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Sustainability and gold mining in the developing world

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Abstract

Generally, the gold mining industry has a negative image because it is potentially highly polluting, its costs often externalized on local communities that host its operations. Recently, there has been growing activism in most countries where rich gold deposits exist. Although the industry has many drawbacks, it can potentially confer many benefits, especially for the people of the developing world, by providing employment and foreign exchange. In the context of the mining sustainable development debate, this paper examines the environmental performance of the gold mining industry in developing countries, and its impacts on resident populations and communities.

Keywords: Gold mining; Sustainability; Mining codes; Mining impact; Developing world

1. Introduction: mining and sustainability

In 1987, the Brundtland Commission set out the parameters for sustainable development, which has become a guiding principle for businesses, organizations and governments. In its report, *Our Common Future*, the Commission defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [1]. Although sustainable development has since entered into everyday dialogue, because of the limitations of the Brundtland definition, a number of additional interpretations have emerged [2]. For example, prior to the Rio Summit, the World Wide Fund for Nature (WWF), the World Conservation Union (IUCN), and the United Nations Environment Programme (UNEP) jointly published "Caring for the Earth" in the report *A Strategy for Sustainable Living*, in which sustainable development is defined as "providing the quality of human life while living within the carrying capacity of supporting ecosystems" [3]. In another example, the Development Assistance Committee of the Organization for Economic and Cooperation Development (OECD) asserts that "sustainable development entails balancing the economic, social, and environmental objectives, integrating them through mutually supportive policies, and practices, and trade-offs" [4]. The report emphasizes, among other things, the need to integrate the three pillars of sustainability (environment, economic, and social) into development policymaking. Researchers at the World Bank also maintain that the attempts taken to generate economic growth and development have underestimated the value of the environment [5].

In recent years, the application of sustainable developing in the mining industry has become a subject of considerable debate. The interpretations that have emerged are wide-ranging in scope, with the earliest efforts focusing upon the non-renewable nature of mineral deposits and its implications for society. Herman Daly [6] provided a very useful insight into

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sustainability of non-renewable resources when he observed that:

"Sustainable society must be based on using renewable resources at rates that do not exceed their capacity to renew themselves; using non-renewable resources at rates that do not exceed our capacity to substitute for them; and using no resources at rates that exceed the capacity of the natural world to assimilate or process the wastes associated with their use" [6].

Speaking along similar lines, Mikesell [7] notes that sustainability could be achieved for mineral reserves by saving and reinvesting annually an amount equal to the present value of the annual net revenue obtained from the sale of mineral products.

In sharp contrast, the more recent mining sustainable development literature emphasizes the corporate perspective seeking, specifically, to assess how mines themselves have both interpreted and attempted to put the concept into practice. For example, according to the multinational gold mining company Placer Dome, "sustainability means the design, construction, operation and closure of mines in a manner that respects and responds to the social, environmental and economic needs of the present generations and anticipates those of future generations in the communities and countries where it works" [8]. Similarly, Gibson [9] argues that when the sustainability assessment criterion is applied, "mining may be acceptable where its immediate negative effects are largely corrected through remediation and its socioeconomic benefits are designed to provide a bridge to a more sustainable future for the local community". Hodge [10] echoes these views noting that "if mining is to be considered as contributing towards sustainability, it implies the need to achieve a net environmental and human benefit" [10].

According to Auty [11], "the limited number of people displaced by mining renders the costs of compensation for livelihood disruption and social upheaval small compared with total mine revenues. Most new mines earn sizeable rents. The mining company therefore risks being regarded as greedy by local groups for not paying more". Auty suggests that independent social audits can play a key role in mediation between the mine and the local community. He is of the view that social audits can trace not only the revenue flows and compliance with environmental standards but also the utility of compensatory payments to the community. He furthermore notes that, "transparency over revenue flows are an important antidote to mistrust".

