

Chapter 5

Impacts of Artisanal and Small-Scale Gold Mining on Water Quality in Mozambique and Zimbabwe

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ABSTRACT

Artisanal and small scale gold mining (ASGM) is an informal economic activity. ASGM is the process of extracting gold ore from the ground in the absence of land rights, mining license, exploration or mining mineral exploration permit or any legitimate document that allows the operation. Its haphazard nature, location close to and dependence on water have negative effects on the physical, chemical and biological composition of water. The socio-economic benefits of small scale mining, which include employment and income generation, are seriously outweighed by devastating environmental costs and impacts. The objective of this chapter is to examine effects of ASGM on water quality in Mozambique and Zimbabwe. Findings show that ASGM causes land disturbance, loss of biodiversity, deforestation and depletion of water resources, increased levels of siltation, turbidity and heavy metal content and the disturbance of aquatic life and its habitats. ASGM also negatively effects the health of people and animals. Based on the research findings, it is important to support and formalize, as much as possible, the mining operations so that it becomes environmentally friendly and sustainable.

INTRODUCTION

Mining is an important economic activity in Southern Africa. According to Pereira (2009), it generates about 60% of foreign exchange, makes up to 11% of the region's gross domestic product (GDP) and 5% of total employment in the Southern Africa Development Community (SADC). With regards to gold, Africa possesses a third of the world's mineral wealth. Gold mining in the region involves conventional and ASGM operations (Baird, 1999).

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ASGM covers a broad spectrum of activities which depend on size of work force, timing, methods used to carry out the operations and whether operations are legal, illegal, formal or informal (Dreschler, 2001). The mining is done mainly by poverty driven rural individuals, groups, families or cooperatives with minimal or no mechanization, knowledge or technology in mining and mining safety. It is commonly associated with informal, unregulated, unregistered, unlicensed, under-capitalized and under-equipped mining operations (Chenje, Sola, & Paleczy, 1998; Manuel, 2011).

Mineral resources are state property in Mozambique and Zimbabwe. Therefore, it is illegal to mine without a license from the local government. Artisanal and small scale gold miners are organized in two sectors (Manuel, 2011). They are either the

1. *Formal sector* in which miners have mining leases from government and are regulated. It is comprised of either: small enterprises belonging to individuals or group of people who are formally registered and have their claims; artisanal gold miner's associations composed of the formal artisanal gold miners; or individual gold miners holding mining certificates or passes.
2. *Informal sector* comprised of individuals or groups of miners who undertake the activities informally and illegally. Miners seldom have a legal right to the mineral deposits they exploit. Informal artisanal miners may be organized in small groups of two to seven people. Usually, they operate within large companies' claims with or without authorization or in farmlands with permission from the farm owners. The informal sector is largely uncontrolled by government.

ASGM is largely seasonal. Miners utilize rudimentary forms of mining equipment, techniques and mineral extraction processes. Miners dig into river banks, river beds, surface trenching, paleo-channels, floodplains and stockpiles of abandoned gold mines using simple tools like picks and shovels. The activities usually involve the displacement of less than 50 tons of solid earth per person, with a monthly production of less than 100 grams of gold per person. Miners often operate under hazardous, labor-intensive and highly disorganized conditions and have few concerns for the environment (Svotwa & Mtetwa, 1999).

Positive Impacts of ASGM in Southern Africa

ASGM is labor intensive and thus provides employment and income to large numbers of people who are generally poor and live in remote areas where fewer opportunities exist for formal employment. ASGM contributes to national economies and economically empowers disadvantaged groups by virtue of its low investment costs and short lead time from discovery to production. ASGM also contributes to poverty alleviation through the encouragement of alternative economic activities for sustainable rural development where technical and management skills are lacking. In Southern Africa, up to 10 million people are employed or benefit directly from ASGM activities (International Labour Organization [ILO], 1999).

ASGM also leads to development of basic socio-economic infrastructure and services such as roads, water, education, banking, health care and sanitation; opportunities are created for skills training and capacity development. Opportunities are made for cultural contacts between mine workers of various ethnic groups in the mining areas and social activities such as entertainment, socialization and marriages (ILO, 1999).

In most SADC countries, gold mining is an alternative economic activity to agriculture and employment within the mining sector increases many fold during the recurrent droughts in the region (ILO,

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