

Mining and its Impacts on the “Caatingas” of the Brazilian Semiárido

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Abstract — Mining is one of the activities that affect the environment intensely, changing the location and environment where waste deposits are discarded. Being one of the basic sectors of the Brazilian economy, mining has contributed to the economic development, since operated with environmental responsibility, based on the precepts of sustainable development. The present study aims to demonstrate the socioenvironmental impacts and conflicts caused by mining activities in the rural community of Paredão, located in the north of the State of Bahia, as well as to discuss the ineffectiveness of Brazilian legislation through illegal mining without licensing. It is a qualitative, descriptive, observatory, bibliographical and participatory research based essentially on the Geosystemic Theory (Sotchava, 1977), the Ecodynamic Method (Tricart, 1977) and the GTP Theory (Bertrand, Bertrand, 2007). Discourse and Content Analysis of Bardin (2009). The results indicate that the area is totally degraded, directly impacting "the Caatingas" in loco, being with the soil and the subsoil deteriorated, completely naked, eroded and frail.

Keywords — Primary activities, Social conflicts, Environmental damage.

I. INTRODUCTION

Mining is one of the activities that affect the environment intensely, altering the exploited area and all its surroundings, where waste deposits are discarded. Being one of the basic sectors of the economy, and having contributed to the development of cities and small towns, it has not always been operated with environmental responsibility, thus causing irreversible impacts on nature and society.

The history of Brazil bears witness to how old is the exploration of ore in the country and especially in the northeastern Sertão. In 1671, he was invited by Governor Afonso Furtado to lead a big flag in search of silver and emeralds Fernão Dias Paes, the emerald hunter, who had in his curriculum a previous trip to the Sertão with Raposo Tavares, around 1636. The invitation came from the governor through a Royal Charter, in which the monarch asked, the "men of São Paulo", to take to the field in search of a great dream of the Portuguese

government: the silver and emerald mines, which were supposed to exist in the undue Brazilian Sertão (FERRAN, 2007).

Based on these initial assumptions, this study aimed to demonstrate the negative environmental impacts caused in the Caatingas (native vegetation) by mining activities in the community in thesis, and the impacts and social conflicts generated from mineral exploration, as well as to discuss the ineffectiveness of the legislative applicability in Brazil, which implies illegal mineral exploration and without proper licensing.

This research is qualitative, descriptive, observatory, bibliographic and participatory based on the Geosystemic Theory (Sotchava, 1977), the Ecodynamic Method (Tricart, 1977) and the GTP Theory (Bertrand, Bertrand, 2007), in addition to the Discourse and Content Analysis method by Bardin (2009). In addition, for data collection, on-site visits and photographic records were used for real analysis of the impact on the area.

The results show that the area is totally impacted, with deteriorated soils and subsoil, completely naked, eroded and weakened. In addition, the wild and domestic animals with habitat in the area are chased away by the unwanted human presence, traffic and noise of transport and people, putting this ecosystem in total danger. As far as vegetation is concerned, it is totally suppressed, where species that should protect the soil and serve as shelter for animals and humans have been abruptly stoned to give way to the sinister "place of mineral exploration".

II. STATE OF THE ART RESEARCH

2.1 MINING IN BRAZIL

Mining in Brazil transcends seasons and has its records since Pero Vaz de Caminha. According to Ferran (2007) in reference to the Letter of Caminha, this is very clear when in 1590, in the captaincy of São Vicente found gold in the vicinity of the peak of Jaragua, and also to the north of the airport current Cumbica - Guarulhos, occurring the same in the Ribeira valley.

Already in 1671 Fernão Dias Paes, through the Royal Charter, was invited by the governor Afonso Furtado to head a large flag in search of silver and emeralds, since the same had experiences with previous trips to the region

with Raposo Tavares, in 1636. The request was to seek to discover the mines of silver and emeralds, which was assumed to exist in the indevassado the brazilian sertão. The record shows that there were more than seven years of marches and prospects. (FERRAN, 2007).

However, since the beginning of the history of our country that “the wealth generated by mining do not remain in Brazil (perhaps limited to the fifth - 20% - compulsory) and little went to Portugal” (Ferran, 2007, p. 36). The dependence of the Portuguese in relation to british power was the former, and “a large part of the debts of the Portuguese, ended up being paid with the gold of brazil, which allowed still more, a great accumulation of capital in the United Kingdom unprecedented” and that led to obviously the Industrial Revolution.

Was departing from the port of Paraty in Rio de Janeiro, crossing the Serra do Mar mountains and reaching the Valley of the Paraíba, which has reached the General Path of the Wild. Based on the Serra da Mantiqueira mountain range, through the Throat of the Embaú, and ventured into the hinterlands that, during the eighteenth century, would be devassados, in the first race of the gold of the modern era (SHELLARD, 2015).

