Journal of Service Science and Management, 2023, 16, 567-591
https://www.scirp.org/journal/jssm
ISSN Online: 1940-9907
ISSN Print: 1940-9893

Large Mining Projects and Socio-Environmental Impacts: Economic and Socio-Environmental Dynamics in Barcarena (Pará, Brazil)

Raimundo da Costa Almeida[1], Christian Nunes da Silva[2], João Marcio Palheta da Silva[3], Aghane de Carvalho Antunes[4], Cynthia S. Simmons[5], Daniel Araújo Sombra Soares[6]

[1]Environment Center, Federal University of Pará (PPGDSTU/NAEA/UFPA), GAPTA/CNPq, Belém, Brazil
[2]Environment Center, Federal University of Pará (UFPA), GAPTA/CNPq, Belém, Brazil
[3]Faculty of Geography and Cartography, Federal University of Pará (UFPA), Belém, Brazil
[4]Center for Latin American Studies, University of Florida, GAPTA/CNPq, Gainesville, USA
[5]Department of Geography, University of Florida, GAPTA/CNPq, Gainesville, USA
[6]Environment Center, Federal University of Pará (UFPA), Belém, Brazil
Email: raimundo@ufpa.br, cnsgeo@yahoo.com.br, jmpalheta@ufpa.br, agantunes@ufl.edu, cssimmons@ufl.edu, dsombra@ufpa.br

How to cite this paper: Almeida, R. da C., da Silva, C. N., da Silva, J. M. P., Antunes, A. de C., Simmons, C. S., & Soares, D. A. S. (2023). Large Mining Projects and Socio-Environmental Impacts: Economic and Socio-Environmental Dynamics in Barcarena (Pará, Brazil). *Journal of Service Science and Management, 16,* 567-591.
https://doi.org/10.4236/jssm.2023.165030

Received: August 1, 2023
Accepted: October 17, 2023
Published: October 20, 2023

Abstract

This paper analyzes the socio-environmental impacts caused by the "Large Project" of mining in Barcarena, a municipality in the Brazilian Amazon located in the Metropolitan Region of Belém, with a previous rural history, abruptly converted into a mineral processing area. Through documentary analysis of taxes and fees generated, and local development indices, we show how mining activity does not generate development for the inhabitants of Barcarena. For the municipality, only externalities remain. We used secondary, statistical and cartographic data analysis, although we carried out fieldwork to understand the situation on the ground.

Keywords

Mining-Metallurgical Activity, Municipal Tax Collection, Socio-Environmental Impacts, Barcarena, Brazilian Amazon

1. Introduction

This paper discusses aspects of these socio-economic impacts that have occurred in the municipality of Barcarena, highlighting the socio-environmental risks and the increase in unequal urbanization (Fenzl et al., 2020) as the main consequences of this process of "globalitarianism" (Spariosu, 2006; Santos,

2017), i.e., the forced incorporation of this place into the global capitalist economy, based on the raw materials activities (beneficiation of aluminum, alumina, and kaolin). Barcarena is a municipality close to Belém, second largest city of the Amazon, and, since 2023, is part of the Metropolitan area of Belém (Pará, 2023) (**Figure 1**).

Concerning mass migration from the arrival of the mining project, the local infrastructure was not sufficient to serve the population. Although company villages were implanted in municipalities that received mining projects, such as Parauapebas, in the urban nucleus of Carajás, and Vila dos Cabanos, in Barcarena, despite easing the pressure, it does not solve the infrastructure problem, because this equipment are intended only for the population that gets jobs in the enterprises, leaving immigrants, who come in search of an opportunity.

However, those who cannot get one, often living in precarious places, increasing the need for housing and other structural services, as well as health, education, security, among others, in the cities that receive these projects. Today, these historical models of company-community interaction, such as the company-city model, are no longer valid and most companies avoid this solution for various reasons and strategies.

