

# Impacts of Mining on Environmental and Social Safeguards in Maniema, Case of Mining Squares in the Territory of Pangi (DR Congo)

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**Abstract:-** The objective of this study is to assess the various environmental risks related to mining to which the local populations are exposed in the territory of Pangi in the Province of Maniema. Three methods were used to carry out this study, firstly the documentary review, secondly the observatory prospection of the mining sites of the territory of Pangi along with individual surveys, and lastly, the interviews. The results showed that in all the mining sites concerned by this study, 81% of the people met for the interview and accepted to have known the existing conflicts between the local populations and the extractive companies. A representative sample of 100 people from all the local populations of the ten mining sites was selected for the quantitative research purpose. For the existence means of reducing environmental impacts, 96% of those surveyed affirm that no means of reducing environmental impacts were put in place, while 87% believed that mining in all sites accompanied by environmental degradation. When environmental impacts related to mining were interviewed, 90% cited the pollution of water sources, 80% of soil degradation, 68% cited the reduction of agricultural production, 65% cited the deforestation and 27% cited the disruption of ecosystems. For exposure to the risk of accidents and STIs/HIV, 90% claim to be aware of this exposure. As for the risks of decreasing agro-pastoral production, our surveys revealed that 54% agreed with these risks and 34% disagreed.

**Keywords:-** Environment, Exploitation, Degradation, Safeguard, Pangi.

## I. INTRODUCTION

The DRC is one of the countries in the world that has enormous potential in terms of natural resources, particularly in mines, hydrocarbons, energy, forests, fresh water, etc. (IPSA Regarding mineral resources, the DRC has diamonds, copper, cobalt, tin, gold, niobium, uranium, etc. They are mainly concentrated in the southern and south-eastern parts of the country (cobalt, copper, zinc, silver, germanium, and uranium), in the East going towards the North-East (gold, tantalum, niobium, tin, etc.), in the center

and south-west (diamonds, platinum), the littoral zone in the east (phosphates, aluminum, copper, gold, zinc, vanadium, petroleum, and natural gas) and in the west (aluminum, phosphorus, salt, diamond, gold, lead, zinc, vanadium, copper, manganese, iron, marble, cement limestone, tar sands, petroleum, natural gas, industrial minerals). These resources are in the form of either mineral showings or economically exploitable mineral deposits or deposits Ministère national des Mines RDC (2016).

The distribution of mineral indices, deposits, or deposits is based on data from the mineral deposit map, the archives of the Museum of Tervuren (Belgium) as well as recent data from artisanal mining or other field studies. Concerning the other substances listed in certain provinces, they are generally presented in the form of indices for which in-depth studies are necessary for their evaluation.

Despite these strengths, the Congolese economy is still fragile and vulnerable to climatic hazards and exogenous shocks. The incidence of poverty remains high, and achieving Sustainable Development Goals (SDGs) remains a concern and a major challenge that requires sustained efforts. The fact remains that much work remains to be done in terms of good governance in the management of the extractive sector and in improving the environmental impacts associated with mining. This exploitation is done in an industrial and artisanal way. At all levels, the effects on the environment are noticeable. These operations present risks to the environment and society USAID (2017).

The province of Maniema is no exception: high expectations or strong suspicion in certain areas have already led to disappointment and grievances. A host of benefits can come from mining investments, but governments, companies, and communities each have a role to play in managing the potential costs. This research focuses on potential benefits, and environmental, social, health, and safety guidelines, but the potential costs should not be underestimated. Generally, as can be demonstrated through initiatives such as asset accounting and valuation of ecosystem services, mining diminishes national mineral, faunal and floral resources. It also has environmental and social impacts that can damage biodiversity and/or affect

communities. It is essential to promote the right policies and/or practices to take advantage of the positive aspects. But it is at least important that the appropriate capacities are in place to monitor operations and manage the sector. Reflection on the institutional framework as well as on capacity-building strategies is essential in this regard.

