

# **SOCIO-ECONOMIC IMPACT OF SMALL SCALE EMERALD MINING ON LOCAL COMMUNITY LIVELIHOODS: THE CASE OF LUFWANYAMA DISTRICT**

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## **Abstract**

Lufwanyama district has some of the world's best emeralds and mining, is not contributing to the local economic development. Mining has failed to stimulate local enterprises, traditional industries and access to environmental resources. Mineral wealth continues to benefit the elite. Vulnerable and resources dependent communities bear the socio-economic and environmental costs of loss of access to land, impoverished livelihoods and degraded environments. This research sought to investigate the economic, environmental and social impacts of small scale emerald mining on local community livelihoods in Lufwanyama district. However, this paper will only examine the economic impacts arising. Through the employ of a descriptive survey design, the effects of mining in the area were evaluated. Results indicate that overdependence on mining and poor diversification of livelihood options has hindered development of rural communities. Equitable distribution of employment opportunities and revenue from small scale mining remain a challenge for sustainable local development.

*Key words: emerald mining, local communities, economic development, environmental resources, livelihoods, sustainable development, equitable distribution*

## 1 Introduction

Zambia is endowed with abundant environmental resources and has enjoyed positive economic growth over the years (United Nations Development Programme [UNDP], 2011). Mining has been a cornerstone for Zambia's economy for over 70 years as a major copper and cobalt producer which contributes some 70% to total foreign exchange earnings (Cross, van de Wal, & Haan, 2010:20) and is also one of the three largest producers of emeralds worldwide (Cross, et al., 2010, United Nations [UN], 2011). Formal and regulated small scale mining (SSM) activities contribute 80% of the country's emerald production representing 20% of world production (Environmental Commission for Africa, [ECA] 2002). The gemstone sector is not significantly contributing to the economy because some gemstones revenues are not accounted for due to smuggling and undocumented trade (Cross et al., 2010).

This study is based on emerald mining in Lufwanyama district, in the Copperbelt Province of Zambia. Lufwanyama has abundant environmental resources both natural and mineral resources while boasting of the largest emerald reserves in Zambia (Shulumi unpubl.; Choongo, 2004). Local communities depend on small scale agriculture, charcoal other non-timber forest products (NTFPs), and illegal mining. The district is the least developed in the province with few people in formal employment in the mining sector and public service (*Ibid*).

Principle 1 of the Rio Declaration on Environment and Development 1992 (UN, 1999) provides that humans should be at the centre of concerns for sustainable development and also entitled to a healthy and productive life in harmony with nature. SSM has environmental, social and economic impacts that affect or enhance the development of local communities and their livelihoods and mining has been blamed the world over for harming and impoverishing communities. Little information regarding the direct benefits of local communities in Lufwanyama district from SSM of emeralds exists hence the need to examine the relationship between small-scale emerald mining and its impact on livelihoods of the local community. The objective of the research was to understand the socio-economic impact of small-scale mining on local community livelihoods.

## 2 Literature Review and Conceptual Frameworks

Mining by its very nature is not a sustainable activity as its production processes involve clearing of forests, removal of large quantities of soils, use of large quantities of water, and emission of gases and particles into the atmosphere (Orguela, 2012; Silengo & Sinkamba n.d; Cross, et al., 2010 and International Institute for Environment and Development [IIED], 2002). Many rural households in sub-Saharan Africa heavily depend on environmental resources for their day-to-day lives (United States Agency for International Development [USAID], 2006). However, millions of these community members and individuals live in poverty and experience food insecurity due natural disasters, political conflicts and wars as well as human activities which have resulted in dwindling livelihoods and increased vulnerability. According to Pedro (2004), mining has the potential to reduce poverty and contribute to sustainable development if proceeds are used prudently. Governments should therefore demonstrate mineral potential and viability for mineral extraction and creating a conducive environment which attracts investors while balancing this with the needs of local communities (IIED, 2002).

