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Artisanal and Small-Scale Mining as a challenge and possible contributor to Sustainable Development

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ABSTRACT

This paper explores the different challenges posed by Artisanal and Small-scale Mining (ASM) to Sustainable Development (SD), as well as proactive and unrealistic approaches in dealing with these challenges. Since there is no clear cut internationally acceptable definition of ASM, this paper considers ASM as the exploitation of marginal ore deposits, which are not profitable to mine on a large scale, through both informal (I/ASM) and formal channels (F/ASM) using rudimentary tools. I/ASM is illegal while F/ASM is legal and its activities are conducted under the approval of the presiding government. It is mainly I/ASM that poses disastrous challenges to SD. These can be classified into social, economic, environmental, safety and health and political challenges as expressed in the text.

The first move towards making ASM a sustainable livelihood is to recognise and formalise it. Peaceful and all-encompassing approaches have to be devised in order to formalise ASM because ASM is a significant source of livelihood for mainly the poor and those who are unemployable due to lack of professional skills, a vivid fact governments cannot afford to ignore. These approaches facilitate easy administration of the sector as miners are held accountable and since they would have been given legal mandate to exploit the mineral deposit. This paper also discusses barriers and challenges to implementation of proactive approaches to ASM. These include International laws like the Dodd-Frank Act of 2010 together with international reforms such as Economic Structural Adjustment Programmes (ESAP).

Several proactive approaches which interested and affected parties can adopt to realise full returns and benefits from ASM are discussed at length in this paper.

Some reactive and unrealistic approaches which countries need to desist from in dealing with ASM challenges are also conveyed by this paper. DRC and Zimbabwe are discussed as country case studies to illustrate poor practices and good practices in dealing with ASM respectively.

1. Introduction

Artisanal and Small Scale Mining (ASM) has different definitions in different countries. One version of ASM involves exploitation of marginal ore deposits, using rudimentary tools such as picks, shovels, wheelbarrows, panning dishes etc. which are unprofitable to mine on a large-scale. The cumulative amount of the mineral produced by ASM in a particular area can surpass the amount produced by a single LSM. An example of this is the tribute system of the Zimbabwean chrome industry (Zvarivadza and Tholana, 2015). The combined output of chrome from ASM under the tribute system surpasses that of any single LSM in Zimbabwe. The overall performance of artisanal miners in Zimbabwe was praised by John Mangudya, the Reserve Bank of Zimbabwe governor (Zwinoira, 2017). Reporting on the gold production for the month of July 2017 in Zimbabwe, the governor reveals that while LSM produced 930 kg of gold, artisanal miners produced 1.2 t of gold (Zwinoira, 2017). Zwinoira (2017) further reports that John Mangudya revealed that Fidelity Printers and Refiners (FPR) of Zimbabwe pay $15 million on a weekly basis to over 300,000 artisanal gold miners in Zimbabwe. ASM normally flourish in areas with old mine workings. Looking at the archaeological history of mining in Zimbabwe, all major gold workings established as LSM after 1890 were set up on existing precolonial gold mines which were worked by the local Shona people since time immemorial (Mudenge, 1988; Swan, 1994; Phimister, 1976; Chipangura, 2017). Chipangura (2017) argues that reworking of old abandoned reefs by Makorokozas (Makorokozas are the illegal or informal miners in Zimbabwe local parlance) might be regarded as a process that has its genealogy in precolonial workings which were the precursors to most forms of gold mining happening today. ASM is equally prevalent along rivers (alluvial mining). Commodities such as gold and precious stones with high value are normally mined under ASM due to their portability, low cost transportation and ready market

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among others. These miners normally work in groups of two to twenty or slightly more consisting mainly members of the same family. Though women constitute a significant component of the ASM, in each group it is typically the male counterpart who happens to be the family head that leads others and has control over the proceeds from ASM. There are some instances where women are in control of the mining. Although women might not be involved in underground mining, they are still visible on the mining landscape grinding and pulverising the ore. Observations in Nyanga, Eastern Zimbabwe show women involved in alluvial gold panning within Nyangombe River. These miners go where the mineral is and rarely seek regulatory approval.

Literature is awash with different definitions of ASM, but there has never been a clear-cut definition acceptable at an international or regional level. ASM means different things to different people. For instance, Rupprecht (2017) described ASM as manual, applying low technology, predominantly in rural areas. Hence, it is crucial to give the author's definition of ASM so that the reader easily follows the arguments presented in this paper. The author defines ASM as the exploitation of marginal ore deposits, which are not profitable to mine on a large scale, through both informal and formal channels using rudimentary tools. The informal ASM (I/ASM) is done illegally, and there is normally a high degree of irresponsibility as the miners are not registered and therefore not accountable. This is the form of ASM that poses great challenges to Sustainable Development (SD) as illustrated using the DRC case study. Rupprecht (2015b) notes that informal ASM has little consideration of mine planning issues such as mine access, rock breaking, material handling, support, ventilation or general safety considerations. Proactive approaches are discussed in the text to try and eliminate I/ASM and convert it into formal ASM (F/ASM). F/ASM is undertaken under the blessing of government legal framework and poses fewer challenges to SD as the miners are accountable to the law and work towards safeguarding the mining claims allocated to them.