In most cases, the legal texts in force in African countries show the requirement of environmental and social assessment for this type of activity (mining) but the strength would be to recognize that this tool should make it possible to prevent and manage risks and disasters, is not properly used or remains ignored by some actors. **World Health Organization (1946).**

The repercussions on the environment and society become catastrophic, especially when the use is artisanal and poorly controlled.

Despite the perceptible negative consequences, gold panning and mining activities continue to develop, because they constitute a source of income for a good part of the population. Moreover, the awareness role that the State and organizations must play to raise awareness suffers from shortcomings, International Alert (2009). On the other hand, the risk analysis in the environmental assessment process, when it is carried out, remains insufficient due to the lack of mastery of the approaches, methods, and information processing. The various fields of application of environmental assessment in the prevention and management of disasters, both at the level of the implementation of specific projects and at that of strategic planning at the level of African countries, make it possible to take stock of practices, in this regard, seem to be misunderstood or poorly applied. The specific case of the environmental assessment process applied to the prevention and management of disasters in mining in the DRC was targeted for this research. It aims to enable lessons to be learned to promote best practices conducive to the protection of the environment and society, UNEP, 2012.

**Christine (2014)** In her work presented at the University Center for Training in Environment and Sustainable Development, entitled: *Environmental impacts and mitigation measures related to the exploration and exploitation of uranium mines*. The author talks about the remediation measures applied to limit contamination in the environment, such as the excavation of mine tailings, the covering of waste rock with layers of soil and water treatment. The author shows that these measures were poorly known. It goes on to show that today the rehabilitation measures envisaged for the site include better design of soil covers and a permeable reactive barrier. It shows that these measurements are expensive and complex, for the reason of lack of knowledge on the migration plume of contaminants, as Mudd and Patterson in 2010.

**Cordaid (2015);** In studies on Mining in the heart of rural areas: what development for local communities? Fully understand the perception, expectations and priorities of

local communities as well as the impact of mining in South Katanga, Democratic Republic of Congo.

In this article, Cordaid demonstrates the inadequacies observed at the level of the institutional framework where it notes the exclusion of local institutions in the management of the sector against a strong concentration of attributions at the central level. The conclusions of the study make it possible to identify the negative effects resulting from the inadequacy of the legal and institutional framework on the life of local communities who have seen their economic and social status degraded by extractive activities. The author has come to conclusions that environmental concerns are growing in the region and mainly concern water pollution, biodiversity and soil degradation, and their effects on public health. The author concluded the section with a summary table of the priority problems and expectations of the communities by theme.

**Mangambu et al. (2021)** arrived at the results according to which: After the analyzes on the consequences of the mining of the Chinese company, their study showed that 76.63% of the population surveyed are neither trained nor made aware of the new mining code amended in 2018 by the DR Congo and 79.5% do not master the new law or their rights. In this study, the authors confirmed that currently, the watercourse appears as important receptacles of tensions and conflicts, because of the major abuses that have been observed during mining in the territory of Banalia. They consider this attempt of exploitation as illicit which is associated with many negative phenomena, such as land disputes, human rights violations, disturbance of the aquatic ecosystem and cavalier procedure in disregard of the regulatory and legal process. Faced with this danger, the authors have decided to issue a cry of alarm to alert society to the ecological, environmental and socio-economic disaster that awaits the local populations of Aruwimi and thus express their disapproval of this mining operation.

## II. MATERIAL AND METHODS

### A. Environment

The territory of Pangi is located south of the equator between 2° and 4° south latitude, and between 25° and 28° east longitude. Its area covers an area of 14,542 km<sup>2</sup> or 10.9% of the total area of the province of Maniema.

### B. Methods

For this study, the following methods were used:

#### ➤ Document Review

During this method, it was a question of exploiting the available documentation concerning, on the one hand, the analysis of the environmental impacts related to mining exploitation and on the other hand, the institutional and normative framework of the mining sector. in the DRC.

#### ➤ Qualitative Research

For this step, it was approached in two parts:

- *Part 1:* Meet experts in the mining field to take stock of the major challenges by the situation of environmental impacts
- *Part 2:* Meet the opinions of non-expert and non-operating people, especially civil society actors and some local customary authorities on the situation of environmental impacts.