Zambia has, in abundance, a variety of gemstones which include tourmaline, aquamarines, amethysts, garnets and emeralds (Cross et al., 2010; Silengo & Sinkamba, n.d) with emeralds biggest exports by value (Cross et al., 2010). Most of the gemstones are found in diffuse areas

which are remote and underdeveloped, lacking basic infrastructure and with low yielding reserves. Hundreds of small-scale and gemstone mining licenses have been issued including over 345 emerald mining licenses in, Lufwanyama, formerly Ndola Rural Emerald Restricted Area (NRERA) but only a few large and small scale mining companies have been able to successfully mine the emeralds (Cross et al., 2010). Zambia's emeralds are exported rough to Asian countries where they are polished before they are sold to the west (Cross et al., 2010).

The contribution of emerald mining to Zambia's Gross Domestic Product (GDP), after decades of mining, is still insignificant compared to that of copper mining. The challenges for the gemstone sector, emeralds included, include lack of geological information, low technical and management skills, poor infrastructure and access to finance which have hindered the successful exploitation of the minerals.

## **2.1 Mineral Resources and Vulnerable Local Communities**

The challenge for mining development is to be able to equitably distribute mineral resource revenues to all stakeholders and contribute to reducing vulnerability of local communities (IIED, 2002; Silengo & Sinkamba, n.d.). Equitable benefit distribution is concerned with fairness or justice in the distribution of mineral resources and costs and distributing resources according to the needs of various sectors, in line with Brundtland Commission, that is, meeting the present generation's needs without compromising the ability of future generations to meet their own needs (Jabareen, 2008; World Economic Commission and Development [WCED], 1987). Mining is the backbone of Zambia's economy and how the benefits are distributed determines the success of translating current positive economic growth into economic development that sustains the lives especially for the rural poor and marginalized (IIED, 2002). Most of the rural poor depend solely on natural resource for their subsistence and have no other options for their livelihoods (USAID, 2006). The International Fund for Agricultural Development (2001 cited by the United Nations Environment Programme, 2006) indicates that over 70% of Africa's population depends directly on land and environmental resources for their livelihoods. Equitable distribution of benefits and costs is essential as a means to reduce poverty while at the same time improving standards of living and economic growth and development.

Mining has been a disputed activity that disempowers communities who bear a disproportionate share of the economic, social and environment cost (IIED, 2002). This is exacerbated by the fact the mineral explorations take place in remote, distant areas with poor infrastructure with disputed land tenure rights between government and communities as well as a weakened traditional system and power imbalance between communities and private companies (IIED, 2002; Le Billon, 2001). These diffuse and remote areas lack access to services such as infrastructure, markets, education and resources contributing to keeping the poor in a position where they are unable to participate and benefit from economic opportunities (USAID, 2006). Mining development and concessions have contributed to vulnerability of communities due to misappropriation of land owned by marginalized social groups, power imbalances, poor linkages, environmental degradation and also create restrictions on access to formerly common property resources (IIED, 2002). Ham and Chirwa (2010) argue that resilience of such communities is increased when secure access to resources needed to generate livelihoods is reinforced. Mineral exploitation should also reduce vulnerability and enhance resilience through creating new stocks of capital by enhancing the physical, financial, and human and information resources (Isaacs & Gervasio 2010).

## 2.2 Mineral resource conflicts and development

**2.2.1 The political ecology of the resource curse.** This debate seeks to explain the negative or lack of development of resource rich countries as compared to resource poor countries which have done well in paving the way for sustainable development. According to Le Billon (2001), the resource curse is a continued negative growth of an economy due to overdependence on mineral resource extraction and external market forces like fluctuations in the prices of primary commodities as in the case of Zambia's dependence on copper mining and export. The factors blamed for the resource curse include weakened governance, rent seeking and corruption as well as exposure to external market forces (Auty, 1993; Ross, 1999; Le Billon, 2001 and Tilton, 2005). Political instability and poor governance can influence the diversion of funds from government coffers to private individuals and has resulted in resources being used to inspire and motivate conflict (Le Billon, 2001; Pedro, 2004). The political economy of the resource curse explains issues concerned with the distribution and ownership of resources by the elite which results in resource capture by them and exploitation of local communities thus perpetuating poverty.