The company-town has traditionally prevailed in extractive industries around the world, however, as noted by Donadelli et al. (2010), this pattern has been avoided based on the assumption that governments, not companies, are responsible for local development. In addition, the company provides social services, such as housing, health, and education, to facilitate its operations, often creating a cycle of paternalistic dependence of the community on the company (Donadelli et al., 2010). On the other hand, local governments often lack the resources to provide social infrastructure and the company operating in the community fills this infrastructure gap at its discretion.

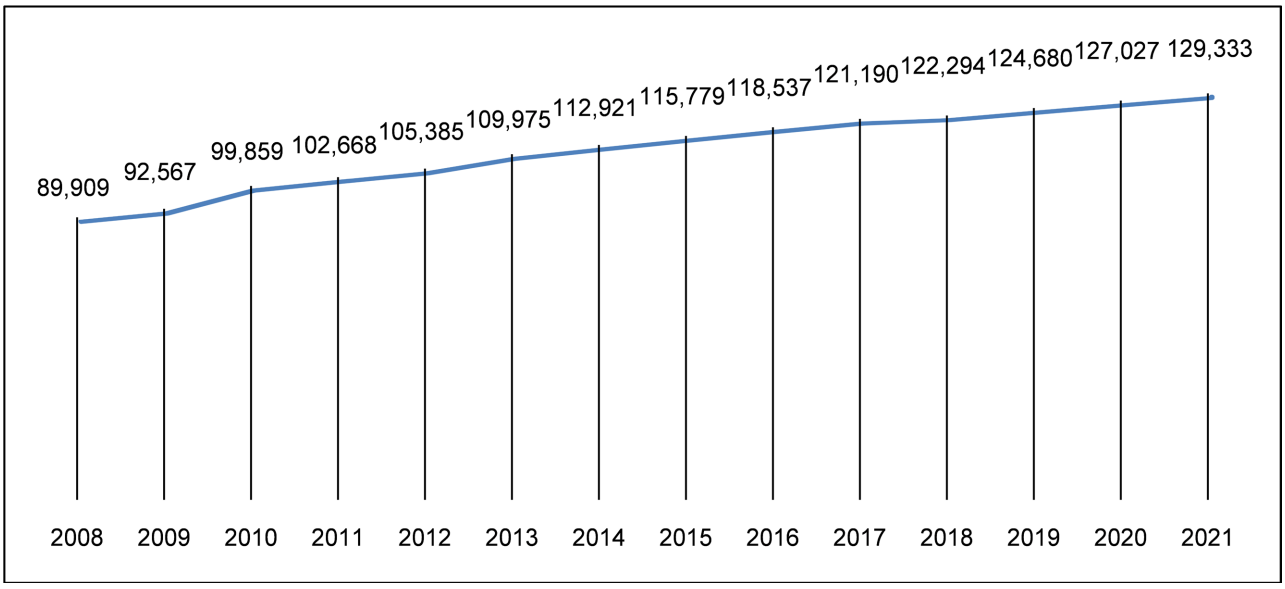


Figure 1. Population growth of Barcarena for the period 2008-2021. Source: IBGE (2023). Elaboration: Authors, 2023.

We aim, on this paper, to expose a portion of the Amazonian territory in the state of Pará that was not created due to mining but has undergone a remarkable change in its functionality because of the installation of iron ore processing companies by foreign companies. This municipality contains mineral processing enterprises in its territory that link the local to the international economy, triggering the reorganization of geographic space and a different set of complexities that articulate relationships that go beyond the local scale, generating new territorialities from the economic dynamics of mining.

After this introduction, the article is divided into four more sections. The first is the methodological section, which highlights the procedures developed for this research. Next, a section that presents the context of the implementation of "Large Projects" in the Amazon, as a face of the advance of globalization and the imposition of an international division of labor on peripheral countries. Subsequently, a section presents how the process of implementing the mining industries took place and the issue of fees and taxes generated for the municipality, while the last session presents the consequences of this activity for the local population.

