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Research paper

Feasibility and acceptability of environmental management strategies among artisan miners in Taita Taveta County, Kenya

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ABSTRACT

Artisanal mining employs many people across the globe. In Kenya, it provides vocational jobs which represent the livelihood of poor communities. In spite of the economic value that could be attached to the artisanal mining activities in Taita Taveta County, these activities have resulted in environmental degradation; thus, calling for necessary interventions. It is for this reason that this study intends to examine effective strategies that could be adopted to reduce environmental degradation in the county as a result of artisan mining. The key objective therefore is to test the feasibility and acceptability of community participation, partnerships, modern technology and quarry management strategies on the reduction of environmental degradation by artisan miners in Taita Taveta County. A descriptive case study research design was adopted, and the target population for the study was 451 registered artisan miners and 13 environmental bodies operating in the area. A simple random sampling technique was used to draw a sample of 218 artisan miners and 13 environmental body heads. Questionnaires were the main tool for data collection from which a response rate of 95% was achieved. The study deduced that community participation, partnerships, modern technology adoption and quarry management strategies, are key influences on the reduction of environmental degradation in the artisanal mining sector if adopted, going based on the high level of agreement and the reasoning exhibited among the artisan miners in the findings. The following policies may be inferred from the study: to set a framework to enable the community to participate in environmental conservation, to enhance partnerships between NGOs, CBOs, the Government and Universities within artisan mining areas, to introduce Government subsidies for modern technology for affordability and to introduce a framework for quarry management.

1. Introduction

Mining is defined as the extraction of valuable minerals or other geological materials. This is done from the earth, ore body, lode, vein, seam, and reef or placer deposits. These valuable minerals are of economic interest to the miner (Organization for Economic Cooperation Development (OECD, 2015). Artisanal mining is largely informal mining which involves the use of basic technologies.

Mining or quarrying of stone and metals has been carried out since pre-historic times and has been and still is vital for the development of any society. To achieve rapid economic development, many countries resort to the exploitation of natural resources through mining. Numerous studies underscore the economic benefits of mining to the world today. For example, the African Development Bank (2014) showed that mining was an important economic activity with the potential to contribute to the development of areas endowed with the resource in question. Artisanal and small-scale mining (ASM) had been important in fighting poverty in counties like Ghana, Lesotho, Sierra Leone and Gambia. About 13 million people in about 30 countries are directly engaged in small-scale mining, a significant proportion of whom are women and children (Hentschel, Hruschka, & Priester, 2003). However, continuous extraction of a raw material, especially through artisanal mining, has massive impact on the environment.

According to UNEP (2012), small-scale mining can be extremely damaging to the environment and often has serious health and safety consequences for workers and surrounding communities. It can lead to erosion, the formation of sinkholes, a loss of biodiversity, and contamination of soil, groundwater and surface water by chemicals from mining processes. As well as creating environmental damage, the contamination resulting from the leakage of chemicals also affects the health of the local population (Nuss &

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Eckelman, 2014). The situation is even worse in Kenya, because the ASM sector has never been well structured until recently when the mining bill was amended in 2016, which states that mining operations need to be undertaken in a sustainable manner to prevent harmful effects on the environment. Although the National Environment Management and Coordination Act (1999) provides for initial environmental assessment and environmental audits, the challenge is to harmonize and align the regulatory policies and practices in the country's mining sector with existing environmental legislation.

In Kenya, the mining of gemstones is dominated by artisanal miners for reasons that range from the low technology required to start the mining process, scarcity of capital, poverty of the residents, poor policies regulating mining in the country and an increase in population that constrains agricultural activities (Soekarno & Damayanti, 2012). Poor mining technology has greatly polluted the environment in most parts of the country. This has made bodies like the National Environmental Management Authority (NEMA), United Nations Environmental Protection (UNEP) and other Non-Governmental Organizations (NGOs) request strategies to help check environmental pollution across the country. Some of the strategies that have been developed in various parts of the country, such as Embu, Kisii, Migori and Kitui, have included the involvement of the local community through education, adoption of environment-friendly technology, partnering with relevant research experts for informed decisions, and rehabilitation of destroyed lands through afforestation and reforestation.