**2.2.2 Mineral resources and conflict – greed and grievance theories.** Mineral resources have also contributed to violent conflict and wars around the world more especially in the developing world such as the Democratic Republic of Congo, Sierra Leone, and the Middle East and North Africa countries among others. Structural scarcity or unequal resource distribution can result in resource capture by the elite through changes in rules and regulations which deny others use and access to environmental resources as a result marginalizing them thus leading to mineral resource related conflicts (Homer-Dixon, 1999; USAID, 2006). Mineral resource related conflicts can also be explained by the greed and grievance theory. According to Collier and Hoeffler (1998 cited by Porto, 2002; USAID 2006), greed for valuable resources is responsible for motivating conflict thus economic opportunities seem to motivate conflict rather than grievances because belligerents are driven by the prospect to enrich themselves and to continue to finance conflicts to facilitate unhindered access to trade in international markets. The grievance theory on the other hand, suggests that conflict is a result of unjust and inequitable distribution of land and environmental resources, and social group marginalization (Bigagaza, Abong, & Mukarubuga, 2002). However, Zambia has experienced political stability and its underdevelopment has been blamed on lack of diversification, value-addition of resources extracted before export and continued exposure to fluctuations in commodity prices in global markets as well as corrupt institutions that divert funds required for development to private individuals use (Weber-Fahr, Strongman, Kunanayagam, Mahon, & Sheldon, 2001).

**2.2.3 Dependency and radical theories.** The radical and dependency theories have been used to discuss negative economic growth in the developing world, Zambia included (Kangwa, 2008; Nizamuddin n.d). Zambia's slow development has been blamed on overdependence on mineral resources especially copper and failure to translate positive economic growth into economic development (Pedro, 2004; United Nations Economic Commission for Africa [UNECA], 13 -7 February 2012). Mineral wealth is finite and requires proper and well informed investment in other sectors and into a stabilization fund. Developing countries are experiencing negative growth because they were incorporated into international capitalists systems as producers of primary goods (Ferraro, 1996 cited in Kangwa, 2008). It is argued that Southern African countries are still trapped in a global economic division of labour and have to concentrate their development efforts on the areas of their specialization or competitive advantage in mineral extraction without value addition (van Wyk, 2010). The radical theory posits that Capitalists' countries benefit from exploiting the

South and top government officials in the developing countries serve the interest of multinational companies and not their own people (Kangwa, 2008). Development policies and agreements are seen to favour the capitalists, insisting on favourable investment and free trade, tax exemptions and disinvestments for countries that resist their structural impositions (van Wyk, 2010).

### **3 Theoretical Framework**

David Drakakis-Smith's Components of sustainable urbanisation model (Drakakis-Smith, 2000) (Figure 1) has been adopted to enhance the explanation of the contribution of emerald mining to sustainable environmental and socio-economic development. The model assesses the process of urbanisation, and its sustainability since urbanisation is an essential element of economic growth. Accordingly, it is used to explain sustainability of mineral extraction by examining the tenets of sustainable development on the basis of the economic, environmental and social impacts of small-scale mining.

#### **3.1 Impacts of Mining**

**3.1.1 Social impacts of mining.** Social factors in the mining sector are concerned with the distribution of costs and benefits between the shareholders involved. Where mining is well planned and all stakeholders involved in the decision making processes, it has a potential to spur development contribute to poverty alleviation in host communities and regions (Pedro, 2004; World Bank 2011 cited in Orguela, 2012). Most local communities bear the social cost as compared to mining companies and governments which tend to enjoy the benefits of such activities. Mining activities requires a lot of land which is in most cases in remote occupied by customary land owners or in disputed territories later resulting in loss of land resource rights and livelihoods (IIED, 2002; Orguela, 2012). Mining also has the potential to reduce the gender discrepancies in job opportunities for women, while improving standards of living, well-being, health care, education and better infrastructure (Hinton, Veiga & Benhoff, 2003; Rio Tinto, 2009).