More specific to the present paper, academics and non-governmental organizations have identified several approaches which they claim could make the gold mining industry more sustainable, but how have gold mining companies interpreted the concept of sustainability? Hilson [12] surveyed the world's 20 largest gold mining companies, and indicated that generally, each has taken an active interest in dealing with regards to the environmental impacts of their operations but that socioeconomic and community issues receive less attention. The author identifies the following as some of the environmental and social initiatives undertaken by these companies:

- Drafting of key environmental policies;
- design and implementation of environmental management tools and practices (e.g. audits, EMS, reviews, etc.)
- installation of pollution abatement technology and implementation of environmental management programs (e.g. training and education);
- impact assessment and appraisals;
- financing and construction of community infrastructure;
- development of important community programs;
- contribution to local universities and research units; and
- creation of relationships built on respect and trust.

However, the author notes that only 25% of the companies surveyed incorporated the terms "sustainable development" in their corporate literature, and that only one company in the survey indicated that health, safety and sustainable communities are the most important areas of sustainability [12].

In a similar fashion, KPMG [13] surveyed 50 major mining companies around the world in 2003, and noted that 92% of the companies surveyed included information on sustainability in printed reports and 84% had information on their company websites. Surveyed companies identified the following as drivers for sustainability management and/reporting:

- Economic management from wise energy use;
- meeting societal expectations;
- improving communication;
- transparency;
- maximization of social benefits;
- adherence to international best practice;
- industry leadership; and
- improving business performance.

Table 1 provides a breakdown of the percentage of companies which disclosed information on various aspects of sustainability in their reports.

According to KPMG, of the 22 non-financial reports disclosed by companies, only 27% were independently verified. Finally, the survey showed that most mining companies omit key performance indicators (KPI) such as *resettlement plans* in their environmental reporting [13].

Table 1
Percentage of companies reporting on the various elements of sustainability in their reports

Sustainability information	Percentage
Community issues	100
Healthy and safety	95
Economics	64
Product stewardship/supply chain	55
Social issues	95
Environmental issues	95
Ethics and integrity	59
Security	41

Source: KPMG International [13]. "Mining – a survey of global reporting trends".

In a separate assessment, Hilson and Murck [14] maintain that regulatory frameworks differ significantly throughout the world and therefore, performing in line with legislation does not necessarily translate into sound environmental practice. For instance, the authors cite the developing world as an example of a region where environmental laws are still in their infancy, and where accompanying enforcement programs are far from effective. Thus, in the opinions of the authors, a mine operating in line with, or even beyond, the legislative benchmark, is not necessarily contributing to environmental enhancement or sustainable development [14].

The major environmental and socioeconomic problems caused by gold mining in the developing world include deforestation; acid mine drainage; noise, dust, air and water pollution from arsenic, cyanide and mercury; social disorganization; a loss of livelihoods and mass displacement. These environmental problems are very pronounced in the developing world for reasons already mentioned above; evidence from many developing countries indicates that gold mining companies that fail to address environmental concerns and the needs of communities that host them face opposition. In accordance with these views, this paper interprets a sustainable gold mine as one that meets the needs of present and future generations, and which internalizes the cost of adverse biophysical, economic, and social effects on a community; in the case of developing countries, this often requires going beyond the requirements of legislation. The paper illustrates the paradox with gold mining in developing countries: whilst an increase in gold mine investment is necessary to propel economies, an expansion of operations is often associated with persistent environmental and socioeconomic problems.

The paper is organized as follows. The next section discusses the impacts of the liberalisation policies on the mining sectors of mineral-rich developing economies, with emphasis on the impact of mining codes on economic growth. A case study of Ghana is then presented to illustrate how multinational gold mining corporations have performed in the developing world. The paper concludes with a summary of the discussion and some recommendations.

2. Gold mining in the developing world: a sustainable path?

Many developing countries are endowed with abundant natural resources, and for centuries, have relied immensely on their primary sectors – particularly extractive industries – as a source of wealth and economic growth. Evidence in the literature shows that organized gold mining in Africa dates as far back as the Middle Ages; certain countries, such as Ghana and present-day Mali, were parts of important trans-Saharan gold trading routes. Today, Africa accounts for some 30% of global gold mine output, with South Africa as the world's leading producer [15].