For this study, a representative sample of 100 people from all the local populations of the ten mining sites was selected for this purpose.

*C. Sampling Method*

The area survey as part of the study's sampling, from a grid of mining sites in the territory of Pangî, the areas was noted according to the axes reported by the experts met, as reported in the qualitative research.

The selected mining squares are Mumbizi, Lutala, Mukombe, Moka, Lubile, Kayeye, Kangumbu, Nsolo, Tchelu, and Kampene. In each square, 10 people were interviewed

The field interviews focused on mining governance and compliance with environmental, health, and safety guidelines in the mining squares of Pangî territory.

The content of the interviews was around the following points:

- The existence of complaints from populations living near mining sites against extractive companies and administrative authorities regarding mining governance;
- The methods of registering and managing complaints;
- The actors involved in the management of complaints;
- The existence of social and economic conflicts related to mining governance;
- Means of reducing environmental impacts
- The open forum (comments/remarks/observations)

At the end of the interviews, we moved into the observation phase, to take stock of the state of play of mining sites in the territory of Pangî.

**III. RESULTS**

Table 1 Challenges and their Impacts in the Mining Sector of the DRC According to the Experts Met.

Challenges	Impacts
Energy deficit	- Difficult to establish industries for the transformation of mines in the country; - Low added value.
Decline of transport infrastructure	- Difficult evacuation of ores; - Discounted cost of minerals in mining areas.
Lack of control	- Fraud in the mines; - lack of preliminary studies for sustainable mining; - Underestimation of socio-environmental impacts; - Poor support for community needs; - Low revenue mobilization in the mines;
Administrative and security hassles	- Development of a culture of civic incivility; - Discouragement of investors; - Insecurity, Killings; - Low revenue mobilization in the mines;
Proliferation of artisanal mining quarries	- Attraction of the low-yield mining sector which causes food insecurity in the mining areas

*A. Existence of Complaints from Local Populations Against Extractive Companies*

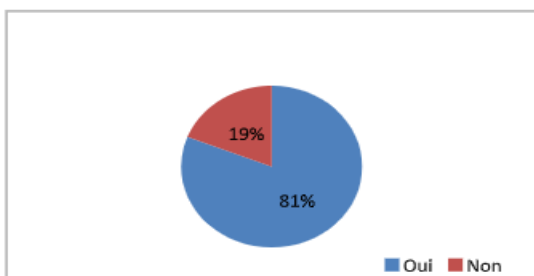


Fig 1 Existence of Conflicts between Companies, Local Populations and Extractive Industries.

In all the mining sites concerned by this study, figure 1 shows us that 81% of the people who met for the interviews, accepted to have known the existing conflicts between the

local populations and the extractive companies in the territory of Pangî.

*B. Methods of Registering Complaints*

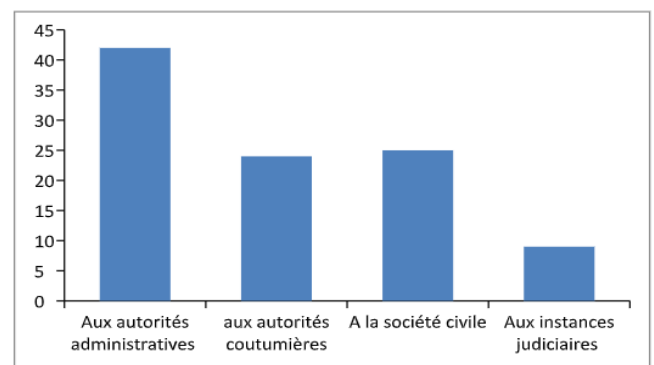


Fig 2 Complaint Recording Mode

It appears from the result of figure 2, that several complaints, that is, 42% are directed towards the administrative authorities, and 28% of complaints are directed towards the customary authorities. It is noted that the judicial bodies receive less than 10% of all complaints related to mining in the territory of Pangsi.