And so came the first environmental impacts that are registered according to Shellard (2015):

Through enslavement, massacre, and acculturation of native peoples, the frontier, colonial has expanded, causing a deep impoverishment of the culture and environment of the Americas. The forests have been destroyed, transformed in lavras, pastures, crops and towns, which included destructuring communities, whose survival depended on certain environmental settings (SHELLARD, 2015, p. 2).

It is noted that since the first steps were taken in Brazil for mineral exploration, that the negative consequences came in parallel to success, whether they are environmental consequences, whether social. Large areas of the mountains have been deforested and eroded the search for the gold of grupiara, that is, the mining has generated and continues generating severe environmental impacts.

Corroborating with Shellard, Santos (2008) argues that the Portuguese Crown articulated, imposing numerous guidelines on mining in Brazil, the local reality of the climate and economic european, and disengaged motivations of use and place, establishing new relationships between use and conservation of nature.

It is relevant to point out that the idea of hinterland in the colonial period relates much more to a perception of

socio-cultural space, the holder of a non - domesticated, hostile, than to aspects of the physical-climate characterized by the dry climate and the vegetation is sparse. In this sense, the barrens would be the hinterland, understood as non-civilised areas conflicting, inhabited by savages (RIBEIRO, 2008), that is, a stereotype created centuries ago.

In this way, Ferran (2007) states that the first emeralds found in Brazil took place in the de1960, in the town of Carnaíba in Bahia, but the idea to search for them, even coming from Portugal, must have originated prior to the Spain, since the treasures of pre-columbian brought to Spanish America, the did know.

2.2. MINING IN BAHIA

In 1942, in the middle of the Second World War, the Brazilian Group Pignatari, Lamination and Metals National, associated with the government of the State of Rio Grande do Sul, and with a third part to be divided between the holders of minors, constituted the CBC-Cia. The brazilian Covers, directed by the Engineer Pedro Barroso and Viktor Leinz, having as a highlight the “Pignatari”, who was the first to explore the lands of Bahia and the interior of the interior.

When the collection of the CBC and Mina Caraíba in the state of Bahia, was assigned to the BNDES-Fibase in exchange for debts for labor, to be searched by Docegeo (Special Projects, the Caribbean and Camaquã), the Engineer Zorzanelli described Baby Pignatari, as “a man adjective” (FARRAN, 2007).

Still according to Farran (2007), in 1938, near the Macaúbas, Bahia, was found a stone with a different and heavier than the others, which melted down by a blacksmith, it was found that it was lead. “But the Compendium of the Minerals of Brazil of Luiz Caetano Ferraz (1928) refers, under the heading anglesita, as sulphate of lead, a density greater than 6 (six) and was only found in the State of Bahia” (p. 66). However, anglesita existed only in these stops, in the outcroppings of the Boquira mine, also in Bahia.

However, before 1928, Souza Carneiro, Polytechnic Institute of Bahia, mentioned in the book “Mineral Wealth of the State of Bahia” to the anglesita of the Sierra de Macaúbas. The bulletin was produced for the national exposition of 1908, being that this is the first reference to the occurrence of lead in the premises and may be where Caetano Ferraz in 1928, supporting his work (FERRAN, 2007).

Around 1954 a priest named Macário, on his way to his parish, based in the municipality of Macaúbas, decided to collect samples that were "open sky", near the village of Boquira in the surroundings of the mountain range of Macaúbas now known worldwide, blue quartzite

and the dumortierite that exists. Soon after the discovery, there was the exploration of the area by foreign groups.

According to Evangelista and Filho (2012), the importance of the blue quartzite of the Serra do Espinhaço Norte in Bahia, marketed under the name "Azul Macaúbas" and its varieties "Azul Boquira" and "Azul Imperial", has been growing in the market international market, presenting great potential as a source of foreign exchange for Brazil.

According to Ferran (2007: 68) "Boquira saw a revolution since the 1950s, but it ended before the end of the 20th century by the exhaustion of reserves." Still according to the author, it is now legal imperative to plan the closure of the mine, so that all infrastructure is used for activities compatible with the locality, and it is necessary to implement the Recovery Plan for Degraded Areas (PRAD) in a compulsory manner. Also in Bahia is located the Mineração Caraíba SA deposit that was discovered in 1874 and, in 1944, the National Department of Mineral Production (DNPM) identified its productive potential.

In 1969, Francisco Baby Pignatari began feasibility studies and in 1974 the enterprise was controlled by the National Bank for Economic and Social Development (BNDES). In 1979, under the name of Caraíbas Metais S/A, the mine's operating activities began at open sky, and in 1986, with the start-up of the Underground Mine, the copper ore was withdrawn simultaneously from the two sources (FRÁGUAS, 2013).