2. Materials and Methods

This research had two fundamental points for its elaboration, the first being carried out through bibliographical research, which constituted the basis of studies and bibliographical and documentary research, to analyze the role of mining activities, especially in the Amazon region, with a focus on the municipality of Barcarena, in the state of Pará. Above all, a rigorous analysis of statistics provided by federal agencies in Brazil and state agencies in Pará.

The second, the fieldwork, carried out in Barcarena, to verify reality and confirm what was found in the literature review. The fieldwork was carried out in communities affected by large projects, such as the Community of Maricá, Acuí and Curupere. In this sense, direct and participatory observation was carried out. The adoption of this method allowed access to information that can only be captured through personal experience, in addition to being a way for those investigated to present their qualitative interpretations about the historical processes experienced (Portelli, 2016).

To better understand and analyze the relations between the community and mining companies, we preliminarily resorted to studies that analyzed the mineral issue in the Pará Amazon, having carried out a bibliographical survey at the Environment Center (NUMA) and in the Postgraduate Program in Natural Resource Management and Local Development in the Amazon (PPGEDAM) and also access to reports from the mining company, available on its website.

Based on consultations carried out at the researched works and pre-established contacts with local community leaders, fieldwork was carried out, in which structured interviews were carried out with community residents. To analyze the data obtained through interviews during the visit, transcriptions were made, us-

ing qualitative analysis of their contents. The cartographic products were created at the Laboratory of Environmental Analysis and Cartographic Representation (LARC), a sub-unit of the Environment Center (Núcleo de Meio Ambiente—NUMA), from Federal University of Pará, using QGIS software for geographic operations and manipulations of images from remote sensors and shapefiles.

This Research was developed based on the results of the project "Environmental Modeling of Territorial Impacts of Mining in the Paraense Amazon", agreement No. 021/2022, from the Amazon Foundation for Studies and Research Support (FAPESPA), and with funding values from the project "Mapping of the territorial impacts of large mining enterprises in the Brazilian Amazon (2010/2020)" originating from the National Council for Scientific and Technological Development (CNPq).

3. The "Large Projects" as the Amazon Face of the Globalization of "Development" Policies

The world capitalist economy development over the last five centuries has been linked to and dependent on the incorporation of socially and geographically remote regions and ecosystems into the world economy. This process has been accelerated since the Second World War by the phenomenon of Globalization (Santos, 2017). A major driving force behind is the growing demand for raw materials to fuel industrialization in the core nations (Ciccantell, 1999). The Brazilian Amazon has been targeted for raw materials extraction as part of national corporate and state economic development strategies, which has increased this region's economic and social integration into the global economy. Consequently, the region has experienced a wide range of socio-economic and environmental consequences caused by these market strategies.

Regarding to the Amazon, and Barcarena, particularly, we must consider the socio-environmental and characteristics that shaped this territory. Under the Portuguese crown between the 17th and 18th centuries, Barcarena's economy was largely based on agriculture and plant and animal extraction activities. Between the 1870s until 1912, the Amazon became the largest supplier of natural rubber to an emerging transportation industry (Ciccantell, 1999).

During the "Amazon rubber boom", foreign companies used slaves and indigenous labor at first, and, after, workforce made up of migrants from northeastern Brazil, who were widely employed in the extractive system that exported rubber, mainly to England and the USA (Soares, 2021). Colonialism and its dependency framework create a vicious circle, denying peripheral nations the chance to ever be "modern" or "industrialized" (Porter, 1990).

Historically, the Amazon region has always been seen as a reserve of natural resources ready to be appropriated. Becker (2004) points out that the late 1960s was marked by the Amazon occupation process acceleration, considering the regional planning in the period 1930-1966 as the initial phase of the urbanization process.