C. Means of Reducing Environmental Impacts

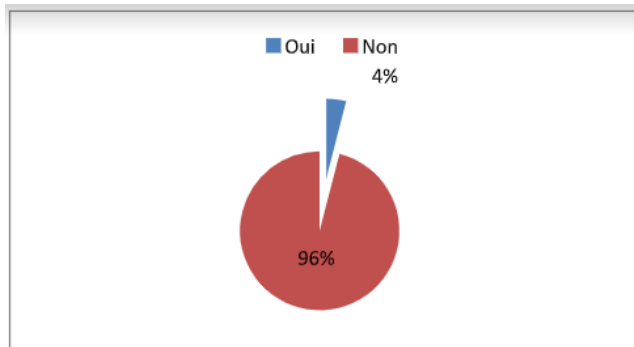


Fig 3 Existence of Means of Reducing Environmental Impacts

The analysis of this figure 6 shows the inexistence of means of reduction of the environmental impacts related to mining exploitation. 96% of respondents say that no means of reducing environmental impacts has been put in place by extractive companies. On the other hand, 4% say that these companies are implementing some means of reducing the impact.

➤ Comments and Observations

According to the data in Figure 3. Compliance with environmental and social safeguards in mining in the territory of Pangsi is not observed as such and is yet an obligation of mining companies. On the one hand, we observe the silence of the supervisory authorities and the bad faith of the extractive companies based in the territory of Pangsi. Some 4% who accepted the implementation of these means of reduction referred to the planting of ornamental trees in the mining squares of Kampene and Kikungwa. During the interviews, respondents expressed the wish to recruit a local unit in charge of managing the environmental component as a requirement on the part of extractive companies.

➤ Analysis of the Perception of Communities Living Near Mining Sites on Mining Governance and the Management of Environmental Impacts

The analysis of the perception of the populations living near the mining sites on mining governance and the management of environmental impacts focused on the following themes:

- Knowledge and understanding of environmental problems around mining sites;
- Perception of exposure to risks and dangers related to environmental impacts;
- Assessment of the degree of exposure to risks and dangers related to environmental impacts;
- Perception of human impacts of mining.

➤ Knowledge and Understanding of Environmental Issues Around Mining Sites

It is a question of assessing the knowledge of the local communities on the environmental impacts related to mining on the one hand and appreciating their ability to apprehend the extent of the impacts related to the degradation of the environment.

D. Knowledge of the Link Between Environmental Degradation and Mining

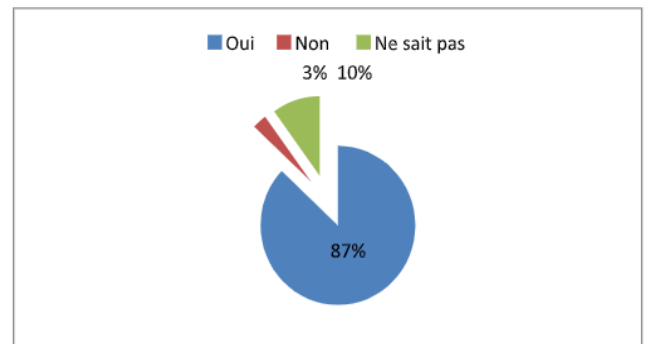


Fig 4 Perception of the Link between Environmental Degradation and Mining.

Our surveys revealed that 87% of those interviewed believe that mining in all mining sites in Pangsi is accompanied by environmental degradation. Thus, they assert that there is a connection between the two.

10% of these respondents are perplexed by the link between mining and environmental degradation, unlike 3% who are not convinced of the link between the two.