**3.1.2. Economic impacts of mining.** Mining has a multiplier effect in development as it create jobs directly and indirectly, can contribute to infrastructure development and also improve the well-being of communities through access to education, healthcare and transfer of skills. Where proper linkages have been created through diversification, value addition and local community supply systems, business opportunities are created, and wealth generated for local and national economies. However, in most resource rich countries, mining is not making significant contributions due to lack of infrastructure, value addition and fewer benefits to communities and more to central governments (Crowson, 2010 cited Orguela, 2012). Most mining projects do not benefit the immediate local communities as most labour is obtained from neighbouring areas. Mining does result in the loss of access to land and forest based resources communities depend on heavily, such as timber and non-timber forest products (NTFPs) for subsistence and incomes (Mwitwa, Muimba-Kankolongo, German & Puntodewo, 2012). Loss of access to land and environmental resources can also result from dislocation. Poor compensation of dislocation victims regarding lost land (Custer & Nordband, 2008) is very common and van Wyk (2010) argues that emphasis should not be on relocating them but on rehabilitating them. Mining activities do create social tensions and conflicts while job insecurity is also rife from retrenchments and mine closures. The management of Zambia's emeralds is shrouded in mystery and therefore characterised by smuggling, undervaluation and under declaration (Cross et al., 2010) resulting in the poor contribution of emerald mining to the local and national economies.

**3.1.3. Environmental impacts of mining.** Mining involves the removal of large quantities of vegetation and soils to make way for mining activities. Depending on the types of minerals extracted and technology used mining can have significant impacts on the environment from environmental degradation to air pollution and contamination of both surface and underground water, and loss of biodiversity (Silengo & Sinkamba, n.d; IIED, 2002; Lungu & Shikwe, 2006; Cross et al., 2010; Mwitwa et al. 2012; (Durucan et al., 2006; Peck & Sunding 2009) cited in Orguela, 2012). Lufwanyama is a watershed area with various water courses and vegetation types such as the *miombo* woodlands (Choongo, 2004; Shulumi, unpubl.). Use of open cast and illegal mining in the extraction of emeralds is a threat to this fragile environment while waste dumps permanently degrade the environment and large open pits are a permanent scar on the earth surface and if not properly rehabilitated can have adverse impacts (IIED, 2002; Silengo & Sinkama, n.d). Deforestation is a common feature where forests are cleared to pave way for mining, infrastructure developments, shelter and food and also from charcoal production activities.

## 4 Methodology

A qualitative approach in form of a descriptive survey research design was adopted, in which purposive systematic sampling was used and qualitative data was generated. Semi-structured questionnaires were used to collect data the households in Chantete, Bulaya and Mukumbo wards which are affected by emerald mining. The sample size was necessitated by the vastness of Lufwanyama district which has a sparsely distributed population.

The focus of data collection was on households instead of the entire population. A household was taken to be 'a group of persons, who normally cook, eat and live together,' and these people may not necessarily be related but have one person regarded as the head of house (CSO, 2008: 9). The total number of households for the three wards was 1, 228 and a sample of 10% (123 households) of the households was taken which was made up of 13 households from Bulaya ward, 18 from Chantete ward and 91 from Mukumbo ward. Households taken to be part of the sample were systematic selected, every second households was selected till the number was reached. Female headed households made up 31% of the households while the remaining 69% were male respondents.

The socio-economic variables that were assessed were economic contribution of SSM, employment creation, health and education infrastructure, literacy levels, improvement in incomes, employment and access to livelihood assets. Community perceptions of SSM impact on the environment was also assessed.

## 5 Discussion of Results

### 5.1 Economic Development Facilitated by SSM

**5.1.1 Local economic development.** The findings indicate that local economic development is insignificant with 63% of the respondents indicating that mining has not brought about infrastructure and community development such as roads, tertiary education institutions and hospitals (Figure 2). A total of 37% of respondents indicated that mining companies have built or rehabilitated one school plus agriculture cooperatives and a market as part of the CSR programme. Mining companies are also importing labour from neighbouring towns of Kitwe and Kalulushi and not employing local people in secure paying jobs. According to Rio Tinto (2009) employment of

locals in the mining sector improves their economic status, their mobility and skill thus lack of jobs does compromise this cause for development.

