

Pragmatic Vision of the Socio-Economic Impacts of Semi-Industrial Mining On the Aruwimi River: A Bad Paradigm on the Rivers of the Congo Basin (Basoko Territory, DRC).

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Abstract:

The socio-economic impacts of major mining projects are complex and controversial. Their effects on water create a considerable ecological imbalance in both the environment, the economic and social characteristics of the indigenous people. The study was conducted in the villages of Liambe, Likombe, Ilongo-Mbutu, Ilongo-Koki, Yangonde-Lioto, Yakoyo, Bomane, Baonde..., in the Territory of Basoko (DRC), which are targeted for semi-industrial diamond mining. The research was used an action-research approach which was completed by three techniques (documentary, focus-group and semi-structured interview). Mining projects are likely to adversely affect the environments, communities, and economies inherent in the projects and their contexts. Mineral exploitation often creates wealth for a category of people; however, it can also cause considerable disruption. The benefits and consequences can be inequitably shared. Mining at the targeted sites could generate consequences such as: the vulnerability of indigenous and riparian people, when the relationship between the authorities and other sectors of the economy are weak, and immigration and demographic transition could also affect the social cohesion and customs of communities and disrupt the social and economic structure, to satisfy the selfish desires of others. The project could even disrupt the ontological balance of the people. Starting the development of an entity by mining without taking into account the socio-cultural aspects of the population, would be like beginning the construction of a house from the roof. Hence our survey on a certain awakening of the collective conscience. The present survey is an instrument for collective awareness

Key Word: Controversy, mining, socio-economic impacts, Aruwimi River, Basoko Territory, DRC.

Date of Submission: 29-08-2021

Date of Acceptance: 12-09-2021

I. INTRODUCTION

Currently, at global scale, water constitutes a major political and economic issue. Water is, in fact, a subject of controversy, even conflict between States, and within certain States, between the different powers and interests that direct or claim to direct its appropriation and use, and influence its production, uses and control (BOUGUERRA, 2000). The mining industry has been widely targeted in the debates on the real economic effects of extractive industries. The abundance of natural resources was long considered a powerful vector of economic growth. This view was criticized in the pioneering work of PREBISCH (1950) and Singer (1950).

Their theories predicted the slow deterioration of developing countries' terms of trade and the destruction of the environment through the unbridled exploitation of non-renewable resources, despite the application of the principle of social and environmental impact mitigation and compensation procedures that are well established in Extractive Industry development processes (DALY, 1990; VILLENEUVE, ET AL., 2016). The environmental impacts associated with the mining industry are numerous and variable depending on the phases of a mine's life cycle. They can, temporarily or permanently affect water, air, soil, biodiversity, and especially human life, in particular that of indigenous people. Furthermore, mining activities affect the surrounding communities, mainly employees and their families, local communities, and those living in the vicinity of the mined sites. A considerable amount of social and cultural disruption and impairment has been observed, which

also raises ethical questions. These impacts vary according to the level of development of the country involved (ECAAU "ECONOMIC COMMISSION FOR AFRICA AND AFRICAN UNION", 2011; LAFORCE ET AL., 2012).

This contrasting picture is intimately linked to policies and regulations in place, the effectiveness of their application, the local culture and social structures. Mining exploration and exploitation undoubtedly disrupt indigenous' ways of life, customs and symbolic values (CIMM "INTERNATIONAL COUNCIL ON MINING AND METALS", 2010; ELAW "ENVIRONMENTAL LAW ALLIANCE WORLDWIDE", 2010). The occupation of their lands and displacement, the influx of non-indigenous workers, and the shift from a local subsistence economy to a market economy driven by large cash flows can affect community cohesion and social order.

When training and affirmative action are not taken prior to mining exploitation, local labor is often limited to menial and ancillary jobs. However, the suspected or proven impacts of extractive resource development on communities, their economies, and the environments on which they depend continue to generate strong reactions, tensions, and conflicts, especially among indigenous communities (DALY, 1990; COSTANZA ET AL., 2013). A large influx of foreign workers can not only impact local infrastructures, but also undermine social networks, local decision-making structures, traditions, customs, and practices: moral depravity, prostitution, delinquency, and other forms of lawlessness and criminality, including cultural conflicts between foreigners and natives. For a deep understanding of predictable and possible environmental impacts of mining exploitation, this paper focuses on the analysis of the socio-economic impacts of mining in the Aruwimi riverbed in Liambe and its surroundings.

II. METHODOLOGICAL APPROACH

Study environment

The Territory of Basoko covers an area of 22. 436 km², located at an altitude that varies between 120 and 800 m, a latitude of 1 to 2° North and a longitude of 20 to 26° East, with an estimated population size of 332,117 inhabitants (i.e., 15 inhabitants/Km², Figure 1). Basoko Territory is a Deconcentrated Territorial Entity (DTE) in Tshopo Province, Democratic Republic of the Congo, Figure 1 (source: BASOKO CIVIL STATUS OFFICE DATA 2016).