According to Fráguas (2013, page 3), in 1988 the former Caraíba Metais started the privatization process and in 1994 it entered the National Privatization Program, now known as Mineração Caraíba S/A. "In 2006, the leaching plant began operations to extract copper from the oxidized ore, which has been stored since the beginning of operations."

The mining company is located in the north of Bahia, more precisely in the district of Pilar, municipality of Jaguarari, with more than 1300 direct employees and almost 2000 in total (FRÁGUAS, 2013).

One of the questions of Fráguas (2013), is about the environmental licensing issues, where according to him:

A factor that has become important and sometimes limiting to the feasibility of mining projects are the constraints of the TC (commitment terms) assumed in public hearings during the environmental licensing processes, forcing the Mining companies to have a sometimes expressive cost for activities together with the communities that should be the role of the state or municipalities (FRÁGUAS, 2013, p.8).

However, anyone who knows this mining company knows that it, even though it has the concession of exploitation by the Union, is not in the habit of acting clearly and with respect to the environment. It tries to convince the residents of areas with mineral deposits to be rewarded with simple works and without legitimate value, not doing the environmental compensations that the legislation demands. In addition, the mining company has not acted in a respectful way in relation to the existing flora, removing the vegetation to open the road for the drainage of its production. According to Filho (2011) Mineração Caraíba concentrates (12.1%) of the country's annual copper exploration is 1.1 million tons of sulfide, and 70 thousand tons of concentrate, with an average content of 37% copper.

2.3 MINING IN THE PAREDÃO/BRAZIL COMMUNITY

In the community focus of this research, the first expeditions and demarcations minerals also came with the "Pignatari", which with the support of the government sought to search areas throughout the state of Bahia to explore copper, gold, or any other mineral. Later, Mineração Caraíba SA continued its relentless pursuit.

In this way, since the decades of the 1970s and 1980s that the Mining Caraíba S/A explores areas in the north of Bahia, for they called Vale do Curaçá, areas close to the community Wall, leaving marks harmful to the environment and to the Caatinga biome, already so devastated from decades. The habit of open bites (variants like that are named by the community) and fincar paddocks (small posts marking the area), it has brought over the years numerous environmental damage to the communities targeted by the research of referred to mine.

However it is not a concern on the part of the company, reflect on the environmental damage and to seek a way to reward them, on the contrary, what the company seeks in fact it is the advancement in research, profit seeking new methods of improvement.

Thus, from 1998, MCSA started to use the modified vertical crater retreated (VCR) method, which allowed the ore to be recovered with greater recovery, safety and lower cost, with a view to its development in only two levels, one for drilling and another for production. The advantage for the company was the obtaining of a more homogeneous plowed product, which facilitated the concentration process without the need for a homogenization pile (SAMPAIO; CARVALHO; ANDRADE, 2002).

In addition, with the advancement of technologies, today, the methodologies used by it are very advanced, because to georeferentiate the soils and subsoils of the Paredão community they use airplanes with numerous

devices and chambers (according to figure 1) that fly over communities and cause uneasiness and some fear, for not being formally communicated of what is at issue and what are the real objectives and implications.



Fig. 1 – Georeferencing of the soil/subsoil the wall

Source: Moreira, Jader Hadad Rosa (2018)

However, the community has suffered from environmental crimes, where about one year ago the community had part of its reserve of pasture fund invaded by a group of illegal exploiters who, using the bad faith of a squatter (who illegally sold thirty hectares of pasture land), were grotesquely and irresponsibly seized with heavily armed jagunfos, provoking terror and conflict in the small rural community, consisting of just over twelve (12) families from one same family tree.

The area besides being invaded is having its soil, subsoil and devastated flora to give rise to immense craters where the mineral denominated ora of green quartz, hour of malachite is removed. Such indecision in describing the material collected is partly due to the knowledge that malachite is much more valuable than green quartz. As explorers propagate what is being quartz green, they are thinking about the possibility of being charged for royalties.

Native species of Caatinga o umbuzeiro (*Spondias tuberosa* L.), baraúna (*Schinopsis brasiliensis*), angico (*Anadenanthera macrocarpa* Benth.), Catingueira (*Caesalpinia pyramidalis* Tul), pereiro (*Aspidosperma pyrifolium* Mart.), Imburana (*Commiphora leptophloeos* Mart.), black jurema (*Mimosa hostilis* Benth), among others, are being devastated by both MCSA and clandestine explorers.

Through the many forms of reported and symbolic violence that directly and indirectly involve expropriation, the destruction of biomes and ecosystems, the elimination of local and regional economies, as well as the insecurity and annihilation of territorialized ways of being, doing and living, affected communities to seek legal means of claiming and claiming their rights based on environmental legislation. Thus, to the material and symbolic violence, intrinsic to the expansion of the mineral borders, the difficulties of rural communities in the semi-arid Sertão of Bahia (ZHOURI, 2018).

