ORIGINAL ARTICLE

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ABSTRACT

Faced with environmental issues and the activity of mining, it is important to analyze the relationship between social and environmental and health issues and mining activities and their direct relations with development, especially the economic one. The present work aimed to evaluate the socio-environmental and health changes resulting from the implementation of large mining projects in Barcarena-PA, contextualizing the development and its contradictions in the Brazilian Amazon. For this purpose, bibliographic research was used, about the literature published in books, scientific and documentary articles, related to the theme under study. It was found that Brazil represents one of the greatest potentials of

mineral resources on the planet, with approximately 55 types of minerals that can be used for economic exploration purposes. On the other hand, in addition to contributing to the strengthening of the regional and national economy and to the generation of jobs and the increase in the income of the local population, as is the case of the municipality of Barcarena-PA, this region has suffered consecutive socio-environmental and health impacts, due to the mining activities developed in the region. The surroundings of large mining projects are inhabited by families who, since their implementation have their way of life, their economy, their health and their sociocultural organization impacted, resulting from this activity and the successive environmental impacts that occur on the site. Given all that has been analyzed, it is possible to conclude that, because it is an accelerated economic development model, and often not properly planned, not taking into account the peculiarities of the Brazilian Amazon, it ends up generating numerous environmental, social impacts that even directly reflect serious health problems of the local population. Thus, it is essential to urgently rethink this form of implementation of mineral exploration projects in the Amazon region, as is the case in the city of Barcarena, because major socio-environmental disasters can still occur.

Keywords: Changes, socio-environmental, health, mining, Amazon.

1. INTRODUCTION

Ores have existed since the beginning of the world. They are mineral formations that make up naturally and are economically interesting for their extraction. On Earth, iron is the one that appears in the greatest abundance of production in the crust. In the list of ores of great relevance to our lives, we also have copper, gold, aluminum and coal. The list is immense, and they are essential to the development model deployed on the globe. Without them nothing would be the same as we see today. And more and more will be necessary, because the greater the technological development, the greater the demand for these products (OLIVEIRA, 2019; SIMINERAl, 2019).

Brazil represents one of the greatest potentials of mineral resources on the planet, with approximately 55 types of minerals that can be used for exploration purposes, such as iron, copper, gold, manganese, niobium, among others. Brazilian iron reserves have an average content of 45.7%, and represent 17% of the world's reserves. In the State of Pará, Northern

Brazil, “the mineral industry generates 266,000 direct and indirect jobs in the local production chain and accounts for 20% of Brazil’s Gross Domestic Product” (SIMINERAl, 2019).

As we know, these industries implement in the region, gigantic works and structures, such as this Refinery (Figure 1), installed in the city of Barcarena-PA, for the refining of minerals extracted from amazonian soils.

Figure 1: Refinery of extracted minerals, Barcarena-PA. Source: Tarso Sarraf, O LIBERAl, 2017.

Source: Search Data.

On the other hand, in addition to contributing to the strengthening of the regional and national economy and to the generation of jobs and the increase in the income of the local

population, the municipality of Barcarena-Pa has suffered consecutive socio-environmental and health impacts, due to the mining activities developed in the region. The surroundings of large mining projects are inhabited by families who, since their implementation have their way of life, their economy, their health and their sociocultural organization directly impacted by the numerous socio-environmental disasters that occurred on the site (NASCIMENTO; HAZEU, 2015).

In the last twenty years, bauxite, kaolin, river contamination, river and water wells have been recorded, which supply families, directly affecting the lives of local communities, causing incalculable damage to the health of residents and the environment in which they live (MAIA; MARIN, 2014).

The magnitude and complexity of understanding the phenomenon makes it indispensable to seek references in the area of Social Sciences and Health, considering that the environment and health are inseparable fields of the human being, directly related to their existence and permanence on Earth. However, the environment in its high complexity does not need the human being to remain and exist. In this environment, “reflections are guided in order to understand how the environment interferes in human health and how human beings interfere in the balance of the environment”, that is, it is of paramount importance to know the causes, inferences and impacts caused by human beings on the environment (MACEDO, 2019, p. 20).

In view of the above, it is necessary to understand more about the changes or socio-environmental impacts and on the health of local residents, resulting from the implementation of mining projects in Barcarena-Pa, aiming to understand how these processes of installation and operation of these large enterprises occur and still occur, in order to characterize the possible damage to the environment and in the health of local and nearby residents.

Thus, the present work aimed to evaluate the socio-environmental and health changes resulting from the implementation of large mining projects in Barcarena-PA, contextualizing the development and its contradictions in the Brazilian Amazon, resulting from these enterprises.