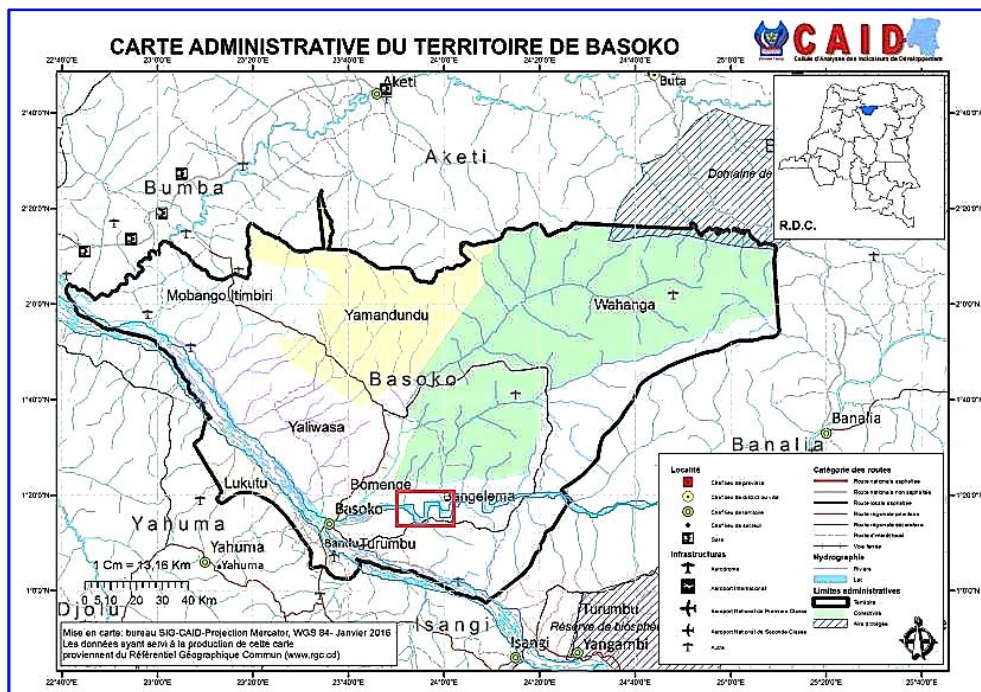


Figure 1: Map of Basoko Territory: Chiefdoms, Sectors and Planned Site for Semi-Industrial Mining by Xiang Company (Source: Modified CAID Development Index Analysis Unit Map).

Its climate is equatorial with alternating dry and rainy seasons. The dry season runs from mid-December to mid-March, while the rainy season runs from mid-March to mid-June for crop season A; and from mid-June to mid-August and mid-August to mid-December for crop season B. Its average ambient temperature is higher than or equal to 25°C. The thermal amplitude is null, the rainfall is abundant and not uniformly distributed during the year. The maximum rainfall is recorded in April and October. Humidity and heat are constant (ANONYMOUS, 2016).

Its relief is dominated by large areas of flat land with several small hills. The soil being suitable for agriculture, the establishment of large fields of basic foodstuffs (cassava, plantain, corn, rice, soybeans, beans, etc.) was essential to fight against the food deficiency. Its subsoil is rich in minerals (gold, diamond..., ANONYMOUS, 2016).

The vegetation of Basoko Territory is dominated by the equatorial evergreen forest, which is primary or secondary, where usable tree species such as *Afromosia* (Mogoya), *Gilbertiodendron dewevrei* (Limbalu), *Pericopsis elata*, *Milicia excelsa*, *Uapaca guinensis*, *Prioriabalsamifera*, *Entandophragmasp* (Liboyo), etc., dominate. The key species of the Basoko fauna are: Hippos, Crocodiles, Elephants, Monkeys (Common Chimpanzee, Colobus, Baboon...), Snakes (Vipers, Pitons, Mambas...), diversities of birds and freshwater fish, for example *Clarias* sp. (Ngolo), *Auchenoglanis* sp. (Foka), *Hydrocynus* sp. (Mbenga), *Distichodus* sp. (Mboto), *Heterobranchus* sp. (Kamba) (ANONYMOUS, 2016).

Its hydrography is dominated by two major affluents: the Aruwimi and the Itimbiri. The first flows into the Congo River at Basoko on the right bank of the Congo River, and the Itimbiri flows into it at Moenge (about 100 km west of Basoko). The Aruwimi River, our study site, is also named Lohale by the population of Basoko. It flows in the North and North-East of the country, in the regions of Ituri, Uélés, and Tshopo. Its upper reaches are called Ituri. The Ituri River originates in the savannah region north of the Kibali River basin. It then mainly flows southwest from Kibali until it is connected to the Shari River which flows near Bunia. It then shifts westward through the legendary Ituri Forest. It becomes Lohale from the confluence with the Nepoko (or Nepoki) River at the locality of Bomili in Bafwasende Territory. Always towards the West, the Lohale flows into the Congo River on the right bank at Basoko.