Natural resources have formed the engine of growth for most developed countries, presenting abundant opportunities for diversification of their economies. However, with the exception of Botswana, most have failed to facilitate marked economic growth. Broadly speaking, this has been attributed to a lack of capital to initiate mining projects, institutional instability and poor economic management.

Gold mining projects are capital intensive, and poor countries have relied heavily on foreign direct investments for their financing. Generally, economic and political conditions in a country determine the level of foreign investments. Studies by Otto [16] and the World Bank [17] indicate that security of tenure or contractual stability, right to repatriate profits, access to foreign exchange at market rates, management control, equity control, fixed tax terms, and effective support and monitoring of private mining investment by well-organized government institutions constitute the major issues that determine a company's decision to invest. Therefore, unfavourable business climates and political instability dissuade private sector investment. There is a negative relationship between risks of investments and capital expenditures.

Bohnet [18] argues that if risks are high, then front-end loaders, with shorter useful lives and fewer capital costs are preferred over larger shovels and draglines. In other words, techniques that require low investments may be preferred to techniques that require high capital outlay. For instance, foreign investment in Ghana was very low during the 1970s due to nationalization of most businesses by the military governments. However, institutional and economic reforms introduced under the SAP reversed the decline in investment and poor performance of the minerals sector.

The World Bank studied 51 mining countries in the developing world and concluded that they are economically more viable than other countries in their

regions [19]. However, empirical studies by Sachs and Warmer [20] indicate that the World Banks' assertion is flawed. The Harvard scholars studied 97 developing countries in the period 1970–1989 and observed that resource-poor economies outperformed resource-rich economies in terms of economic growth. This phenomenon is often referred to in the literature as the *Resource Curse*, and raises questions about using the mineral sectors of developing economies as the engines of growth.

The World Bank's rationale for continued support of mining projects in the Third World is poverty alleviation, job creation, infrastructural development, and to put the countries concerned on a sustainable path of economic growth [21]. Clearly, the Bank and the IMF are of the view that mining development is key to economic development and growth in mineral-rich developing economies, but after several years of reforms and liberalisation, how have mineral-rich developing economies performed? Recent empirical studies have shown that huge investments into the mineral sectors of resource-rich developing economies have failed to produce the desired results [21].

The literature shows that mineral-rich Third World Countries have a high incidence of poverty, high levels of corruption, authoritarianism, civil wars, government ineffectiveness, and poor social and environmental performance. The world saw the carnage in Angola, the Democratic Republic of Congo, and Sierra Leone, for instance; the incidents in these countries are testament to the link between mineral resources and deadly civil wars on the African continent [21].

Officials at the World Bank argue that institutional stability, good economic management of revenues from the mining sector, and the management of the sector itself are necessary for the good economic performance of resource-rich countries [22]. Whereas this is true to an extent, many experts believe that the new mining codes and conditions introduced for multinationals under the auspices of reform have been detrimental to the growth of developing economies. The conditions and incentives provided to multinationals include reduced taxation, royalties and other fees; elimination of domestic ownership requirements and restrictions on repatriation of profits; deregulation of commodity markets; and strengthening of investor protections and property rights [23]. The question now raised is whether this has been of benefit or to the detriment of developing countries.

The liberalisation policies have stimulated a massive inflow of direct foreign capital into the extractive industries of developing economies, and resulted in an increase in gold production as depicted in the graphs below. In Fig. 1 for example, between 1970 and 1998, gold production in Ghana fell below 23 metric tons, but after 1991, there was an upsurge in production due to reasons mentioned above. Presently, Ghana is the second largest gold producer in Africa. Fig. 1 also shows an increase in gold production in Mali from 1991 onward. Gold production in Zimbabwe and Tanzania has been very sluggish. However, production in Tanzania is expected to rise because of the development of new mines by Barrick, Anglo Gold, Ashanti Goldfields, and East African Gold Mines. The major gold producing countries in Africa are South Africa, Ghana, Zimbabwe, Tanzania, Guinea, and Mali.