2. METHODOLOGY

The present work was carried out through a descriptive-analytical and exploratory study, developed through bibliographic research about the literature published in books, scientific and documentary articles, related to the theme under study. As for the approach, it is qualitative, seeking to analyze the reality of the theme, highlighting the main authors who discuss the major projects in the Brazilian Amazon region, especially in Barcarena-PA, a municipality bordering Belém, Ponta de Pedras and Abaetetuba, all belonging to the State of Pará.

It is descriptive-analytical, since it sought to classify, describe, explain and clarify the problem presented. It is also exploratory, because it aimed to research, analyze and describe the main ideas of the authors, through the information researched on the theme in focus.

3. RESULTS AND DISCUSSION

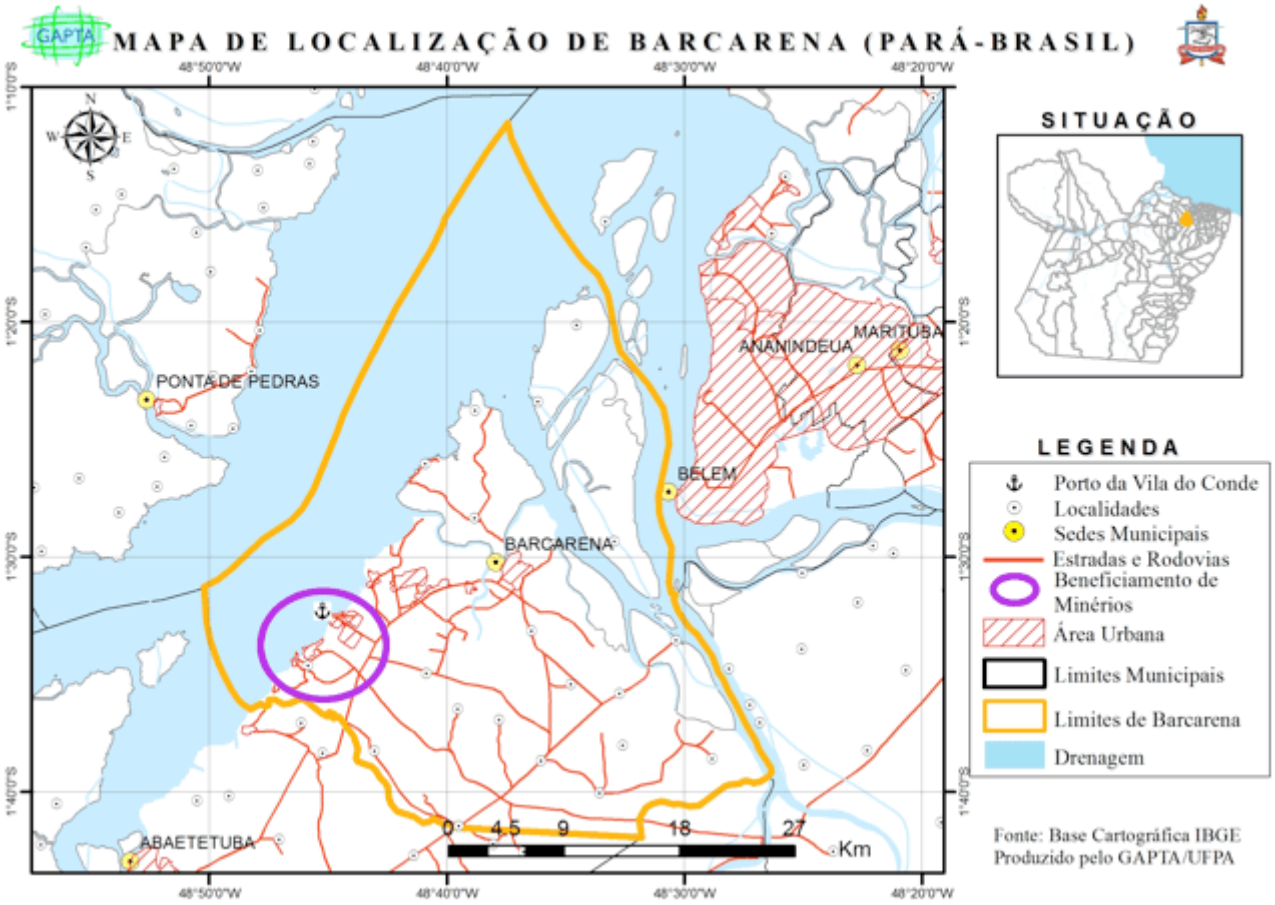
The installation of large mining projects in the Brazilian Amazon region has sustained many discussions over time. At the beginning of the 20th century the installation of Henry Ford's venture, the well-known *Ford Motor Company*, represented the arrival of modern companies in the State of Pará, generating high expectations for the beginning of industrial and economic development for the region. The installation of this great developmental project gave rise to the city of Belterra and the village, popularly known as Fordlândia, also representing the exploration model, based on rubber extraction, to meet international automotive demand (CANTO, 2015).