Data Collection and Factual Analysis

Data collection was conducted through action research, which is a research conducted in such a way that social actors are subjects of the research and are themselves involved in identifying and developing a solution to the problem being studied (NEILSEN, 2006; COGHLAN, 2011). In other words, action research is a research approach linked to the pragmatism paradigm, which assumes that it is through action that scientific knowledge can be generated that is useful for understanding and changing the social reality of individuals and social systems. This intention to change as a motivation for undertaking research goes beyond the simple description, understanding, and explanation of phenomena that is usually associated with research (ROBSON, 2011).

This pragmatic utility-based conceptual analysis method differs from traditional literature review approaches in that it meets the scientific quality criteria of research in management science, and provides a sufficiently robust diagnosis that allows for informed decision making (REASON & BRADBURY, 2008). As a result, critical appraisal of the literature is assured. It clarifies the theoretical confusion surrounding a given concept and increases knowledge.

As stated in the introduction, our goal is not to clarify all of the semantic and conceptual diversity related to mining, but rather to show the socio-economic impacts of mining in a river, a source of life without complexity or influencing people's needs assessment processes (GREENWOOD & LEVIN, 2007; BRYDON-MILLER & GREENWOOD, 2006).

In addition to the first method, we also used three main techniques. These include documentation (consisting primarily of historical archives), focus groups, and individual interviews (TOURÉ, 2010). Documentary (historical) sources are valuable in studies of the consequences of mining on local knowledge and practices, as MARCHENAY (2005) points out. The information collected from the archives because of its historical value, was further triangulated through the collective memories of the communities studied and individual interviews. Focus groups, as defined by GAVARD-PERRET ET AL. (2011) and MOREAU ET AL. (2004), were administered to communities to understand their perceptions of non-artisanal mining. This latter aspect is consistent with MOREAU ET AL. (2004) and TOURÉ'S (2010) view that "*exchanges promote the emergence of knowledge, opinions and experiences as a chain reaction*".

III. INTERPRETATION AND DISCUSSION OF THE PRAGMATIC VIEW OF THE SOCIO-ECONOMIC IMPACTS OF SEMI-INDUSTRIAL MINING ON THE ARUWIMI RIVER

The exploitation of natural resources causes change. Such projects have the potential to negatively affect the environment, communities as well as the economies in and around project sites. Economic, social, and environmental changes are interrelated. For example, impacts on ecosystems can disrupt the environmental services provided by those ecosystems and the economies and livelihoods of people dependent on those services.

Mining Social Impacts Paradigm

Social Impact Assessment (SIA) is a process for understanding and responding to social issues associated with mining (COMINAK 2012; COLLIER, 2014; WOYNILLOWICZ, 2020). This study focuses on how to identify, prevent, mitigate, and exacerbate the consequences for communities. And the process is most effective when done as an iterative process over the life cycle of exploitations rather than as a one-time activity at the end of the exploitations (VANCLAY 2003; BECKER AND VANCLAY, 2011). Originally conceived as a tool to predict the impacts of proposed projects prior to exploitation, HIA is actually considered as including systems and strategies undertaken during the implementation phases of an exploitation (including exploration) to proactively monitor, report, evaluate, revise, and respond to change. A social impact is something that is experienced or lived (real or perceived) by an individual, social group, or economic unit (VANCLAY, 2002).

Social impacts and the effect of an action

Social impacts are the effect of an action (or lack of action); they can be positive or negative. Social impacts are distinct from social change processes, in part because different social groups may experience social change differently depending on their circumstances (VANCLAY, 2002). The study of social impacts allows identifying key issues from the perspective of entities potentially affected by projects; predicting and anticipating change; and embedding these understandings in ongoing systems and strategies in order to proactively respond to the consequences of exploitation (VANCLAY, 2002; VANCLAY&ESTEVEZ, 2011).

Mining as a resource for changes in the human environment:

Mining projects have the potential to negatively affect the environments, communities, and economies at or near the project site. At the same time, they may generate opportunities through the conversion of natural resources into financial resources, the development of social capacities and skills, the development of infrastructures and businesses, and the investment of these resources in promising environmental and social programs that lead to growth and socio-economic development.

Economic, social, and environmental changes are interconnected. Impacts on ecosystems can disrupt the environmental services provided by those ecosystems as well as the economies and livelihoods of people dependent on those services. Impacts are also dynamic (BROWNE ET AL., 2011). For example, new employment opportunities often seen as a key benefit of projects may actually result in social challenges if the required skills by the industry are not locally available, or are slow to develop through job training programs (WOYNILLOWICZ, 2020).

Planned and unplanned migration of workers into the region associated with population growth may also result in greater needs for social services such as health, education, housing, commerce, and physical and social infrastructure (VANCLAY, 2002). Population growth, if well managed, could be a driver for infrastructure and service development. However, the long time required to improve existing services and infrastructure can become challenging in many resource-rich regions.

Impacts of mining projects on social values

In Black Africa, social values are sacred and their impacts are considered a malediction or a blessing depending on whether they are positive or negative. Immigration and demographic transition can bring changes and affect social cohesion, community customs, and disrupt social order. When male workers constitute a significant part of the workforce, prostitution and open cohabitation almost automatically emerge. In the case of formally organized enterprises, labor camps can generate conflict and frustration among the locals if they are not well integrated into the local communities. Mining exploitation can also disrupt existing land use and activities such as agriculture, tourism, fishery and hunting.