E. Knowledge of the Main Environmental Impacts of Mining

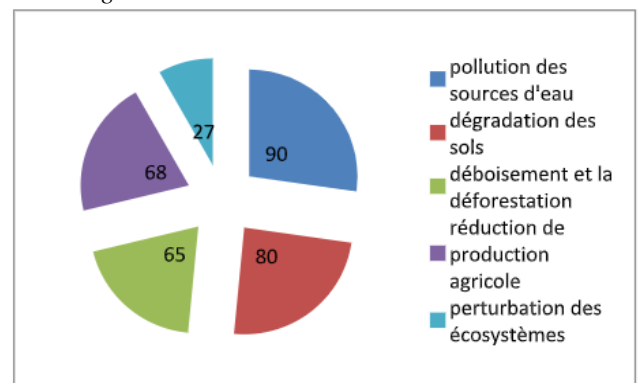


Fig 5 Distribution of Respondents According to Known Environmental Impacts Related to Mining

It follows from this figure that respondents know the environmental impacts related to mining. 90% of those interviewed cited the pollution of water sources (82%), 80% spoke of soil degradation, the reduction of agricultural production was cited by 68% while deforestation and deforestation were cited by 65% and disruption of ecosystems was cited by 27%. Based on this observation, it can be said that the populations living near mining sites are aware of the consequences of mining on their environment.

**F. Distribution of Respondents According to the Perception of their Exposure to Atmospheric Pollution by Gases**

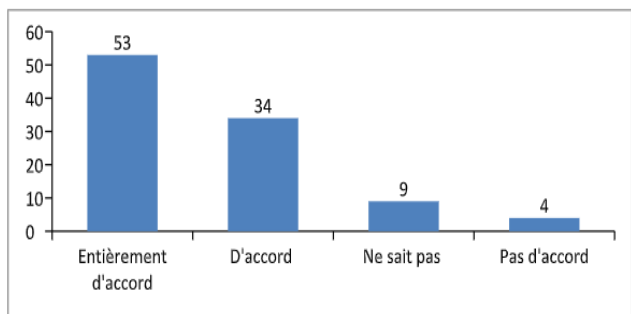


Fig 6 Perception of Exposure to Physico-Chemical Water Pollution

Reading the figure above, we observe that a large part of the population living in riparian environments is very aware of the physicochemical exposure of groundwater and surface water in their living environment caused by mining...53% fully agree with this exposure and 34% agree.

**G. Perception of Exposure to Land and Landscape Degradation by Solid and Chemical Waste**

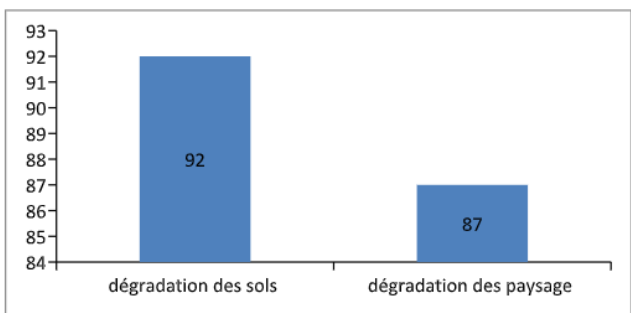


Fig 7 Distribution of Respondents According to the Perception of their Exposure to Soil and Landscape Degradation by Solid and Chemical Waste

Observation of the content of Figure 7 reveals that several people living in mining areas, i.e. 92% claim to be aware that their area of residence is exposed to soil degradation and 87% are in agreement with the degradation of their landscape due to the discharge of solid and chemical waste from mining.

**H. Knowledge of Exposure to Loss of Flora and Biodiversity**

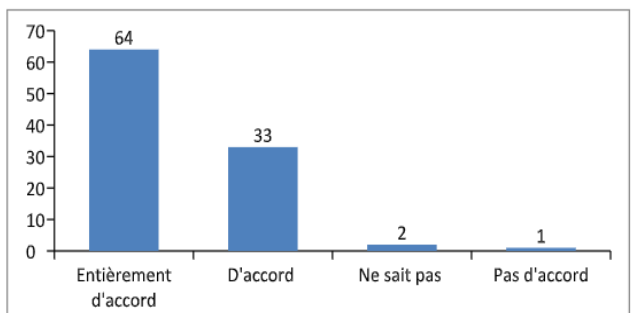


Fig 8 Perceived Exposure to Loss of Flora and Biodiversity

To the question: your area of residence could currently be exposed to the loss of flora and biodiversity due to mining. A large majority are aware of the situation, 63% of respondents fully agree with this loss and 33% agree that their environment suffers similar losses.