The term SD is a fusion of two terms: Sustainable – meaning that which can be maintained at a particular level indefinitely and Development – which means growth. Combining these two can form a definition of SD as the growth and maintenance of systems functioning across social, ecological and economic fields. SD survives on the mentioned three fields. Any fault in one of the fields renders sustainable development ineffective. There are several definitions and schools of thoughts of SD available in the literature. Bruntland (1987) defines SD as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." SD calls for a look at things in a holistic fashion that requires a balance and not at few limited silos. The 5 Capitals Elements Model approach by the Forum for the future (2017) can also be used to explain SD. The model gives the relationship between the five capitals which are part of resource utilisation and lays out the characteristics used to identify a sustainable society. The spectrum of issues in SD consists of Risk, Ethics and Governance, Legislative requirements, Natural capital/the green environment, Social capital/society, Human capital or people, Economic capital, Human-made capital, indirect and induced consequences, unintended consequences and cumulative consequences (Flint, 2007).

From the explanations of ASM and SD it can be noted that proactive and realistic approaches in dealing with ASM challenges can reduce the negative impacts of ASM on SD. This is more evident from the proactive and realistic approaches discussed in this paper. Actually non-aggressive and proactive approaches induce a sense of belonging and self-criticism in ASM such that these miners work towards the good of a nation. Accurate knowledge of how ASM operates and its challenges to SD is essential in devising realistic and all-encompassing solutions which lead to the development of communities and poverty alleviation. It is worth noting that ASM has also driven knowledge systems used in the exploration of viable reefs which, sometimes, do not have sufficient geological background.

2. Challenges posed by ASM

ASM challenges are mainly associated with I/ASM as it is illegal and therefore difficult to regulate and implement approaches that minimise the challenges. I/ASM poses a real threat to SD due to its nature. The way it is undertaken negates the dictates of the 5 Capitals Elements Model description of SD. It fails to translate natural capital into human, social, manufactured, and financial capital to achieve SD. Given that it is illegal and unregulated, there are no appropriate measures employed by these miners to prevent disastrous consequences. The challenges of I/ASM to SD can be classified into social, economic, environmental, and safety and health challenges. The political challenges also merit mention and are given. A potential economic disaster emanating from wasteful and destructive mineral resource exploitation may occur if these challenges are not checked. Peaceful and all-encompassing approaches have to be devised in order to formalise ASM and come up with F/ASM because ASM is a significant source of livelihood for mainly the poor and those who are unemployable due to lack of professional skills, a vivid fact governments cannot afford to ignore. While I/ASM does not contribute to SD (as argued using the DRC case study), F/ASM guided by the principles of the 5 Capitals Elements Model of SD contributes to SD.

2.1. Social, environmental, economic, safety and health challenges

ASM is characterised by several challenges running across the social, environmental, economic, safety and health atmospheres as listed in Table 1.

2.2. Political challenges

One of the major problems leading to the disregard of the law by Artisanal and Small-scale Miners (ASMs) is the political factor. Some major political figures use their political power to sustain I/ASM as they benefit a lot by buying the minerals from I/ASM at give-away prices. Garrett (2007) reveals that ASM has become part of a political

Table 1
ASM social, environmental and economic challenges.

Social	Environmental	Economic	Safety and health
Crime	Deforestation	Lack of collateral security	High fatality rate
Prostitution and spread of HIV/AIDS	Pollution of water bodies	Difficulty in obtaining information for planning purposes	Rapid spread of diseases
Alcoholism and substance abuse	Soil erosion	Rent capturing difficulty	Lack of protective clothing
Neglect of human rights	Siltation of rivers	Lack of education and professionalism	Unsupported or poorly supported workings
Conflict and lack of security	Dust and noise production	High grading	Unsafe working tools
Child labour	Land degradation	Failure to adapt to technological change	Main reliance on natural ventilation
Destruction of cultural and ethical value	River diversion	Mineral rush effect (Tragedy of Commons)	Poor lighting
Destruction of cultural heritage sites	Mercury and cyanide pollution	Retardation of economic growth	Uncoordinated transportation
Gender discrimination	Destruction of biodiversity	Short sighted planning	Exposure to dust and dangerous gases
Limited social amenities	Poor disposal of mine tailings	Corruption	Insufficient safe drinking water