Emerald mining activities are currently not contributing to poverty reduction and improvement of livelihoods as indicated by 85% of the respondents with only six percent benefiting from the two agricultural cooperatives provided by Kagem mining's corporate responsibility initiatives and another nine percent on government cooperatives. 96% of the respondents indicated that they were not benefiting but cross-scale elite capture by investors, government and traditional leaders occurs. This was because they were not seeing any infrastructure development and no other non-mining related investments were coming into the area to create jobs and enhance local livelihoods.

### **5.1.2 Infrastructure development.**

**5.1.2.1. Road network.** Lufwanyama district has over 700km of unpaved roads (Choongo, 2004), and is not easily accessible physically as road infrastructure is in a deplorable state, and hindering availability of public transportation in most areas. This compromises education, health and other service delivery systems and transportation of produce especially during the rainy season between November and April due to impassable roads. Only roads of interest to the mines are repaired or graded such as Emerald road. Road infrastructure in the area are the responsibility of government, however the unwillingness of mining companies to contribute to the improvement of the poor roads they use in the extraction of emeralds is indicative of the failure of mining companies to invest in social services in areas they operate in.

**5.1.2.2. Education and health facilities.** Lufwanyama district does not have adequate secondary schools infrastructures and hospitals. There is only one secondary school and no referral hospital except for small health posts/centres which have limited capacity for bed admissions. Pupils and the sick, travel long distances to access educational and medical facilities. Poor infrastructure, has impacted on service delivery in education, health and agriculture. None of the schools, health centres or villages had electricity and this has implications on service delivery in clinics for instance operating at night is a challenge. Communication has improved with mobile phones reaching the area. 28% of respondents also indicated that mining companies have been rehabilitating community schools. The lack of infrastructure is compromising both education and health in the district. Quality of education and literacy levels are a challenge because access to education is hindered by the distance to school and availability of resources. Education and literacy, both key to poverty reduction, are unsustainable due to inadequate education institutions, poor quality of education and high dropout rates at secondary school level and limited learning and teaching resources in schools. According UNEP (2006) literacy affects the type of information one accesses, the opportunities available and their livelihood choices. Quality education and improved literacy are essential if local people are to compete for jobs, enhance their skills, contribute to the national economy as well as protect their environment to enhance inter-generational equity.

**5.1.2.3. Water and sanitation .**Lufwanyama district is a vast rural area and has no water reticulation system hence no piped water and solid waste disposal systems (Choongo, 2004). Water is vital for survival and clean fresh water is essential for a healthy life. UNDP (2011), states that access to adequate and clean water for consumption is essential to obtain a healthy life while appropriate sanitation prevents diseases assures dignity to individuals in Zambia. Water sources include boreholes, shallow wells and pits and rivers. No respondents had access to piped fresh water. Seventy-nine per cent (79%) of people have no access to clean fresh water and get household water from shallow wells (*ifishima*), pits and rivers/streams. Solid waste disposal system is in the form of pit latrines. Twenty-one per cent (21%) of respondents have access to clean water obtained from boreholes and protected wells provided by government, mines or NGOs. However, the water

is considered unsafe by some as it is rusty and causes stomach ailments. Clean water access is a challenge for schools as well due to unrepaired boreholes.

**5.1.3 Employment opportunities for local people in emerald mines.** Fewer job opportunities for locals that have become dependent on illegal mining activities exist while mining companies import labour from neighbouring towns. The jobs are of casual nature or short-term contracts. Grizzly Mining did refute this, indicating that they employ 70% of local community members (personal communication; Zambia Review, 2012/13).