2.4 LEGISLATION AND ITS CONDITIONERS

Brazil has a subsoil with important mineral deposits. Yet despite this rich potential, the environmental and social impacts caused by this practice are indescribable. In addition, mining in the country is subject to a set of regulations, where the three levels of state power have attributions regarding mining and the environment (FARIAS, 2002).

Among the regulations is Law No. 6.938, dated August 31, 1981 and its amendments (Laws No. 7,804, of July 18, 1989 and N°. 8,028, of April 12, 1990), which provides for the National Policy on Environment, its purposes and mechanisms of formulation and application. In addition to the aforementioned laws, there is Decree No. 97,632 of April 10, 1989, which provides for the Plan for the Recovery of Degraded Areas by Mining (PRAD). To these laws and decrees mentioned, it is valid to add some resolutions that are indispensable as conditions for access to the use and exploitation of mineral resources, namely:

1. CONAMA Resolution No. 1 of January 23, 1986, which establishes basic criteria and general guidelines for the Environmental Impact Report (RIMA);
2. CONAMA Resolution No. 009 of December 6, 1990, which provides for specific rules for obtaining the environmental license for the extraction of minerals, except those for immediate use in construction.
3. CONAMA Resolution No. 010 of December 6, 1990, which provides for the establishment of specific criteria for the extraction of mineral substances from immediate employment in construction.
4. CONAMA Resolution No. 2 of April 18, 1996, which provides for the compensation of environmental damages caused by projects of significant environmental impact.

Finally, approval of the Environmental Impact Study (EIA) and Environmental Impact Report (RIMA) is the basic requirement for the mining company to apply for the Environmental Licensing of its mining project, if this is not the case in the search.

2.5 THE SOCIO-ENVIRONMENTAL IMPACTS OF ORE EXTRACTION

By impact it is understood that all forms of changes in the environment caused by anthropic activity can be positive or negative, and the negative represents a break in the ecological balance, causing serious damage to the environment and society.

Article 2 of CONAMA Resolution No. 1, dated January 23, 1986, is explicit in stating that it will depend on the elaboration of an Environmental Impact Study and its Environmental Impact Report, to be submitted to the approval of the competent state body, and IBAMA on a

supplementary basis, the licensing of activities modifying the environment, as described in paragraph IX of the same resolution, the extraction of ore.

Article 5 of the aforementioned resolution goes further when it states that the EIA, in addition to complying with the legislation, in particular the principles and objectives expressed in the National Environmental Policy Law, will obey the following general guidelines:

I - Contemplate all technological alternatives and project location, confronting them with the hypothesis of non-execution of the project;

II - Identify and systematically evaluate the environmental impacts generated in the phases of implementation and operation of the activity;

III - Define the limits of the geographic area to be directly or indirectly affected by the impacts, denominated area of influence of the project, considering, in all cases, the hydrographic basin in which it is located;

IV - Consider the governmental plans and programs, proposed and implemented in the area of influence of the project, and their compatibility (BRASIL, 1986, p.1).

Thus, the need for responsibility and accountability of the ore explorer is evident, not only in relation to the environment, but also in relation to society, social actors who suffer the beneficial and harmful impacts of mineral exploration.

Among the beneficial impacts of a mineral exploration project are usually: the indemnification of occupied territories, the sale of land near the mine and the emergence of direct and indirect jobs. Already the evil impacts are countless and because of this, it is necessary to take into account the legislative procedures. It is possible to describe the evil impacts as being: damages that are often caused to the soils and the relief; devastation of forests and native forests by the removal of vegetation; soil degradation causing erosive cycles on a large scale due to the absence of vegetation; noise and vibration; air pollution from dust, smoke and soot; leakage, or irregular disposal of toxic mineral substances that can pollute watercourses and groundwater; besides the burning of the metallic mercury in the open air, among other environmental impacts of the ore exploration.

In addition, social impacts are as damaging as environmental impacts. It is possible to enumerate many, among them: insecurity due to the presence of unknown people; loss of large areas of native ecosystems or human

use; abandonment of properties due to lack of safety and / or due to dust and daily soot that cause respiratory diseases; population raises disorderly, with workers attracted by the illusion of easy employment; problems of transportation, housing, education and public health increase, therefore, the system does not include such expansion; the lack of regulation of land use and occupations in areas of risk bring problems related to basic sanitation, among many other problems.

However, there are those who argue that mining does not cause as many impacts as we describe. Machado (1998) states that "the assertion that mining is the most aggressive economic activity to the environment is false. Other activities, such as agriculture, petrochemicals, steelmaking, large dams and urbanization itself, have more shocking characteristics than mining"(MACHADO, 1998: 648).