As logging activities expand, the demand for goods and services may result in higher prices (PNUD 2016). People working in the service industry and in agriculture, which generally do not generate the same income compared to the workers in the resource sector, experience an erosion of their purchase capacity, making it difficult for them to survive on a daily basis. On the other hand, resource exploitation, if properly planned, would provide opportunities to strengthen local businesses and economies and generate revenues and taxes, which in turn would provide financial and material resources to local government. The way in which change occurs also influences the way in which that change is experienced by the society. When all stakeholders (the state, the local population, and the company) have the opportunity to actively participate in decision-making on resource exploitation, and to ensure that projects are consistent with their values and livelihoods, their support for these operations tend to be more positive, as will be their attitudes towards the project (PNUD 2017).

Public participation can take the form of local community consultation, opportunities for civil society participation in impact assessment processes, or more active participation such as involvement in community reference panels or environmental and social monitoring initiatives. Mineral development sometimes creates wealth for a category of people, but it may also lead to considerable disruption. Mining projects can create jobs,

roads, schools, and increase the demand for and supply of goods and services in remote and landlocked areas; the benefits and consequences may be unevenly shared (VANCLAY, 2002), creating frustration for those who do not benefit.

If communities consider being unfairly treated or insufficiently rewarded, mining projects could lead to social tensions and violent conflicts, as is currently occurring in Liambe, where indigenous villagers, nationals from the entire Basoko territory including the civil society, local Asbl, local leaders and local and provincial political-administrative authorities do not share the same view of the project. Do not have the same vision of the project.

There is a prevailing opinion that a handful of nationals have already benefited from bribes. Therefore, the social climate is critical and explosive. The violent reaction of the population of Liambe against the mixed delegation of Basoko authorities, the civil society, and the representatives of the Chinese company in December 2020 revealed the early frustrations experienced.

In general, African sub-Saharan governments underestimate or seem to ignore the underlying impacts of any mining project on local populations. Communities are most vulnerable due to poor connections to government and other sectors of the economy, and when the environmental impacts of mining (soil, air, and water pollution) affect their livelihoods. In the DRC, experience has shown that the different levels of power (national, provincial and local) often appear to be impotent when communities contradict the potential for change imposed by powerful companies supported at the top of the state. Instead, the government should reinforce the mechanisms for local communities to play an effective role in decision-making.

However, in most cases, mining activities do not guarantee basic human rights. And the affected communities are not always respected or listened to (EBA'AATYI ET AL., 2009). Basic rights include the right to control and use land for subsistence; the right to clean water, a safe and healthy environment and livelihoods; the right to be protected from intimidation and violence; and the right to be fairly compensated for losses (WORLD BANK, 1992A).

Human displacement and resettlement

Industrial mining can only lead to a massive migration of populations, sometimes the entire community. In fact, the village and its clans could splinter and disintegrate in order to settle either upstream, downstream, or in front of the current site, or even to hide deep into the forest in life-saving strategy. Any mining operation in the Liambe area will inevitably generate an unregulated movement for the local populations. One should expect a delocalization of clans combined with a chaotic occupation in the forests and along the banks of the localities of *Likombe, Ilongo-Mbutu, Ilongo-Koki, Yangonde-Lioto, Yakoyo, Bomane, Baonde...*

This suggests the possibility of encroachment and the duplication of former land boundaries and the disruption of the village and clan topography. Faced with such a situation, bloody land conflicts are expected to be inevitable. According to the International Institute for Environment and Development (IIED): "Displacement of established communities is a major cause of resentment and conflict associated with large-scale mining developments" (CORKAL ET AL., 2020). Entire communities may be uprooted and forced to resettle elsewhere, often in colonies built for the purpose, and not necessarily in settlements of their own choice. Beside the loss of their homes, communities also can lose their land and thereby their livelihoods. Community institutions and power relations may also be disrupted. Displaced communities are often relocated into areas without appropriate resources, some are abandoned next to mine sites where they may endure the burden of pollution and contamination (FRANKS ET AL., 2009).

Forced resettlement can particularly be devastating for indigenous communities who have developed strong cultural and spiritual ties with the lands of their ancestors, and who may find it difficult to survive when these ties are disrupted. The influx of newcomers can have a deep impact on the native inhabitants, and conflicts can arise over the land boundaries and benefit sharing. The cases of Hutu and Tutsi in Kivu, and Hema and Lendu in Ituri clearly illustrate this point. The fratricidal war between the Hema and the Lendu, beyond the political instrumentalization, has its roots in land conflicts generated by non-consensual settlements several decades ago. The two factors above mentioned are among the causes leading to violent uprisings or rebellions and other armed conflicts between peoples. It is therefore crucial that, before any exploitation, all the hidden dimensions of large-scale forestry and mining projects are addressed, rather than solely focusing on the subsequent financial and material benefits. Moreover, the claim by the authorities to the "Bakadjika law" that establishes the soil and subsoil to belong to the State, is simply undermining the power of the customary authority over the land heritage, as the constitution stipulates. We leave this debate to the jurists.