More broadly, and as a consequence of the installation of large industrial projects in the region, the socio-environmental conflicts existing today in the Brazilian Amazon constitute complex processes, involving various subjects and multiple interests, from economic to environmental preservation. For Canto (2016, p. 89), "The territorialization of large companies, foreign or not, has been the epicenter of socio-environmental conflicts in the most varied corners of the Amazon". Tensions from diverse backgrounds, involving mineral extraction, logging, river issues, agricultural and pastoral conflicts, fishing conflicts, demarcation of indigenous lands and many others.

In the context of mineral exploration, since the 1970s, the facilities of large enterprises gained strength in the State of Pará. As an offshoot of the Grande Carajás Project (PGC), companies focused on the production of alumina and primary aluminum were implemented in the region. The Brazilian company Albrás settled in the municipality of Barcarena, Pará, starting operations in 1985 (MONTEIRO, 2005; MACÊDO, 2019).

Barcarena was the city chosen to host large industrial projects, due to its strategic position to serve the European and North American markets, first: for the availability of cheap labor, highly necessary for some jobs and for its proximity to the capital of the State of Pará, the city of Belém, thus facilitating the company's activities (NAHUM, 2011; SILVA, HAZEU, 2019). (Figure 2).

Figure 2: Location of the municipality of Barcarena-PA.



Source: Ibge Cartographic Base- Produced by GAPTA/UFPA, 2017.

The implementation of large developmental industrial projects in Barcarena was intertwined by a series of displacement processes, most often against taste, of traditional communities living in the region. Marin (2017), highlights that there is an evident tension between, the specific territorialities that made up the municipality before the 1970s, and the large enterprises installed there, due to the imposition of a form of accelerated development, largely not well planned, which was taken by the industrial vision, especially from 1980.

The formulation of state policies capable of including large projects, and at the same time mediating the relationship with the traditional populations of Barcarena was fundamental and strategic, in a context marked by the conviction of the local population, by the idea of progress for the municipality. To (CARMO; COSTA, 2016, p. 291) "in the 1980s, the attention of public policies turned to the municipality, so that it would serve the interests of the State and external interests", receiving a large project called the Industrial Complex of Alunorte.

According to Maia and Marin (2018), the companies Norsk Hydro (Alunorte and Albrás), Imerys Rio Capim Caulim, Pará Pigmentos, Buritama, Tecop, Votorantin and Usipar continuously transform the municipality of Barcarena, transforming the region into an industrial waste deposit, deforesting forests and displacing entire people and communities to build more tailings basins, impacting the lives of these traditional communities , thus generating serious damage to the environment, aggravating social issues and thus generating major health problems for these populations.

Among the most exploited minerals in the Barcarena region, aluminum (AL) can be highlighted, which is criticized by a good part of physicians. They state that Al aluminum poisoning has been increasingly studied and is associated with constipation, abdominal cramps, anorexia, nausea, fatigue, changes in calcium metabolism (rickets), neurological changes with severe damage to brain tissue. In childhood it can cause hyperactivity and learning disorders. Numerous studies consider that Al plays an extremely important role in worsening Alzheimer's disease (early dementia). Excess Al interferes with the absorption of selenium and phosphorus. Acidic foods increase the absorption of Al and increase the release of al-pots made with this mineral (PRADO FILHO, 2010).

According to Salvador (2013), it is necessary and urgent an energetic action of our authorities, both to ensure the population of the region, including the workers themselves

complete and transparent laboratory tests, without machinations, to diagnose the illnesses resulting from contamination by heavy materials harmful to human health, used in the exploitation of the aluminum chain, preserving the public health of these citizens.

Every sick worker, still with sequelae and or disability for work, must have guaranteed their right to serious and true diagnostic examinations, aiming at receiving the welfare aid, guaranteed by law for all workers with sequelae and or professional disabilities, which in many cases has been denied, either by the flawed practices of notifications, or by the practice carried out by the INSS to reduce its costs with the granting of social security benefits , instead of making moralizing inspections so that the protective legislation of human labor, with safety, health and dignity is fulfilled, without the known vices of the system (SALVADOR, 2013).

4. FINAL CONSIDERATIONS

In this contradictory logic of development, it is observed that the global dispute over the natural resources of the Brazilian Amazon region makes the dispute for control of its territory become crucial in the geopolitical context of the Amazon. However, this model contrasts strongly with the population, economic, cultural, political and social dynamics of the region.

And because it is an accelerated economic development model, and often not properly planned, taking into account the peculiarities of the Brazilian Amazon, it ends up generating numerous environmental and social impacts that even directly reflect serious health problems of the local population, as observed in this review.

For all that has been analyzed, it is therefore necessary to urgently rethink this form of implementation of mineral exploration projects in the Amazon region of Brazil, because major socio-environmental disasters can still occur, affecting many human lives.

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