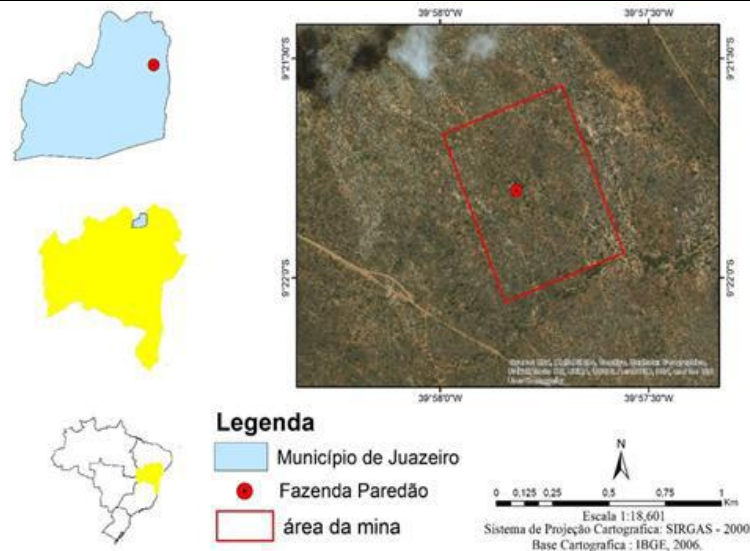
Although the activities described by the author have significant impacts, they are not, for the most part, irreversible, as is the case with many of the impacts of mineral exploration. Moreover, the laws described in the Federal Constitution of Brazil are coherent and indispensable, since the environment is one of the main impacts of the activity, passing through a period of degradation that results in constant changes in its physical structure as the landscape, in the biological aspect and especially in the social aspect.

The art. 225, paragraph 2 of the Federal Constitution of 1988 requires that anyone who exploits mineral resources should have the responsibility of recovering the environmental damages caused by the mining activity, consisting of the obligation to recover the degraded environment by means of a PRAD, with the technical solution required by the competent public agency that has licensed, in the form of a law.

III. MATERIAL AND METHODS

3.1 LOCATION OF THE RESEARCH

The rural community of the Breakwater is situated in the north of the State of Bahia, in the municipality of Juazeiro, being located at the coordinates 09°36'334" S and 39°96'363" W, as map 1.



Map 1 – Geographic Location of the community Wall

Source: Authors (2018)

The community has about 4,000 hectares of land, including legal reserves and pasture funds. The whole area is home to the Caatinga ecosystem, with native vegetation and species almost extinct. It also has great diversity of fauna, which has a habitat the dry areas of the white forest. About 12 families live in the community (these are the target of the research), most of them elderly, all descended from the same family tree, which inhabited these lands for more than 200 (two hundred) years. Younger descendants live in the urban area of the municipality of Juazeiro and other municipalities, but they periodically visit the community and, consequently, their families, participating in all actions and decision-making in the community.

3.2 METHODS

The present research is classified according to Gil (1999), Andrade (2006), and Cervo et al. (2007), according to their nature, their technical procedures, the approach to the problem and the objectives.

Thus, from the point of view of nature, it is an applied research because it aims to generate knowledge for practical application aimed at solving specific problems. As the approach of the problem is a qualitative research, since it considers the existence of a dynamic relationship between the real world and the subject, being descriptive and using the inductive method and the obtained data are analyzed inductively.

In respect of technical procedures, this is literature, as it was developed from material written and already published, mainly comprised of books, e-books, reports and journal articles available on the Internet. It is also a research participant, where develops from the interaction between the researcher and the members of the situations investigated, from the direct contact of the researcher

with the phenomenon observed to acquire information about the reality of the social actors in their own contexts.

With respect to the objectives, this research, and exploratory, because it involves bibliographical survey and dialogue with people who have had practical experience with the problem researched, and also is descriptive because it involves the use of techniques, standardized data collection, such as systematic observation, where the facts are observed, recorded, analyzed, classified and interpreted, without the interference of the researcher.

Furthermore, such research is essentially based on the Theory Geosistêmica (Sotchava, 1977), in the Method Ecodinâmico (Tricart, 1977), and in Theory GTP (Bertrand, Bertrand, 2007) and the method of Discourse Analysis and of Content of Bardin (2009).

The field research started in January 2018, with weekly visits in the first two months on-the-spot observation, recording, analysis and interpretation of data. Later, for security measure, the visits were sporadic every two months, being completed in August 2018. Initially the area explored was open, without restrictions of entry of people in the space. However, with the course of actions on the part of environmental authorities, the exploited, using the documents “forged” if it was characterized to make the demarcation of the area with fences of barbed wire, making it difficult to lobby for the expansion of the research.