Impacts of rural and urban migration to mining areas

According to the International Institute for Environment and Development, one of the most important impacts of mining is the migration of people to mining zones, particularly in regions far from the usual area,

which brings a change in lifestyle that no longer represents the traditional economic activity. The influx of immigrants (newcomers) can have a deep impact on indigenous people and lead to land disputes over how benefits are shared (FRANKS ET AL., 2009). Rapid increase of the population can also lead to pressure on land, water, and other resources, resulting in sanitation and waste management problems. The effects of migration can also extend far beyond the immediate proximity of the mine (VANCLAY & ESTEVES, 2011). However, evidence of the negative environmental impacts of the latest mining activities in the past is source of concerns for surrounding populations. They are afraid new mining activities will negatively affect their water supply, as in the past. This experience will only make them more resistant to new projects. The phenomenon of rural and urban migration to mining zones creates overcrowding on the mining site, making livelihoods more difficult.

Food and basic products (vegetables, starchy foods, cereals, soap, salt, kerosene, etc.) are extremely expensive due to the law of supply and demand. An excessive promiscuity fosters indecent habits and generates adult and child prostitution in the open air. It encourages a spirit of robbery and delinquency that is difficult to control... The lack of drinking water, poorly built and maintained latrines, indecent housing and chronic insalubrity are sources of water-borne diseases, pandemic and causes of high mortality. The same situation leads to the cessation of food production activities in several villages and to school dropout, especially in secondary schools and the final level of primary education. The loss of schooling is also the cause of many early marriages and early pregnancies, youth delinquency and famine in the countryside, which is deprived of its members who are active in rural production.

The mining sites are also places where men in uniform sow terror through extortion, torture and rape. For more than three decades, these abuses, often committed in artisanal quarries, have been denounced by civil society, human rights groups and others. But solutions have still not been found by the public authorities, whose mission is to protect the common good, to ensure the protection of people and their property. We will continue to urge these organizations not to give up. The mining sites are also places where men in uniform impose their terror through extortion, torture and rape. For more than three decades, these abuses, often committed in artisanal mines, have been reported by civil society, human rights groups and others. However, solutions have still not been provided by the public authorities, whose mission is to protect the common good and to ensure the protection of people and their property. We will continue to encourage these organizations not to give up.

Impacts on livelihoods and basic human rights

When mining activities are not properly managed, i.e., according to the principles of Sustainable Development Policy, their impact on natural resources and the environment quickly emerge. The major impact is the degradation of soil, water, biodiversity and forest resources essential to the livelihood of the population. When resource pollution is not controlled, the cost of the contamination spread to other economic activities, such as agriculture and fishery. In this case, subsistence products become scarce to the point of creating a desert-like shortage in the village. The situation becomes worse when mining activities occur in areas inhabited by historically marginalized people, victims of discrimination (FRANKS ET AL., 2010; AFREA, 2011).

According to VANCLAY (2003), the developer(s) of mining projects should provide guarantees that the basic rights of the people and communities involved will be respected. These include the right to control and use land, the right to clean water and the right to livelihoods. These rights can be embedded in national legislation, based on and expressed through a range of international agreements. All groups are equal under the law, and the interests of the most vulnerable groups (low-income and marginalized groups) must be identified and protected. The general observation at artisanal mining sites shows that the public authority is still not enforcing basic human rights, including the right to healthy food, housing and shelter, appropriate medical care, and school education for children and youth. We would like to draw particular attention to the right to education, because the future of the society depends on our youth today. In general, in mining zones, education is often neglected or simply ignored. The use of Child labor and the increasing school dropout are characteristics of mining environments in the DR Congo.

The high illiteracy rate registered is due to the fact that children and young people shift away from education to work in the mines, which appears less "troublesome". That is easily and quickly materially and financially more "profitable" than schooling. The industrial or semi-industrial exploitations provide job opportunities that may themselves discourage the youth from going to school or from seeking more suitable careers given the somewhat higher salaries (BROLLO, 2010). However, we will realize, eventually thirty or fifty years later, that the best strategy for alienating a people is to deprive its youth of education. Let us not forget that the development of a people is first of all mental.

Gender impacts of the extractive industries

Impact on physical, moral and psychological security

The development of extractive industries such as the one proposed in Liambe can also have a negative impact on the physical, moral and psychological security of women, and especially on their protection against

various forms of gender-based violence. As mentioned in the introduction to this section, the demographic concentration due to the migration of young people to mining zones exposes young girls to sexual abuse (rape, undesired pregnancies, sexual abuse, etc.) and to the proliferation of sexually transmittable diseases (HIV/AIDS and other STDs). This climate has an impact even on the couples of legally established adults, where marriages break up, marital violence, marital infidelity, and bloody conflicts between rival women and rival men are recorded. These sexist attitudes are further strengthened by the excessive consumption of alcohol and drugs, facilitated by the free flow of cash money and the total failure of state services.