Peru is Latin America's largest gold producer. As shown in Fig. 2, there was an upward trend in Peru's gold production between 1992 and 2001. In Brazil, there was a modest increase in gold production between 1980 and 1990, but following this period, gold production began to decline. There were also modest increases in gold production in both Chile and Columbia between 1980 and 1990. Overall, Mexico and Venezuela have not performed very well; there were only marginal increases in production between 1980 and 2001. High inflation and political instability in Latin America adversely affected the amount of foreign investment attracted to the region and the performance of the extractive industries.

In the case of Asia, as Fig. 3 indicates, Indonesia's gold production during the 1990s was very impressive but comparatively, Kazakhstan, Uzbekistan, and the Philippines did not perform well. Overall, gold production in Asia is on the decline. This can be attributed to decline in exploration, a shift from gold production to base metals, economic downturn, and perceived risks of investments in the region [24].

Although World Bank-endorsed reforms have attracted significant investment into the mineral-rich economies of the developing world, they have also led to an overdependence upon natural resources, much to the detriment of other economic sectors (e.g. manufacturing and services). In Ghana, for instance, the mineral sector has attracted huge investments but has failed to create jobs, provide incentives for value-added processing, promote economic growth, and promote linkages between the mineral sector and the rest of the economy [25]. In fact, according to Campbell [26],

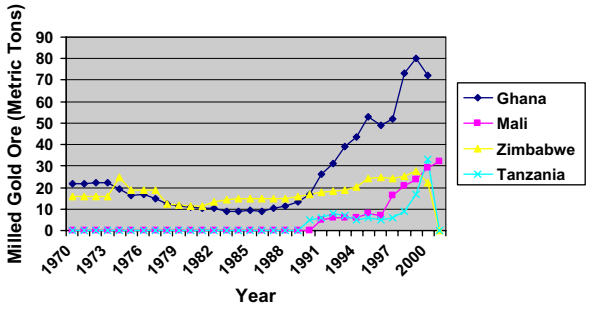

Fig. 1. Gold production in selected African countries, 1970–2000.

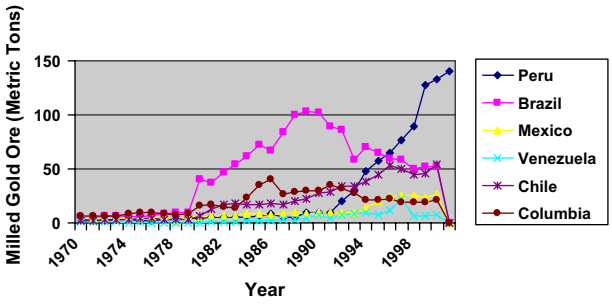

Fig. 2. Gold production in selected Latin American countries, 1970–2000.

Africa's mining codes as a whole undermine growth and development. The authors claim that the new mining policies implemented to attract foreign investment have redefined the role of the state and "have the potential effect of driving down standards in areas of critical importance for social and economic development, as well as in protection of the environment in the countries concerned" [26].

Despite claiming otherwise, it is becoming increasingly apparent that gold mining corporations operating in the developing world have not operated sustainably. The literature highlights the trail of environmental (biophysical, economic, and social) and health problems associated with gold mines in the developing world, many of which have culminated in catastrophes. In 1995, for example, cyanide-laced slurry leaked from a ruptured tailings dam at Guyana's Omai gold mine into the Essequibo River, causing considerable aquatic damages. Four other spills occurred in the same year. Following the spill, local residents developed various ailments, including skin infections, vomiting, diarrhoea, eye irritation, and headaches [27]. Table 2 highlights the history of cyanide spills in the developing world.

The Pan American Health Organization (PAHO) maintains that the gold mining industry is directly responsible for the high levels of air and water pollution by toxic waste, and associated health problems in Latin America and the Caribbean [28].