Jobs in mining in Lufwanyama are also gendered with fewer than 10% of employees being women and employed in administrative jobs with no females employed in underground operations. This is not surprising considering the ECA (2002) indicated that the formal mining sector for example in Zimbabwe and Ghana employs ten per cent (10%) women compared with the informal sector which employs up to 50% women. According to Grizzly Mining Limited the number of women employed is negligible due to the nature of mining which is assumed not to be suitable for women. Thus women will continue to be passive recipients through their spouses while they engage in activities such as *munkoyo* and *kachasu* brewing (illicit alcohol), vending, selling grass, farming and also prostitution. The latter responsible for HIV/AIDS exacerbated by the presence of emerald mining activities. The Emerald and Small-scale Miners Association of Zambia (ESMAZ) agreed to the low employment opportunities for locals because a few mining companies were operational and also that locals were lazy and wanted to do seasonal work after the farming season is over. Since mining activities have failed to bring about economic development, jobs and infrastructure, local community members had multiple livelihood strategies that are seasonal and diversified to buffer themselves against unforeseen eventualities and have a reasonable lifestyle such as farming, illegal and formal but casual employment, charcoal production as well as trading in NTFPs activities.

**5.1.4. Emerald mining and local people's incomes.** Incomes of local people were not improving according to 96% of the respondents despite mining companies claiming employment levels of over 70% for local people and this translated into failure to improve local peoples' lives. Land alienation has made mining especially illegal mining difficult and seasonal, as it has to be supplemented by other livelihood activities like farming and charcoal production. Some small scale miners have invested all their capital and pensions but have not successful found emeralds thus becoming destitute and living in poverty. Lack of secure jobs has also contributed to low incomes because a few companies are operating efficiently. Furthermore, lack of investors is a major challenge as hundreds of plots lay idle and unproductive hence minerals not extracted do not contribute anything to the economy.

**5.1.5 Creation of local business opportunities.** Local business opportunities are few except selling grass, *munkoyo* and *kachasu* (illicit alcohol) and a few other supplies to illegal miners and the informal sector. In Bulaya all respondents noted that there were no business opportunities resulting from mining whilst in Chantete, 33% indicated grass for roofing, and while *munkoyo* and charcoal displayed along road sides indicated that there exist demand for them. In Mukumbo, small businesses in the form of markets (31%), grass (1%), and other illegal activities, like sale of *kachasu* (8%) exist driven by illegal mining activities in Perala market. Since Grizzly Mining and Kagem Gemfields employees stay within their mining compounds out of reach of local businesses they are not contributing to the local economy but income is taken out of the community. Mining has also failed to create multiplier effects in the communities such as supply chain linkages and skills development in marketable locally produced goods and services.

**5.1.6. Access to forest resources.** Lufwanyama communities obtain timber and non-timber forest products (NTFPs) such as fruits, vegetables and medicinal plants from forests to earn an income and supplement their diets (Shulumu, 2002; Choongo, 2004). Being a restricted area and



under paramilitary guard means access is by permit and without its trespassing. Mining concessions are not enhancing access to forest resources which contributes 20% of household incomes in rural areas (Bishop et al. 2008 as quoted in Ham and Chirwa 2010). Women are sometimes allowed to collect NTFPs since they are food providers while men on the other hand, are victims because they are suspected to be illegal miners. As a result, calls by Chief Lumpuma's at his annual *amafulo* visit 2012, to increase access by mines to allow local people passage through the area and requests for surveys to determine exact location of emeralds so that new land uses can be devised.

**5.1.7 Support for traditional industries.** The majority of respondents, 85%, indicated that mines were not supporting traditional enterprises such as subsistence agriculture, charcoal production and NTFPs nor are they transferring livelihood skills and training people. However, efforts by Kagem Gemfields Plc. in financing green market cooperatives in Kapila villages were appreciated by nine per cent of the respondents who spoke highly of the projects which will be extended to more community members once the first batch is successfully trained. In Mukumbo, government is supporting small-scale farmers' cooperatives with agricultural inputs like fertilisers though not everyone qualifies for such schemes. Other activities like charcoal have major impacts on the environment but are not being addressed by the mining companies. Support for traditional industries is completely absent even though it is essential in enhancing diversification into non-mining related industries that are independent of mining and also sustainable in the long term. All these factors have resulted in lack of improvement in the incomes of local people