Life in the mines

Life in the mining zones considerably destroys the youth and the stability of families. Several men do no longer think of returning to their families (wives and children) left behind in villages and city centers simply because they have contracted marital agreements with other partners in the mines. Job opportunities may themselves discourage young people from attending school or seeking more suitable careers. Moreover, when the promise of prosperity associated with a well-paid job may not be achieved; it becomes challenging to recover former job opportunities once lost (BROLLO, 2010).

The concentration of a high number of young working people also constitutes a fertile ground for recruitment into militias, armed, and rebel groups, particularly when people realize that life in the mines is unlikely to meet their economic expectations (DE WACHTER, 2008). Extractive industries can lead to the loss of ownership or use of farmland, and thus the loss of income generated by agricultural activities. Such situation draws more attention when it comes to land expropriation from "single women (widows, divorced, single) who have children to care for and educate" (BRÜCKER ET AL., 2014). Aside from the risks described above, gender-sensitive extractive industry projects can better benefit women (BÉRENGER & CHOUCANE, 2008). In this regard, studies have suggested that "Improving women's access to employment in the extractive industries and microcredit services can have positive impacts if combined with broader socioeconomic empowerment programs, such as education, vocational training, promoting women's access to community decision-making processes." (BROLLO ET AL., 2010).

Impacts on Public Health

In general, in Sub-Saharan Africa, mining projects often underestimate the potential health risks associated with mining exploitations (PUND, 2016). Harmful substances and waste dumped into water, polluting the air and soil, can have severe impacts on public health (VANCLAY, 2002; FRANKS ET AL., 2010). The World Health Organization (WHO) describes health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (VANCLAY, 2003; DANIEL ET AL., 2013).

Hazardous Substances

The term "hazardous substances" is broad and includes all substances that may be harmful to humans and/or the environment. Given the quantity, the concentration, the physical, chemical, and infectious characteristics of the hazardous substances expected to be applied, the extractive industry in Liambe may generate:

- An increase in mortality or in serious irreversible or disabling infectious diseases caused by chemical substances.
- Substantial or potential risks to human health and the environment if such substances are inadequately processed, stored, transported, discharged, or otherwise managed.

Unusual geochemical processes

COLEMAN ET AL. (2018) state that soils develop and evolve as a result of geochemical processes (the totality of mineral alteration processes, secondary mineral formations, and other types of solid/solution interactions), biological processes (degradation of organic matter and formation of evolved organic compounds), and material and energy transfer. The mineral phases and complexes formed are predominantly silicates (such as clay minerals), oxides and oxyhydroxides, carbonates, phosphates and sulfates (CORKAL ET AL., 2020). We notice in the image by the authors (Figure 2) that the transfer of substances from water, atmosphere, fauna and flora to humans who ingest them by inhalation and skin absorption are dangerously exposed to infectious diseases and carcinogenic.

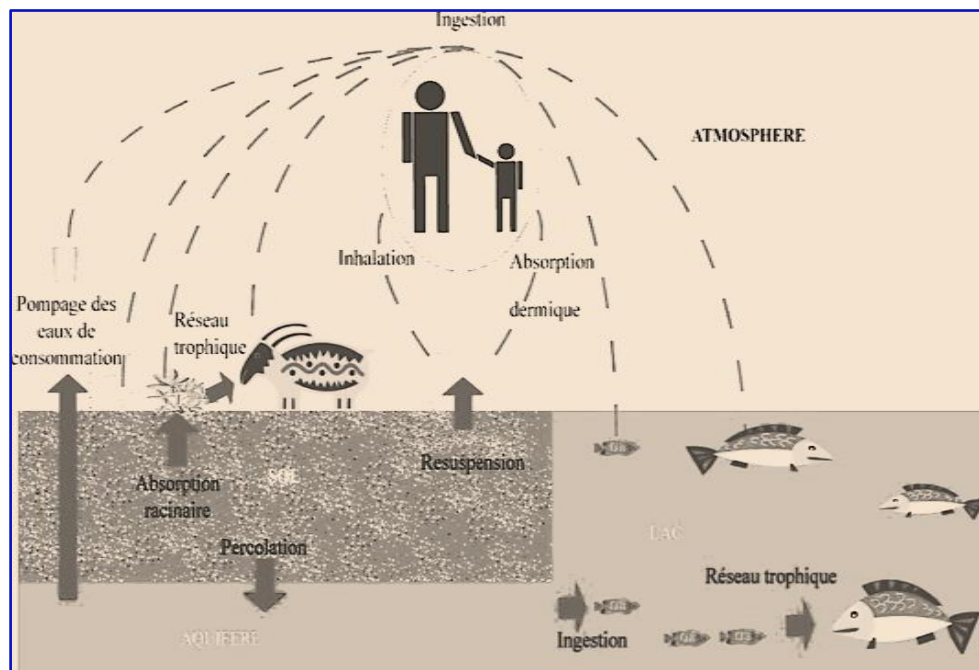


Figure 2. Global diagram of contaminant transfer from soil to humans through the different components (atmosphere, biosphere, lithosphere and hydrosphere, source: authors' imagination).