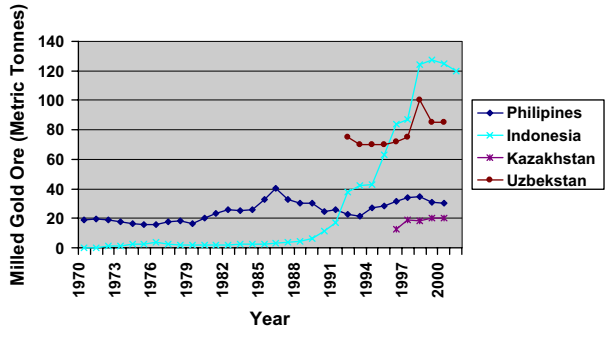

Fig. 3. Gold production in selected Asian Countries, 1970–2000.

Table 2
Chronology of cyanide spills and mine-related accidents in the developing world

Mine/country	Year of occurrence	Impact
Harmony mine, South Africa	February 1994	10 miners killed by cyanide-laced mud.
Omai gold mine, Guyana	August 1995	All aquatic life forms in a creek that runs into the Essquibo were killed.
Kumtor mine, Kyrgyzstan	May 20, 1998	Truck transporting cyanide to Kumtor mine plunged off a bridge, spilling 2 tons of sodium cyanide. Four people died and others checked into hospital. Communities were evacuated or displaced.
Baia Mare, Romania	January 2000	Thousand of tons of fish died in the Tiza and Danube Rivers. Rare Osprey, river otters, fox, birds, and other mammals died from eating cyanide contaminated fish.
Tolukuma mine, Papua New Guinea	March 2000	Dome helicopter of the mining company dropped a crate of 1 tonne of sodium cyanide pellets into water system in the rainforest.
Ghana ■ Bogoso Goldfields 1994 ■ Teberebie Goldfields 1996 ■ Ashanti Goldfields 1998 ■ Goldfields (S.A.) 2001 ■ 2001 – second spill occurred in the same area after 2 weeks	1994–2001	Communities were re-located, waters polluted, there were reported cases of avian mortality, and crops were affected. There were serious health impacts including skin rashes.
Placer Dome tailings disposal, The Philippines	1975–1991	Loss of aquatic life forms in Mogpog River and Calancan Bay.
Grasberg Mine, Indonesia	1996	The spill affected aquatic life forms in Ajkwa River and surrounding communities.

Source: Rainforest Information Centre <http://www.rainforestinfo.org.au/gold/cyanide.htm> and "The mining news".

There has been growing activism and legal conflicts in Indonesia in recent times over the environmental, social, and health impacts of gold mining in the region. In 1996, the Grasberg mine reportedly dispensed over 40 million tons of tailings into the Ajkwa River, posing a major environmental and health risk to the surrounding ecosystem and communities. In its annual report, Freeport acknowledged responsibility in dumping over 125,000 tons of toxic rock waste into the Irian Jaya River daily. Moreover, the company admitted involvement in numerous human rights abuses [29]. For instance, it reportedly paid the Indonesian military

$4.7 million in 2001 and $5.6 million in 2002, and in August of that year, the military killed a mine employee and two Americans working near the mine [30]. Similar human rights abuses have been reported in the gold mining regions of Africa and Latin America, including Yanacocha (Peru) and Victoria Goldfields (Tanzania).

3. Case study: gold mining in Ghana

Mining constitutes the backbone of the Ghanaian economy, providing valuable foreign exchange. In 1997, minerals contributed 612.9 million or 45.48% of Ghana's foreign exchange earnings, and gold accounted for $579.2 million or 95.44% of the value of all mineral export earnings [31]. The macroeconomic reforms implemented under the Structural Adjustment Program in 1983 reversed some two decades of stagnating production in the country's mining sector. The changes made under the Program included:

- Modifications to mining sector legislation to make the sector more conducive to foreign investment;
- increased fiscal liberation of the mining sector;
- privatisation of state mining assets;
- enactment of environmental laws and other mining sector legislative changes; and
- strengthening and reorientation of government support institutions for the mining sector.

These reforms facilitated a massive inflow of investments and a phenomenal growth in the mining sector; since 1983, over US$5 billion has been invested in the Ghanaian mining industry, particularly the gold sector [32].