Mining activities have failed to reduce poverty as communities continue to live in chronic poverty, with Zambia's extreme rural poverty currently estimated at 67% (UNDP 2011) as a result pushing people to unsustainably harvest forest resource to meet their livelihood needs. Both the traditional leadership and communities agree that the availability of emeralds has not brought about any tangible benefits and, benefits and costs have not been distributed equitably. While companies boast of various CSR activities in the area, these are *ad hoc* activities which are not a result of local community needs and unsustainable. The CSR activities also lack evaluation for their effectiveness and are assumed to show good corporate citizenship to shareholders. Thus, Kemp and Owen (2013)'s argument that mining companies are claiming CSR as a core competence whereas they have failed to incorporate it as 'core business' in practice.

## 6 Conclusion and Recommendations

Findings regarding economic impacts of emerald mining activities indicate that not much is being done to improve incomes, infrastructure, benefit distribution as well as human well-being in resource areas of Zambia. Overall small scale EMERALD mining is not contributing significantly to the development of the local economy, local business enterprises and infrastructure development considering its economic value that is capable of enhancing, improving and sustaining livelihoods. The annual world market value of gemstone was estimated at over US\$7billion and Zambia's market share at US\$170million (World Bank, 2004 cited in Lungu & Shikwe 2006). Orjuela (2012) also infers that local communities in mining areas continue to be poorer than other regions despite mining activities in their areas contributing significantly to gross domestic product (GDP). Mining activities have failed to integrate the rural poor (UNDP, 2011) and CSR activities are not sustainable and have not enhanced poverty reduction and better infrastructure.

According to the Zambia Consolidated Copper Mines – Investment Holdings (ZCCM-IH, 2005) study, the Copperbelt province is an example of the interaction between unemployment, poverty and environmental degradation. This can be explained as a poverty and environmental

degradation nexus to show how they affect each other. Lack of employment and livelihoods exacerbates poverty because the poor cannot sustain their basic needs. As a result they harvest or use environmental resources in an unsustainable manner to sustain lives and income resulting in environmental degradation for example dependence on charcoal for income visa vie deforestation. Within the communities there is lack of information on environmental impacts of mining. Mine waste dumps are a necessity to them and are a major livelihood strategy for illegal miners considering Zambia's SSM contribute up to 80% of the country's emeralds production representing 20% of world production (MMSD 2001 as quoted in ECA 2002) while communities remain impoverished despite the wealth that is generated. It is therefore essential that emerald exploitation be balanced with improving people's lives and it is government's role to ensure this is achieved through creating the right legal framework which attracts investors while protecting communities and the environment. Participatory decision making involving all stakeholders including communities and civil society is essential in ensuring that decisions that affect communities and their environment are made in participatory process to ensure that fundamental human rights are protected.

Equitable distribution of mineral wealth is at the cornerstone of development and should be addressed in development agreements between the state and the investors. CSR activities should also be made more compulsory, reviewed and evaluated for success while community participation is essential in enhancing support, ownership and protection of such activities. Integration of local community benefits as a component in investment agreements should be informed by an unbiased appreciation of social costs that have or will be borne by communities. Improvements in human development and in the quality and quantity of education, technology, information research and development is also important as all stakeholders will have access to information to make informed decisions in the management of emeralds and for sustainability of the gemstones.

Furthermore, infrastructure is essential for physical accessibility and as channels of distribution of products and services and poor infrastructure has contributed to poverty and poor service delivery. Lufwanyama needs physical infrastructure such as roads, bridges and energy supply lines in order to open it up for development, investments and socio-economic growth. Both government and the private sectors should be involved to enhance exploitation of other resources which are greener, renewable and sustainable than mining activities. This will also contribute to environmental protection and reduce over harvesting of natural resource.