Possible ways to boost the development of the Basoko Territory

Beyond the environmental and ecosystem aspects described in our analysis, a question could be raised: could this semi-industrial mining operation constitute an opportunity to boost the development of the Basoko entity? Today, talking about the development of a population in a given environment, necessarily refers to the concept of Sustainable Development. As we have already pointed out, the sustainability of a project is mainly based on the guarantees it offers for the rational management of non-renewable natural resources. A rational management combines economic growth with environmental protection. Thus, the main objective of Sustainable Development is to reconcile economic and social progress with the environmental preservation. The latter is considered as a heritage to be passed on to future generations. Technically, we speak of "intergenerational" equity that is social equity between generations (AGGIRE, 2018).

The first issue in mining development is the non-renewable nature of the resources and the geographical distribution of suitable geological structures. Development can be seen as a process of adaptation aimed at improving a situation perceived as improvable. Mining development, on the other hand, would aim to satisfy the needs of world markets that will ultimately serve to better meet the needs expressed by humans. From a classical economic perspective, increased economic activity, which translates into an increase in Gross Domestic Product (GDP), is a sign of increased wealth. This represents a better margin of flexibility to satisfy the needs of societies. Economic growth is therefore considered both the result and the objective of development. It is a positive feedback cycle.

However, there are some areas of human activity where this feedback is problematic. This is particularly true for the mining industry. In a resource-limited world, it is impossible to indefinitely maintain a positive feedback loop when the sector's main activity is based on the extraction of non-renewable resources. It is therefore necessary to distinguish between the life of the mine, which is a one-way process (exploration, production, operation, closure, rehabilitation of the site), and the life cycle of the resources extracted from the mine, which may or may not involve a more or less efficient recycling phase after the processing of the mineral and its first use.

In summary, resources are depleting, yet, future generations will also need them. They (resources) create wealth, but they can also cause diseases as a result of the pollution they generate and increase inequalities among people and communities. Natural resources can provide solutions to problems of life and livelihoods, but they can also be the cause of vital and societal problems and ecosystem disasters. The above discussion shows that extractive activities have huge impact on local communities in terms of the exchange of goods and services (the market, taxation), social life, societal relations and the environment. They generate formal and/or informal employment, income, cash flows, economic exchanges, but also the negative externalities indicated in these sections.

The analysis carried out above makes it clear that the effects that would result from logging in the Yaliwasa chiefdom and the mining on the Aruwimi River in the Mongandjo sector, specifically in the locality of

Liambe, may be harmful to the population and devastating (Impacts on the soil, habitat, water, fauna, flora, livelihoods, social life, culture, public health...)

In view of these analyses, negative impacts may affect

- Survival activities, in particular the fishery, agriculture, hunting, and gathering;
- Land ownership, will lead to almost complicated social and land conflicts, since families, clans and villages may not accept to be dispossessed of islands, shores, and forests inherited from their ancestors
- The environment: the ecosystems including the fauna and the flora will be affected
- The social life: the degradations of the customs, the instability of families, and the school dropout will negatively impact the development

Experiences in other mining sites on the Aruwimi River or its affluents

We could also learn more from experiences elsewhere in the region. For example, what has been the economic and social outcome of gold and diamond mining in the territories of Banalia and Bafwasende since the early 1980s? Closer to Liambe, has diamond mining in Liongo (Yambuya) since the late 1990s generated any benefits for the local populations? On the contrary, these areas are increasingly impoverished! Altogether, industrial, semi-industrial or artisanal mining is not recommended considering the current context of the DRC, which is characterized by a predatory state governance at the micro, meso and macro level.

In the absence of a sound governance framework, impacts of the mining industry can only produce negative effects. In countries with poorly reinforced mining laws, corruption, ethnic and land conflicts, mining companies and operators must strictly comply with standards, and take into consideration scientific observations under the regulation of the public authorities, in order to prevent a criminal disaster for humans, the society, and its environment.

The most important challenge is to establish a global, multidimensional and long-term vision. This vision can only be strengthened by international collaboration, the harmonisation of standards, principles and models of Sustainable Development Policy, based on a better application of internationally validated good practices, since the majority of mining companies are transnationals (MOUSSEAU, 2012; THE NATURAL RESOURCE CHARTER, 2012).

What about the development of the Basoko Territory?

To what extent could the logging operations in the past (Bokondoriver, Lileko, Bolila) and those in progress, the semi-industrial mining projects in Liambe, generate opportunities for the development of the territory? The scientific analysis presented in the sections above makes it evident that there is a risk of regressing. Otherwise, we will need to consider other strategies. The impulse for the development of the region could be given by the local leaders and facilitators, from each village to the main city of the territory through the districts, sectors and chiefdoms. Under the guidance and leadership of the territory's administration, the local facilitators and leaders are to support and promote rural entrepreneurship that seeks to meet basic social needs. The territory office is equipped with all possible services designed to accomplish these tasks (office of agriculture, fisheries and livestock, office of the environment, public works, agricultural service roads, tax services ...). Agriculture will always be the priority of priorities. Promoting local entrepreneurship will boost a significant economic activity that could generate resources for the local administration and allow it to improve the public welfare in a sustainable way.