Notwithstanding the success reforms have had in attracting foreign investment to gold mining, many Ghanaians believe that the industry is not sustainable. More specifically, there is growing consensus that the overall cost of the industry in environmental, economic, and social terms exceeds the benefits it provides to indigenous communities and the Ghanaian economy as a whole. Many critics attribute this to the generous tax breaks now provided to mining companies: corporate income tax was reduced from 45% in 1986 to 35% in 1994; initial capital allowance, which in 1975 was 20% during the first year of production and 15% in subsequent years, was increased in 1986 to 75% in the first year of operation and 50% in subsequent years; the royalty rate, set at 6% of total value of minerals in 1975 was reduced to 3.7%; and other duties and foreign exchange taxes were abolished, and investors are now allowed to retain 25% of their earnings in foreign accounts [33].

In 1995, the total value of minerals as a percentage of national exports stood at 45.48%; however, since 1993, the sector's contribution to GDP has only been 1.5%. Gold accounts for 90% of Ghana's total mineral earnings but of the total earnings accrued from gold exports, only 10% is retained in-country [34]. The Bank of Ghana estimates that 71.2% of the value of all mineral exports is held in offshore accounts [35]. This is evidence that the incentives and tax breaks implemented for mining since the launch of the Structural Adjustment Program has eroded tax revenues and foreign exchange, both of which are necessary for the recovery and growth of the Ghanaian economy. In light of the direct and indirect costs of gold mines on the environment and communities, and these generous incentives and tax breaks, the net impact of gold mining on the Ghanaian economy is miniscule.

Overall, huge investment in the mining sector has not created more jobs for Ghanaians. Due to the capital-intensive nature of surface mining, large-scale mining corporations presently employ only 20,000 indigenous people. An estimated 50% of the country's large-scale mining workforce was retrenched following the privatization of operations in the Tarkwa locality [36]. Low labour absorption rate in the mining communities, coupled with the displacement of farmers and resident small-scale miners, have been the chief causes of major unrest in the mining regions in recent years.

The gold mining industry has also caused its share of environmental problems in Ghana. Notably, there have been cyanide spills and leakages, particularly in the Wassa West Region; between 1994 and 2001, there were five major cyanide spills documented. The first occurred at a mine operated by Bogoso Goldfields Ltd., which contaminated the River Anikoko and River Bodwire. Farmers living in the area were forced to abandon their farms and relocate to other unaffected communities. Subsequently, in June 1996, there was a major spill at a mine operated by Teberebie Goldfields Ltd., causing widespread damage to the River Angonabe and surrounding crops. In 1998, there was another spill at a mine operated by AGC in Obuasi, resulting in the displacement of several communities, including Dokyiwa, Hia, Finaso, Penipa, Ewiase, Badukrom, and Ntonsoa [37]. In October 2001, a spill occurred at a mine operated by the South African-based company, Goldfields. Thousands of cubic metres of cyanide-contaminated water polluted the Assaman River, a source of drinking water for five villages in the area. All life forms in the river and its tributaries reportedly perished. Exactly 2 weeks after the incident, a second spill occurred in the same area [38].

Land degradation is another major environmental concern in the industry. Throughout Ghana, numerous landscapes are scarred with potholes and devoid of vegetative cover as a direct result of intensive large-scale mining activity. Land degradation imposes huge costs upon agriculture. For instance, in areas such as Tarkwa,

land degradation has led to a shortening of the fallow period from 10–15 years to 2–3 years [39].

Dust pollution in the mining districts of Ghana has also been a major concern, and is said to be responsible for the high incidence of silicosis and tuberculosis in the mining communities. Studies conducted by Amegbe (1998) on the incidence of silico-tuberculosis show a rate of 10.1–18.7/1000 people per year because of inhalation of quartz dust from gold bearing rocks [40]. Residents of villages in certain gold mining districts in Ghana have also been diagnosed with a type of skin cancer. In the Amansie District, for instance, some residents contracted a disease that causes pigmentation of the skin – an ailment often referred to as Buruli ulcer, which is common in the gold mining areas of Australia and Burundi in Africa, where the name 'Buruli' originated. However, it is important to state that medical experts working in the Wassa District have not yet officially made any direct link between the incidence of the disease and gold mining activity that goes on in the District [41].