Similar strategies have been adopted in northern and central parts of Ghana. A report by the African Union (AU) mining control unit has shown that Ghana is among five countries in Africa that have adopted four strategies that could lead local small-scale miners into becoming better placed citizens. This includes; modern mining technology adoption for artisanal miners, quarry management strategy adoptions, waste recovery and elimination strategy, and planning for environment conservation at initial periods of mine initiation.

Artisan mining and its effect on the environment has attracted several studies. This paper reports findings from a survey of formalized artisanal miners in Kenya regarding the feasibility and willingness to adopt various environmental management strategies. Kenya being an understudied country in academic literature with regards to artisanal miners, this paper is therefore novel and offers some useful findings supported by the quantitative survey data.

This study borrows from (Ogola, Mitullah, & Omulo, 2017) who found that environmental planning, quarry management and community involvement were important for curtailing environmental degradation due to artisanal mining. The focus is on assessing the feasibility and acceptability of environmental management strategies among artisan miners in the Taita Taveta County of Kenya. The major objectives of my study were to:

a) Test the acceptability and feasibility of a community participation strategy on the reduction of environmental degradation by artisan miners in Taita Taveta County;
b) Test the accesssssptability and feasibility of a partnership strategy on the reduction of environmental degradation by artisan miners in Taita Taveta County;
c) Test the acceptability and feasibility of a technology adoption strategy on the reduction of environmental degradation by artisan miners in Taita Taveta County;
d) Test the acceptability and feasibility of a quarry management strategy on the reduction of environmental degradation by artisan miners in Taita Taveta County.

2. Materials and methods

2.1. Study area

The study was carried out in Taita Taveta County. About 89% of the County is characterized by semi-arid and arid conditions. Only 2.5% of the County is located in the highlands. The highlands in the County experience high human population pressure and ongoing down-slope migration into the agro-Sahel (semi-arid and lowlands). It is situated between latitudes 20° 46′N and 40°10′N, and longitudes 37° 36′E and 39°14′E. Geological reports of surveys carried out at different times in this region show the presence of mineral deposits in the County and the neighboring areas (Anyona & Rop, 2015).

The focus of this study was in lower zones of Kamtonga, Kasigau, Kishushe, Chungaunga, Mwachabo and Alia where mining is a major activity. Smallholder farmers have always diversified their incomes to guard against risk, many have turned to artisanal mining in the dry season and use the income earned to support their agriculturally based livelihoods (Hilson, 2016). Though well intended, the activities of these miners have often led to extreme environmental impacts.

The target population for the study was 451 registered mine members and the heads of 13 environmental bodies operating in the area, which in total equated to 464 respondents. Simple random sampling of artisan miners was used. The sample size (n) was computed using (Chande, 1977) as shown below:

$$n = \frac{\frac{P\,(1-P)}{\frac{A^2}{Z^2} + \frac{P\,(1-P)}{N}}}{R} \quad (1)$$

where:

n = Sample size required
N = the population
P = estimated variance in population, as a decimal: (0.5 for this study)
A = Precision desired, expressed as a decimal (0.05 for this study)
Z = based on confidence level: 1.96 for 95% confidence
R = estimated Response rate, as a decimal

Therefore, the sample is given below:

$$n = \frac{\frac{0.5\,(1-0.5)}{\frac{0.05^2}{1.96^2} + \frac{0.5\,(1-0.5)}{451}}}{0.95} \quad (2)$$

n = 218.

2.2. Data collection, data analysis and ethical consideration

Questionnaires were used to collect primary data from the target population and they included both open ended and closed ended questions. Before the actual study, the questionnaire was first pretested with 10 artisan miners that did not take part in the study in order to check the validity and reliability of the tool.

The collected data was analysed using descriptive statistics through frequency tables, percentages, measurement of central tendency and measurement of dispersion. All the data was coded before analysis and a Likert scale was used to rate the opinions of the respondents.

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