**I. Perception of Exposure to The Risk of Accidents and Stis/Hiv**



Fig 9 Assignment of Respondents According to the Knowledge of Exposure to Accident Risks and STI/HIV

In the question of whether we know the environmental media mining sites could be exposed to the risk of accidents and STIs/HIV, a high proportion of respondents, ie 90%, claim to be aware of this exposure.

**J. Knowledge of Exposure to the Risks of Reduced Agropastoral Production**

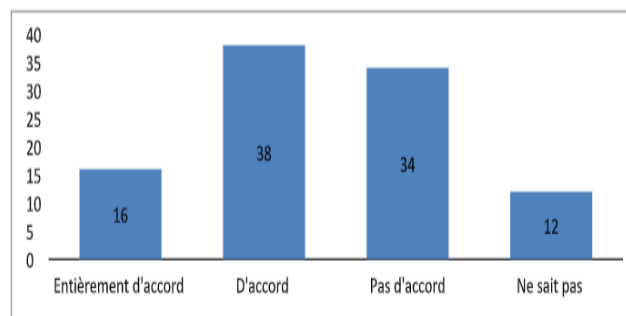


Fig 10 Assignment of Respondents According to the Knowledge of Exposure to Risks of Reduced Agropastoral Production

In our surveys on this risk of exposure to the decrease in agricultural production in mining areas, more than half of the respondents are aware that mining operations are the basis for the decrease in agro-pastoral production in the disturbance of natural ecosystems and climate change. Indeed, at least 34% disagreed.

**IV. DISCUSSION**

After analysis of the opinions and observations on the degree of exposure to the risks of physical and chemical pollution of water in the mining centers of the territory of Pangsi, in general, the perceived risk linked to Physico-chemical pollution of the water remains still high. The situation is not so ignored by the local population.



### A. Measures to Consider for Risk Reduction

The risk factors and conceptual site model, within the framework of contaminant risk principles, also provide a baseline from which to manage and mitigate the health risks of contaminants in the environment. The basic principle is Interim Risk Management, Detailed Quantitative Risk Assessment, and Permanent Risk Reduction Measures (World Bank Group 2007)

Considering the degree of exposure to the risks of soil and landscape degradation linked to mining in the study area, in the eyes of the population, and the opinions of experts in the mine, it is noted that these risks are relatively high.

After observations and interviews with the target people of this study, it was noted that the degree of exposure to the loss of flora and biodiversity is globally high. Generally speaking, the perceived risk associated with accidents and STIs/HIV seems relatively high for the majority of respondents. This reality joins the 2021 rural health report.

- Actions to take inspection, testing, and calibration
- Worker health check
- Personal Protection Training (World Bank Group 2007)

### B. Recommendations and Suggestions

#### ➤ To researchers:

- Work on management, evaluation and monitoring systems for mining operations adapted to the realities of the DRC

#### ➤ To the Congolese Government:

- Strengthen the capacities of actors in the control of socio-environmental impacts and support and supervision of artisanal, semi-industrial and industrial operations
- Rehabilitate transport infrastructure (roads, rivers and railways, etc.)
- Restore the authority of the State in the mining areas of the DRC to secure investors;
- Create consecration frameworks at all levels (Villages, Grouping, Decentralized Territorial Entity, Province and National
- Promote research in aspects of environmental and social safeguard.

#### ➤ National and international investors

- Respect the law on mining in the aspects of environmental and social safeguard;
- Work in collaboration with scientists;

#### ➤ To the international community

- To support the DRC with the working tools in the aspects of environmental and social safeguards;
- Get involved in the issue of peace in the mining areas of the DRC

## V. CONCLUSION

This study, which was conducted in the territory of Pangi, focused on the environmental impacts related to mining in this area, on the one hand, it made it possible to measure the knowledge of the environmental impacts related to the mining of local populations and on the other hand, to take stock of the environmental impacts linked to mining. The analysis of each impact evaluated in this study showed that the risks at all levels remain high. Also, we noted that the majority of the population is aware of these environmental risks.

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