With small taxes collected locally, it is necessary to promote an incentive agricultural policy. Such a policy can stimulate villagers and groups to maintain the infrastructures that connect the villages to the main city of the territory. By providing villagers with farming tools that contribute to the advancement of rural agricultural entrepreneurship, food security will improve and become the foundation of the socio-economic development of people. Food supply is crucial to ensure well-being of the populations, their mobility, their security, and their development. This could be achieved without a financial support from the provincial and national authorities, if good governance was established.

A morbid wait-and-see attitude

Regrettably, the population and the leaders of the decentralised territorial entities (DTE) suffer from a sort of morbid procrastination. There is a lack of know-how when it comes to implementing local agenda, thus local authorities expect that everything will come from above, notably the parliament, the central and provincial government. In the public perception, a Member of Parliament (MP) is usually the one who must address the primary needs of the electorate. Therefore, the MP is often harassed for medical, hospital and funeral expenses, whereas the administrator of the territory, who is appointed to ensure the general welfare by protecting the people and their property, is not bothered. Developing an entity from a mining zone is like building a house from the roof up. The efforts of the Basoko people should focus on the meeting of basic needs (food, clothing,

housing, health care, education of children). It is an illusion to consider that these needs will be met by a capitalistic enterprise whose sole purpose is to make a profit. If we go all over the world, this paradigm is not highlighted anywhere.

Our most important request

Our most important request is to see the central government accelerating the process of local elections to allow the population to choose its local leaders. By duty of eligibility, the candidates may be motivated to promote endogenous development from the grassroots to which they will be accountable and responsible. Moreover, the depoliticization of the local administration may facilitate a true sense of responsibility of local political-administrative authorities, and guide them towards a development administration. It is time to change the face of this territorial administration of self-interest and political positioning!

The development is the responsibility of the public authorities and not the private sector. Investors' mission is not to build public roads, schools, hospitals. And even though they build them, it is not their responsibility to ensure the maintenance, depreciation and possible rehabilitation. The real economic framework that would promote development starts from an investor who pays taxes to the local, provincial or national government. These taxes provide the state with the necessary resources to implement policies, including economic and development policies. Each entity in the world is required to establish an annual budget in which it allocates resources for local public investments and local development efforts. We will not be able to invent a new wheel in this topic neither in DRC, nor in Basoko, nor elsewhere. The barrier to the development of our entities consists in the failure of the State to efficiently play its role. Of course, the mission of the public authority is to promote private investments that will create jobs, goods and services, first of all for the profit of the company; and secondly, to contribute to the well-being of the employees, allowing at the same time, the public authority to carry out a development policy.

IV. Conclusion

Although the environmental impacts of the mining industry may differ depending on the nature of the mineral and the type of mine, it is an activity that is inherently unsustainable since it involves the exploitation of non-renewable resources using destructive or polluting technologies, such as crushing, grinding, washing and grading of minerals, refining and smelting. At the moment, mining industry in the DRC is destructive not only due to its large scale, but also the technology has enhanced its capacity to produce, and also to cause nuisance. According to our database, companies' sustainable development approaches are not always understood by the population, even though the negative impacts of their activities are widely evident: threats to traditional production and subsistence activities; degradation of the environment including living conditions; degradation of ecosystems associated with pollution (ground and surface water, soil, air, etc.); emergence of new pandemics and infectious diseases (Malaria, EBOLA, COVID19 etc.).

From a social perspective, the competition for resources (water, soil, valuable metals) sometimes leads to bloody conflicts as a result of misconceptions and the shift in mood during the process of recruitment of local manpower. Furthermore, the lack of information on mining activities combined with opaque activities that exclude any debate can hinder the effective participation of the populations, especially the most significant groups in the decision-making process that may affect them (source of the social acceptability of the mining project). First, in the case of the exploitation of natural mining or forestry resources, the Sustainable Development Policy calls for a harmony between economic growth, social progress and environmental preservation. The process further implies an informed, responsible and consensual decision making by the stakeholders, the public power, the local populations, and the reporting society.

In the present case study, the outcome of the mining project in Liambe appeals to local leaders and the Diaspora from the area to be involved, upstream and downstream, in order to bring their expertise and know-how on the topic, especially in the feasibility studies. Having learned about the environmental, social, cultural and economic impacts of mining and its applications in the village of Liambe, we call upon the entire community of Basoko not to be misled by mining projects on our land. The requirements of the Sustainable Development Policy are far from being respected from the preliminary process onwards. Closing our eyes to these blunders would be a suicidal act.

In the current socio-political context, in which the well-being of the people is not the primary concern of the decision-makers, any mining or logging exploitation project should be resisted, especially since the equilibrium of the ecosystems, biodiversity, the environment, and social well-being are currently not safeguarded. The Chinese company Xiang Mining is no exception in the preliminary operations. We are warned!

Acknowledgement

The Researchers who carried out the study thank all the people who were willing to collaborate with them during the field survey. We hope that this research will contribute to an improved cooperation between all stakeholders.

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