3.3 MATERIALS

To conduct the research we used the following materials: pen, notebook, Global Positioning System (GPS), camera, map of the community, and the Term of Free and Informed Consent (TCLE) from the Community

Association of the Stream of Mari, authorizing the conduct of research.

IV. RESULTS AND DISCUSSIONS

4.1 ENVIRONMENTAL IMPACTS AND LEGISLATION

The Resolution of the National Environment Council (CONAMA) nº 001 of 23 January 1986, in its Art. 1, it is considered as environmental impact any alteration of the physical, chemical and biological environment caused by any form of matter or energy resulting from human activities that, directly or indirectly, affect the health, safety and well-being of the population; the social and economic activities; the biota; the aesthetic conditions and health of the environment; and, the quality of environmental resources (BRASIL, 1986)

Upon such a premise, and based on the above-mentioned resolution, it can be said that the Community Paredão has suffered from numerous environmental impacts, taking into consideration that the safety of the same is threatened by the presence of unknown and explorers; by the economic activities that are being affected, since most survives the creation of goats, sheep and cattle, and these are restless, were pushed out and some fled to other distant localities on account of the human presence and noises of the very mineral extraction; and by attack immeasurable to the biota and to the natural resources in the community (as in figure 3), promoting the environmental degradation so clandestine and illegal.



Fig. 3 – Environmental degradation in situ in the mine area

Source: Author (2018)

As is visible in the picture, the soil was totally removed, and the vegetation of the Caatinga destroyed by the action of the tractor. It is possible to see the native species of umbuzeiro almost buried in the midst of the waste removed from the soil and piled on the umbuzeiro. In addition, it is possible to identify plastic bags abandoned in the soil and consequently will take a million years to decompose, contaminated soils have already

beaten.

The Art. 2 of the same resolution as versa that “will depend on the preparation of the Environmental Impact Study (EIA) and respective Environmental Impact Report (RIMA) to be submitted to the approval of the state organ competent, and of the IBAMA in character supplementary, the licensing of activities in the modifier of the environment, such as: IX - Extraction of ore, including those of class II, as defined in the Mining Code” (BRASIL, 1986).

However, none of the articles of the resolution mentioned has been fulfilled by the group explorer, as he was denounced by the community, without any prior consultation with the Association of Residents or the public hearing take possession of the land of the community. After a formal complaint to the environmental bodies, the group explorer suffered the intervention of the authorities municipal environmental by means of the Secretary of Environment and Urban Planning (SEMAURB), which autouou by the absence of environmental licensing for operation, as shown in figure 4.



Fig. 4 – Action of the municipal guard in place
Source: SEMAURB (2018)

The environmental damage in the area are severe with each passing month, being visible (figures 5 and 6) the level of degradation the site, both on the ground and in the ecosystem of the Caatinga, seen behind the image.



Fig. 5 – Crater and Material Explored
Source: Author (2018)

It is impossible to overestimate the actual values that are being polished of the heritage site and of the natural reserves of ores belonging to the province of Bahia, and consequently, of the community, which loses any right to take advantage of the profits and/or benefits with the processing of the ore.

Later, the group returned to the site and continued way illegal exploitation of malachite and copper (figure 7), which required more action by the community in order to safeguard their rights of landowners and local residents. By means of legal advice to the community formalized complaint with the Civil Police of Bahia; the Public Prosecutor of the State; the Federal Police; the State Institute of the Environment and Water Resources (INEMA); the National Department of Mineral Production (DNPM); and the Secretary of Environment and Urban Planning (SEMAURB) of the municipality of Juazeiro/BA.

However until the present moment, the only body that gave a formal response was the Public Prosecutor reported to represent the legal community (lawyer) the archiving of the process, considering that the same already running in another instance the federal is the Federal Police. Such a response, he left still more desolate the community for not having seen until the moment, no practical action from environmental agencies that will prevent the crimes and environmental damage committed.



Fig. 7 – Types of minerals exploited

Source: Author (2018)

However, problems arising from conflicts in areas of mineral extraction in Brazil have grown and have caused serious damage to society. Critical experiences reveal that the multiple processes of 'violences of affections' promoted by large-scale mining bring about the emergence of struggles and resistance contexts that intersect different trajectories of the Brazilian population (ZHOURI; OLIVEIRA, 2013).

4.2 THE SOCIAL IMPACTS

It is understood that the social impact are all situations that in some way will cause harm to the

population. In this way, the concept of environmental impact should take note of the environmental cause, but also to the security of the territory and the quality of life of the populations. In this sense, in the Resolution n. 001/86 of the CONAMA in its Art. 1, brings right from the beginning the two items directly related to the social impacts, namely: elements that “directly or indirectly, affect, I - health, safety and well-being of the population; II - the social and economic activities [...]” (BRASIL, 1986).

