investments have to be revived. Due to the above challenges, Zimbabwe remains an un-attractive destination for most foreign investors. Since investors have a choice, they re-direct their investments elsewhere. Consequently, although the mining sector is the government's main source of revenue, little or no investment is taking place in the country. Although mining has the potential to employ thousands of people and 78 260 jobs in the industries that either supply goods and services to the mining sector or use mining products from down-stream value addition (*The Financial Gazette*, 2017), this dream is unlikely to be realized in the short term.

11. Environmental Education in Zimbabwe's Mining Sector

Environmental education (EE) dates back to 1948 when the term was coined in Paris (France). EE refers to a form of education that is geared at promoting sustainable natural resource conservation among members of the public (Palmer, 1998). The aim of EE is to develop knowledge in response to emerging environmental problems such as: global warming, climate change, desertification, air and water pollution (Fien, 1993). It has evolved to become a major subject or discipline in some schools, colleges, and universities. Its growing popularity is due to the realization that the Earth is under increasing stress due to human activities which date back to the Industrial Revolution of the 19th century. ESD on the other hand, has emerged in recent decades to refer to a new type of education, which marries the older concept of EE to the relatively new one, SD (SADC Report, 2006).

Although EE has always been geared towards the achievement of SD, during the last three decades this link has been popularized, adding a new zeal. Mining seeks to achieve several goals, including: promoting the sustainable exploitation of minerals in the country, encouraging the prudent management of mining environments for the benefit of present and future generations, conducting inspections so as to ensure that mines comply with statutory regulations that govern mining operations, provision of explosives, permits and licenses to mines, and encouraging the dissemination of EE/ESD in all mines and mining environments. Some of the mines in the country are listed in the table below (Table 1).

Table 1: Some of the existing mines in Zimbabwe

Name of Mine	Mineral extracted
Renco	Gold
Mimosa	Platinum
Murowa	Diamonds
Bikita Minerals	Lithium
Sandawana	Emeralds
Mashava and Shabanie	Asbestos
Sabi	Gold
Zialndia	Gold
Three Gem	Gold
Dorowa	Phosphate

Source: Field Survey

The main activities of the ministry are: mine visits and inspections, promoting safety at all mines, providing mines and prospectors with legal documents such as licenses, rendering technical and environmental advice to miners, registering of mines and mine claims, resolving disputes among miners and other stakeholders, and encouraging individual mines to provide EE/ESD to their workers and surrounding communities. Examples of mines which are involved in the provision of EE/ESD are: Bikita Minerals, Mimosa and Murowa. Apart from distributing EE literature, they also encourage surrounding communities to form environmental clubs. However, other mines have not done much to improve the plight of their surrounding communities due to resource constraints. Murowa has gone further to electrify neighboring schools, shopping centers and clinics thereby reducing dependency on wood fuel. A major problem of Zimbabwean mines is the lack of EE/ESD literature. This is not surprising as the country does not have EE centres where literature can be obtained.

Although the above activities bear some aspects of EE (such as literature distribution), they are mainly geared at environmental management/protection and should not be mistaken for EE/ESD (Ketlhoilwe, 2007). It should be remembered that the main goal of EE/ESD is to enable communities to develop a sense of environmental stewardship at local, national and global levels. Possible solutions that were suggested by the Ministry of Mines and Mining Development in the dissemination of EE/ESD include: the provision of literature to some mines and their surrounding communities, electrification of all mines, developing environmentally friendly communities through the dissemination of EE/ESD, and using stiffer penalties for environmental crimes such as deforestation and gold panning.

The mining industry is valued for its contribution to the economy and for employing thousands of people. Consequently, government is in a dilemma. Forcing all

mines to implement its policies would result in the closure of those that cannot afford to do so. However, to allow the situation to go on un-checked has disastrous environmental effects. Some studies have shown that since Zimbabwe is desperate for investors, any attempt to be strict on environmental compliance issues is likely to scare them away (Chiwota and Hauge, 1996). Consequently, the country has tended to play down on environmental compliance in a bid to attract potential investors. That is why the implementation of EIAs has not always been consistent in the country since 2000 (Mapira, 2014b). Obviously, this has negative effects on the implementation of government programmes such as EE/ESD. However, this problem is not peculiar to Zimbabwe as it has been reported elsewhere in the developing world (Miller, 1994).

12. Possible Solutions to the Problems

Several solutions can be suggested for the problems confronting the mining industry. Firstly, gold panning should be controlled so as to avoid environmental degradation. Many rivers and dams have been silted in Zimbabwe through this human activity. Since the country now imports asbestos fiber from abroad, Mashava and Zvishavane Mines should be re-opened so as to save foreign currency as well as creating employment opportunities for thousands of citizens. Environmental impact assessments should also be intensified in order to avoid environmental degradation of the mining industry at national level. On the other hand, the use of mercury in the processing of gold should be avoided as it is a threat to rivers, dams and other fresh water sources.

In addition, efforts should be directed at rehabilitating damaged environments. For example, some ghost towns should be reclaimed so that the decay of infrastructure can be halted. A good example is that of Buchwa Mine in Mberengwa which was transformed into a police camp in 1997 as mentioned previously. Many of the houses have been re-occupied. Furthermore, EMA should be fully-staffed and resourced so that it can play its role as an environmental watch dog agency more effectively. In the past the agency has failed to reach remote areas due to the lack of vehicles, manpower and spare parts (Mapira 2014b). For this reason, Zimbabwe has been accused of lacking political will when it comes to environmental issues (Lopes, 1996).

As a developing country, Zimbabwe often exports semi-processed minerals to the outside world. However, in order to reap greater financial benefits, the country should produce finished products which earn more revenue. This would boost the country's manufacturing sector with a positive impact on the national economy. That is why a diamond cutting and polishing plant has recently been opened in Harare. This

would also create numerous jobs for the citizens thereby reducing the rate of un-employment at national level. Finally, there is a need for EE/ESD to be implemented in all mines throughout the country. In addition, following the South African example, EE centres should also be established throughout the country in order to provide literature to those who need it.

13. Conclusion

This paper has examined Zimbabwe's mining industry in the context of sustainable development. It began by examining the global and regional contexts of the mining industry before looking at the country's legislation and its challenges on sustainable development. It noted that gold panning is a major threat to the country's rivers and dams which are heavily silted with little or nothing being done by the authorities. It further examined the contribution of the mining industry to the country's economy. It was noted that mining operations contribute a lot to the national economy through the generation of foreign currency, employment creation and infrastructural development.

However, the depletion of minerals coupled with dis-investment has led to the creation of ghost towns in the country. Another issue that was examined was the impact of mining on sustainable development. Environmental degradation in the form of ugly pits and deep mine shafts are some of the challenges noted. Problems confronting the mine sector were also examined towards the end of the paper. They included political considerations, lack of liquidity, lack of power and the country's negative international relations with donor countries such as Britain and the USA. Finally, there is a need for research efforts which should address the challenges which are being faced by the mining industry at national level in trying to implement EE/ESD. Such efforts should be geared towards the discovery of solutions to problems discussed in this paper.

About the Author

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