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### 8 Appendices

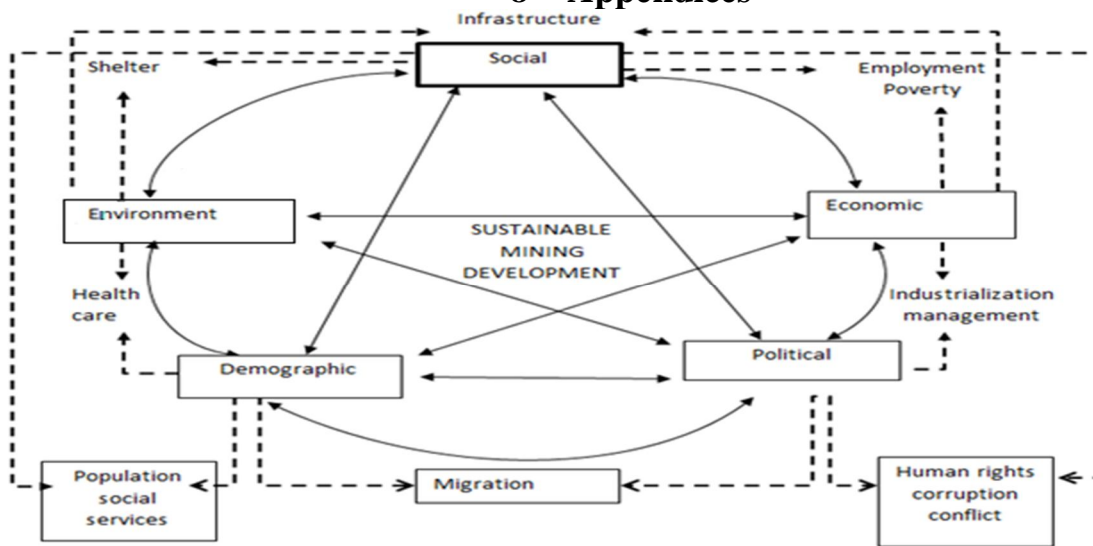


Figure 1: Components of Sustainable mineral resource exploitation. Adopted from David Drakakis-Smith's Component of Sustainable Urbanisation (2000)

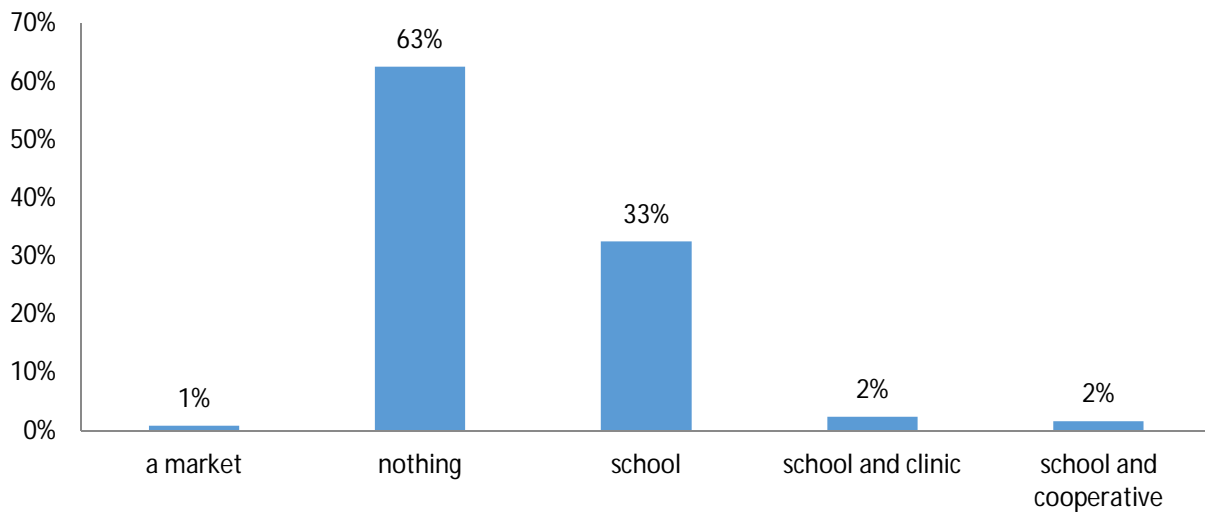


Figure 2: Indicators for economic development brought by mining