In this respect, the community Wall has been directly affected in the health, both physical (particulate matter suspended in the atmosphere), as well as psychological and emotional, from the time that they feel ‘cornered’ within their own territory, intimidated, and without the effective support of the environmental authorities. Also, have their socioeconomic activities directly affected, since they live of the creation and the grazing of domesticated animals, and are frightened of leaving in search of the same (in the areas of fund of pastures), by the fact of having in their surroundings workers, strangers, of unknown origin, in addition to guards (gunmen) in a position that is threatening.

In the face of such reality, the residents feel they are not taking advantage of the law which is peculiar through of Art. 225 of the Federal Constitution that says: Art. 225. “Everyone has the right to an ecologically balanced environment, good of common use of the people and essential to a healthy quality of life, imposing to the public power and the collectivity the duty to defend it and preserve it for present and future generations” (BRASIL, 1998).

Also, also are not seeing in practice the fulfilment of § 2, which says that “he who explore mineral resources shall be obliged to recover the environment degraded, according to the technical solution required by the public agency of competent jurisdiction, in the form of the law”, and paragraph 3 which states that “conduct and activities considered to be detrimental to the environment sujeitarão the infractors, individuals or legal entities, to criminal and administrative sanctions, regardless of the obligation to repair the damage caused” (BRASIL, 1998).

Thus we have in this case a conflict socio-environmental which refers to a situation of dispute over the ownership of the resources and environmental services on which shall govern the conditions of disproportionality in access to natural conditions and legal, with inequality in the provision of the law, characterized by the rupture of ties between rights and duties, between the legislation of fact and law, between accountability theory and practice.

V. CATEGORIZATION ENVIRONMENTAL AREA

5.1 STRATEGIC PLAN ENVIRONMENTAL

The categorisation environmental area arises from the distinction of elements climatobotânicos that distinguishes one landscape from another. In this sense, the method adopted to analyze the ecodinâmica of the studied area, was based on the precepts of the Theory Geossitêmica that seeks to understand the variations of landscape as a historical product of the flows of matter and energy, including the action of man and in the grounds proposed by Tricart (1977) that allowed us to identify the processes morfodinâmicos responsible for the genesis of the relief, and as to the environmental stability of this landscape.

It was necessary for the analysis of critical factors, such as: surface structure of the soil, the use of the subsoil, vegetation, and surface processes. For each of these parameters, did the categorization of the level of balance numerically defined according to Tricart as: i. stable areas; ii. areas intergrades; and iii. areas strongly unstable.

In this sense, the area of the mine was categorized according to the theory tricart'iana, in:



Fig. 8 – Categorization of the mine area

Source: Pacheco (2018)

In the area is still stable, it is still possible to verify the existence of the vegetation native to the area – sparse hyperxerophyllous forest – that during the rainy season presents itself with the color green and lush.

However in the area intergrade noticed the steep decline of vegetables, getting more and more espassa and rala. Is the phase transition between the stable (with vegetation) and the unstable or strongly stable (with no vegetables).

Finally, the area unstable where not possible to discern any plant species, not to be obeservar processes degradacionais, practiced by the exploitation of ore in the location.

Thus, in view of the need to build strategies for the conservation and/or restoration of the area, is relevant for the entrepreneurial company of the damage, develops a Plan of Recovery of Degraded Area (PRAD) provided by the environmental legislation. The PRAD is a procedure

for the preparation of the study, regulated by the Normative Instruction no. 4/2011 of the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA), in order to shape and guide the elaboration of projects with fulcrum in the recovery of degraded areas.

However, at the present time there is no indication of this accountability in the study area, and because of this, this research comes to support with the implementation of a Strategic Plan Environmental (PEA) to the affected area. Such a plan is based on the Theory GTP Bertrand and Bertrand (2007), where it takes into account the gessistema, the territory and the landscape.



Fig. 9 – Strategic Plan for Environmental

Source: Pacheco (2014)

Each strategic plan must be applied in their respective area, namely:

- i. Environmental Management and Conservation Plan - aimed at areas that are still stable, so that they will not be damaged in the future because they are fragile and vulnerable due to climatic and socioeconomic conditions.
- ii. Control Plan and Environmental Conservation - this would be applied to areas that are in transition from the stable aspect to the middle intergrades. It will be necessary to create degradation control strategies in the areas in process and strategies to conserve what remains of some stretches.
- iii. Plan of Revitalization and Environmental Conservation - in this, if primary by strategies of revitalization/reforestation of the areas considered as strongly unstable and, from the results would draw a preservation control, analyzing the resilience capacity of the respective environments.

