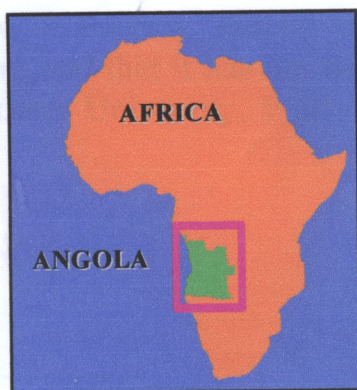


Environmental Impacts of Alluvial Diamond Mining in the Cuango Basin-Angola and Quarrying around Luanda City - Angola.



By

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A dissertation submitted to the University of Zambia in partial
fulfilment of the requirements for the degree of Master of Mineral
Sciences.

University of Zambia
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Declaration

I, Francisco Sebastião Francisco, hereby declare that this dissertation represents my own work and that it has not been previously submitted for a degree at this or any other University. Work from other workers has been referenced.

Signed: S. Francisco

Date: 9th August, 2001

261458

The University of Zambia approves this dissertation of Francisco Sebastião Francisco as fulfilling part of the requirements for the award of the degree of Master of Mineral Sciences.

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ABSTRACT

Angolan diamonds have been produced for more than 90 years. Before independence, indigenous people were not allowed to possess diamonds; those caught with diamonds were executed. After independence the new government empowered its people through issuing licenses to small-scale mining. Over the years, economic necessity has directed thousands of informal small-scale miners (including women and children) into the Cuango Basin, northeast of Angola to search for and to mine diamonds. This has resulted into severe environmental impacts in the Basin. Artisanal mining of diamond in particular has raised a lot of concern about the long-term sustainability of the basin particularly the river systems to hold and sustain the ecosystem. There are already fears that mining has seriously affected aquatic life including wild animals and birds. Similarly those who cannot make it to diamond mining have changed to limestone, sand and gravel quarrying around Luanda City.

The mining methods in both cases are relatively simple. However, their environmental and social impacts are complex. They affect large areas of land and water. The social impact is very complex, due to displacement of the local inhabitants by population migration creating social conflict over land.

Although environmental management guidelines exist, Angola's diamond mining and quarrying still face problems in the implementation of these guidelines. Quite often, they are inadequate in as far as implementation of the policies and regulations as the Government does not seem to have the capacity to do so.

Furthermore, due to the war in the country the government is unable to effectively coordinate the small-scale mining activities. This has led to illegal mining and the miners have taken advantage of this and are carrying out their activities without due regard to environmental regulations and good mining practices. This has resulted in loss of revenue to the government and retardation in the Angolan Economy.

This study therefore outlines the problems in the Cuango Basin and areas around Luanda city where artisanal, small-and medium large-scale mining are taking place. It highlights the environmental impacts and comes out with recommendations that could assist in policy formulation in the country.

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Dedication

This Work is dedicated to my family especially to my mum who always made all efforts for the continuity of my study even when the financial situation was not favourable. She died in 1976.

“The environment is where we all live; and development is what we all do in attempting to improve our lot within that abode. The two are inseparable”

(Norwegian Prime Minister Gro Harlem Brundtland, 1987)

Environmental considerations have become obligatory elements in mining ventures and those countries with competent environmental management have an advantage in attracting new investment. It is believed that the key to successful environmental management of mineral development project is an awareness and consciousness among government officials and senior industry management.

This dissertation therefore attempts to present the environmental issues and mitigation measures of environmental impacts of alluvial diamond mining particularly in

- (i) Cuango Basin and
- (ii) limestone, sand and gravel quarrying around Luanda city.

It is hoped that this will influence policy and formulation of regulatory framework for small-scale mining in the country.

1.1 Research Task and Objectives of the Study

1.1.1 Statement of the Problem

The high-quality Cuango gem diamond has attracted, since the 1980's when Government liberalized the diamond sector, an influx of investors, individual and miners. Artisanal mining (also called "GARIMPO") to medium large-scale mining are carried out in Cuango areas.

In spite of the importance of small-scale mining in the country's economy, the public views this activity as wasteful, illegal, disorderly, messy and uneconomical. To most

people, artisanal and small-scale mining is associated with alcohol and drug abuse, tax evasion and smuggling of the commodities involved. Unhealthy working conditions like poor sanitation, contamination of water, etc., prevail in small-scale mining operations. Large-scale mining companies also have a negative view on small-scale mining operations. The big mining companies perceive small-scale mining operations as a nuisance and an activity that robs them of valuable parts of the deposit. As such they do not encourage small-scale mining.

The lack of monitoring and control of alluvial diamond mining have resulted in serious land degradation and deforestation, river course modification, large excavations and dump material. Other environmental problems include, discharge of large quantities of sediments from the small mining operations into rivers, damaging aquatic ecosystem and affecting the water quality.

On the other hand, small-scale mining has its advantages. It provides a number of jobs i.e a source of revenue from which miners can improve their standard of living, health, education, nutrition, clothing and shelter, regulate rural-urban youth migration, and foreign exchange.

Environmental protection is a significant priority for our society. For the government, a major role is to set environmental standards and ensuring that individuals and organisations meet these standards.

Government, industry and community organisations should work increasingly as partners in protecting the environment for present and future generations to.

This study therefore, intends to assess these problems in the alluvial diamond areas of Cuango and related activities of industrial mining such as limestone, sand and gravel in areas around Luanda City.

1.1.2 Objectives of the Study

In the past, environmental issues were not a major consideration for industry or the community when mineral and fossil fuel deposits were being developed. However, the community now expects the mineral resource sector to apply high standards of environmental practices to all projects.