In terms of socioeconomic impacts, evidence in the literature on mining in Ghana suggests that relocation schemes have led to loss of land and resources, chronic impoverishment, social disruption, and decreased access to basic social and public services. This was evident in Teberebie, where gold mining operations by the American–Ghanaian Teberebie Goldfields Ltd. have displaced the inhabitants of Teberebie. In the early-1990s, the community's illiterate chief signed an agreement with the mining company to provide 168 housing units, a school complex, community centre, electricity, a medical clinic, and portable drinking water within 12 months, but after 7 years, the agreement had still not been fulfilled [42]. In addition, relocation schemes in Ghana have often excluded women from compensation payments. According to Akabzaa and Darimani [43], compensation payments go to heads of families (men), who often abandon their wives and children.

Finally, there have been reported human rights abuses by major gold mining corporations in Ghana, many of which are highlighted in the Ghanaian Human Rights Commission 2000 report. Ashanti Goldfields Company (AGC) for instance, was implicated in human rights abuses against the Sansu community. The Human Rights Commission found evidence implicating AGC security personnel, police, and the military in the killings of three artisanal miners between 1994 and 1997. There have been other reported cases of intimidation and arbitrary arrest by AGC security personnel and the police [44].

To summarize, the case of Ghana provides an illustrative example of how the expansion of gold mining activity in developing countries has failed to materialize into significant benefits for host governments and indigenous people.

4. Conclusion

Developing countries have not been able to achieve the same pace of economic growth as developed countries, in spite of their rich natural resource base. In the case of Guinea, Kathleen Anderson [45] maintains that a challenge facing government is to negotiate financial terms and agreements that would capture a sizeable share of the economic rent from mining. This certainly holds true for other mineral-rich developing economies.

We have also seen that the gold mining industry causes serious problems, including chronic impoverishment, displacement, family disorganization, and a disruption of educational services. It is worth noting that the idea of sustainable mining embraces not only ecosystem balance but also the needs of people in the present and the future. Development activities that displace people, causing social disorganization, loss of livelihoods, and loss of access to public services, are therefore not sustainable. Liberalisation of the mineral sectors in development economies encourages private participation, fosters competition and promotes economic growth, but such policies should not be advanced at the expense of the environment, and social and economic development.

The three important elements of sustainability stressed in the Brundtland Commission's Report are ecology, economy, and social justice. The Brundtland Report mentions the need to conserve the basic needs of life, to enable all parties to achieve economic prosperity, and to strive towards social justice [46]. It is against this background that the following recommendations are made:

- Since mineral resources are non-renewable, governments must widen its tax base to generate revenue for economic growth and development. The economic rents derived must be properly managed and invested in other forms of capital including human resources, to ensure that future generations can meet their needs.
- Since gold mining is touted as activity that creates opportunities for stakeholders and which leads to the well-being of communities that host operations, relocation schemes must be properly planned in consultation with all stakeholders, and affected communities must be adequately compensated to ensure that such schemes do not lead to impoverishment and decline in human development.
- There must be frequent audits, reviews, and monitoring of gold mines by government. In addition, small-scale and artisanal miners must be monitored to ensure compliance with environmental regulations.
- Governments must make environmental and social reporting mandatory for all gold mining corporations,

as it will eliminate the tension and feeling of mistrust that exists in most mining communities in the developing world.

- Gold mining corporations in the developing world must build strong relationships with communities that host the mines. Effective communication between mines and communities will ease tension and promote confidence and trust.
- Mining companies that cause damage to the environment through breaches of tailing dams must be made to pay heavy spot fines, and bear the full cost of cleaning up the environment. Assurance deposits are one way of ensuring that improved environmental management practices are adopted by gold mining companies.
- Since a mining project is a temporary setup, governments of mineral-rich developing economies must negotiate and encourage investment in other sectors (e.g. manufacturing, services) of their economies.

There is a long way to go, but given the importance of gold in the developing world, these issues will not disappear. The implementation of these recommendations, however, would be a significant step forward in helping to achieve economic prosperity and social justice for the families and communities in the gold mining districts of the developing world.

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