The proposals suggested above should come from those responsible for environmental damage, in the case in point, the clandestine explorers. Besides these, it is fundamental a partnership with the community that inhabits the surroundings of the degraded area, because it is these subjects who are living in this context, and can contribute in a positive way in this awareness.

5.2 MONITORING AND ENFORCEMENT

The enforcement and monitoring of the Strategic Plan Environmental (PEA) is based on the Theory Geossistêmica of Sotchava (1977), and it should be the responsibility of (the): 1. Illegal enterprise of mineral exploration; 2. The secretariat of Environment of the Municipality of Juazeiro/BA (SEMAURB); 3. Institute of the Environment and Water Resources (INEMA); 4. The National department of Mineral Production (DNPM); 5.

Federal Public ministry (MPF); the Ministry of the Environment (MMA); 6. Local Community association.

For the implementation of the SAP, it is fundamental to the development and fulfillment of a schedule of activities, that should be constructed collectively, with the community, operator and environmental agencies. Here arises a suggestion of activities (table 1) that should precede the implementation of the PEA, namely:

Table 1 – Suggested Activities for Deployment of eap

ACTIVITIES	TIME PERIOD	RESPONSIBILITY
Public Hearing with the community (Community Association)	02 months	Federal Public ministry; Community Association; Operator; SEMAURB; INEMA; DNPM.
Signing the Term of Commitment between the Operator and the Community Association	01 month	Federal Public ministry; Community Association; Operator; SEMAURB; INEMA; DNPM.
Study of Environmental Impact assessment (EIA) and Environmental Impact Report (RIMA)	03 months	Environmental experts and a multidisciplinary team hired by the MPF and paid for by the Operator
Presentation of the EIA/RIMA to the Community/Company/Environmental Agencies	01 month	Environmental experts and a multidisciplinary Team responsible for the EIA/RIMA.
The Management Plan, and Environmental Conservation (PMCA)	03 years	Operator (deployment); Community Association; Environmental Agencies (oversight)
Control Plan and Environmental Conservation (PMCA)	03 years	Operator (deployment); Community Association; Environmental Agencies (surveillance).
Restoration Plan and Environmental Conservation (PMCA)	05 years	Operator (deployment); Community Association; Environmental Agencies (surveillance).

Source: Author (2018)

It is noted that the activities listed may be modified according to the need, as well as, the period may be relaxed if necessary, in order to the fulfilment of the Strategic Plan on the environment.

VI. CONSIDERAÇÕES FINAIS

A referida pesquisa, visando atender aos objetivos e embasada na metodologia adotada, compreendeu a ecodinâmica da paisagem estudada na Comunidade Paredão no norte do Estado da Bahia, identificando os processos de degradação ambiental provocados pela exploração mineral, além de analisar os níveis de estabilidade do sistema ambiental, discutindo formas de conservação deste bioma, que é um representativo das características climáticas do Semiárido brasileiro.

No que concerne as observações e análises feitas, constatou-se que a área estudada se encontra altamente degradada, tendo em vista os impactos ambientais presentes no geossistema investigado, fundamentado nos preceitos de Tricart (1997) onde, em face disso, constatou-se que a área da pesquisa está classificada nos âmbitos estável, intergrades e fortemente instável e, por conta disso se faz necessário uma urgente sensibilização no que tange à gestão e ordenamento territorial da área.

Resta salientar a existência de uma proposta de

conservação ambiental por meio do PEA para os três ambientes classificados e, a aplicabilidade desta, deve ser de responsabilidade da empresa exploradora de minerais, dos órgãos ambientais fiscalizadores em consonância com governos municipais e estaduais e, da Associação de moradores e, pois, são estes [os moradores] os maiores prejudicados, por serem vítimas de um projeto ilegal e irresponsável.

Ademais, espera-se que a população tenha seus direitos respeitados, que os organismos ambientais cumpram com seu papel de acordo com a Legislação brasileira, que os exploradores clandestinos possam ser responsabilizados pelos danos ambientais e sociais provocados a comunidade e ao patrimônio natural, e que o capitalismo não destrua as pessoas e as paisagens.

Por último, esta pesquisa não possui um cunho conclusivo e, nem se pretende aqui esgotar todo o debate acerca da temática em foco, tendo em vista a relevância dessa discussão nos dias atuais e no âmbito da gestão e ordenamento dos territórios ambientais, levando em consideração que os ecossistemas, especialmente os de caatinga, são mutáveis tanto pela sua dinâmica natural, como pela dinâmica social que o circunda. Sendo assim, a pesquisa e o debate continuam para além da finalização do curso ora realizado, por entender as questões aqui

elencadas como infinitamente pesquisáveis, mutáveis e, dignas de um repensar crítico, reflexivo e reconstutivo.

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