Although the history of alluvial diamond exploration and mining in Cuango Basin is well documented not much is known about environmental damage from these mining activities.

The objectives of the study are therefore to:

- a) assess the mining activities in the Cuango Basin and small-scale mining activities around Luanda City;
- b) assess the land degradation as a result of activities in (a) above;
- c) assess the social conflicts, health and safety for the small-scale miners;
- d) suggest appropriate mining methods that will minimize environmental impacts;

- e) assess the policy framework governing the exploitation of such resources by small-scale miners; and
- f) document the result of the study.

1.1.3 Significance of the Study

There is need for data on the extent and degree of land disturbance, water and soil, and changes in the ecosystem by mining operations. Adequate monitoring and control will help to combat serious environmental hazards presently experienced. It is hoped that the results of this study will contribute to a framework of action to be considered in the mining activities of the Cuango Basin and around Luanda City.

1.2 Methodology

This study involved collection of data from the two areas through field visits. The two areas are:

- (a) The Cuango Basin, northeast of Angola at the Luzamba project which consists of Luzamba, Tazua, Lugerí and Mumbula mines. The mines visited in Cuango Basin are within the Cuango Diamond Mining Division, which is operated by Mining Development Society (SDM).
- (b) Around Luanda City, northwest of Angola, which consists of Cacuaco and Palmerinhas, mines east and south of Luanda City respectively.

In the field, environmental impacts were assessed through photograph taking and interviews. Interviews were conducted at mine sites with mine owners and individual

miners. Mining Development Society (SDM) also provided photographs, which were used in the assessment.

These data were integrated with the existing data and maps at the Geographic Information Systems (GIS) unit at the Ministry of Geology and Mines sector, Angola.

The study conducted at surrounding areas of Luanda City identified environmental impacts related to mining of construction materials for comparison purposes to those of alluvial diamond mining in Cuango Basin, and to produce the adequate measures to mitigate/minimize negative environmental impact.

The field work involved in examining the Cacuaco quarrying area, covers approximately 3000 metres in length, and 1000 metres in width, and that in Palmerinhas, covers approximately 1000 metres in length, and 200 metres in width.

**CHAPTER TWO - GEOGRAPHY, GEOLOGICAL OCCURENCES
AND MINING**

2.1 Study area

2.1.1 Geography

The two areas selected for this study were:

1. The Cuango Basin study area lies within the Lunda-North Province, northeast of Angola about 1000 km from Luanda City covering an area of 105 000 km². The area was chosen because of its importance among all Angolan diamond mining areas including production, potential and gem diamond quality (Fig. 2.1).
2. The around Luanda City study area lies within Luanda Province, east and southwest of the city of Luanda about 10 km and 20 km respectively. The area was chosen in order to study the impact of quarrying limestone, gravel and sand on the environment.

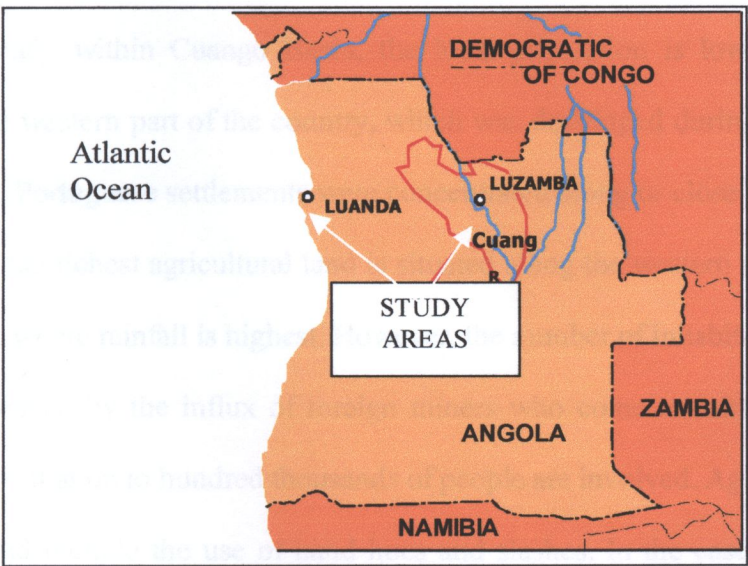


Fig. 2.1 Location of study areas, Angola

2.1.2 Topography

Cuango Basin landscape includes a gradually rolling and hilly terrain. Soil consists of laterite, clay, rubbles, and gravels especially in depressions or river valleys. Around Luanda city, landscape is a coastal lowland, which gradually rolls to the Atlantic Ocean. Soil consists of sand and gravel with outcrops of limestone in Cacuaco area.

2.1.3 Climate and Vegetation

The Cuango Basin is in a tropical rain forest type of climate with an average annual rainfall of 1500 mm and an average annual temperature of 20°C. Vegetation consists of open woodland of short trees and grass. Luanda is in subtropical humid rain coastal type of climate with an average annual rainfall of 850 mm and an average annual temperature of 25°C. Vegetation consists of savannah with shrubs.

2.1.4 Population and Agriculture

Demographically within Cuango Basin, the local population is low because people moved to the western part of the country, which was developed during the colonial era than the east. Portuguese settlements were concentrated along or close to the west coast, and some of the richest agricultural land is situated along the western central belt of the high plateau, where rainfall is highest. However, the number of inhabitant in the basin is largely influenced by the influx of foreign miners who come to mine diamonds. The statistics show that up to hundred thousands of people are involved. Agriculture methods are simple and include the use of hand hoes and slashes. In the case of Luanda City,