Important markers of this phase are the implementation of the *Programa de Desenvolvimento para a Amazônia—PDA* (Development Program for the Amazon), and the creation of the *Superintendência do Plano de Valorização Econômica da Amazônia—SPVEA* (Economic Valorization Plan of the Amazon Superintendence), aiming to promote the Amazonian development, creating special financial and tax incentives to attract national and international private investors. Following the institutional rupture, with the 1964 coup d'état, and the establishment of the Military Dictatorship (1964-1985), more authoritarian measures were taken. From now on, mainly from the 1970s, the era of so-called "Large Projects" begins. The main goal was to include the area in the logic of a capitalist mode of production, inserting it in both national and international economic productions.

The speech of the ruling military caste was that development was directly linked to activities that would generate economic growth and an increase in GDP (Monteiro & Coelho, 2008). More precisely, in capitalist societies, development is conventionally measured purely in terms of the size of the economy, such as GNP, which is the value of the "total final output of goods and services produced by an economy". Often it is considered that higher the GNP/capita ("per capita income"), the more "developed" a country, region, or city is. Thus, the higher the annual GDP/capita growth, the faster a region is said to "develop" (Peet & Hartwick, 2009).

Following these market trends, economic vectors have advanced in the region, with new resources exploitation. So, newer conflicts have arisen, as these extractive resource models have served only as an externality, while the State is no able to provide healing and health to local populations. Indeed, people should be central to development strategies, however, their needs have been neglected and there has been a general failure to consider "development" consequences for local communities, since, as Peet and Hartwick (2009: p. 4) point out, development differs from economic growth in that it pays attention to the conditions of production, e.g., the environments affected by economic activity, and the social consequences, e.g., income distribution and human well-being.

Henceforth, as well as the "global South" in general, the incorporation of the Amazon region into the "development" logic has been accompanied by social exclusion, resource depletion, environmental degradation, and social inequalities, among other common consequences of the development trajectory. Thus, those who live in the territory have been expropriated and conditioned to poverty by uncontrolled exploitation without the commitment of those who have economic interests in the region.

The current production model in the Amazon, based on the "Large Projects" logic, generates more poverty than multiplies the wealth among its local inhabitants. This extractive logic, in the sense of accumulation through spoliation (Harvey, 2004), can be seen in the implementation of large hydroelectric projects (Lima et al., 2020), in the expansion of large monoculture plantations (Ferreira et al., 2023), or large pastures (Lobato et al., 2022), and, also, in the expansion of

industrial logic, such as industrial fishing (Sombra et al., 2022) over the community practices (da Silva et al., 2023). In all cases, these "Large Projects" generate spoliation, inequality and conflicts (Simmons, 2005; Gusmão et al., 2020).

In the case of mining, the logic of new "Large projects", despite the discourse of a "more sustainable agenda", has not differentiated itself from traditional projects, as can be seen in the case of Juruti, in western Pará (Folhes et al., 2022). In municipalities already affected by mining for many decades, the consequences remain the same, even if companies change, as can be seen in Paragominas in southeast Pará (Soares et al., 2016). The income generated by mining is lost in exports (dos Santos Leite et al., 2016), and mining municipalities have low levels of local development, such as Eldorado dos Carajás, a municipality with large mining (dos Santos Leite et al., 2018a), which has similar levels of local development to São Miguel Guamá, a municipality with small local scale mining of non-metals (dos Santos Leite et al., 2018b). Mineral wealth continues to be "volatile wealth" as pointed out Mathis et al. (1997).

In Barcarena, a municipality with the presence of several mineral transformation projects, and with the prospect of expansion, the impacts on water resources, the environment and the population are well documented in the literature (Gester et al., 2023). The faces of poverty consequently increase the imbalance between municipalities that lack large conflicting mining projects, consolidating compartments of poverty in neighboring communities that are unable to guarantee basic needs, such as access to emergency medical care, electricity, drinking water, and sanitation.

The iron ore processing activity in Barcarena started in the 1970s, with the advent of the international oil crisis, when industries highly dependent on the intense use of energy were redistributed in the global territory, in search of places with the possibility of intense energy generation at low cost, flexibility in environmental legislation, and abundance of cheap labor.

Japan, a major consumer of aluminum during the oil crisis, closed aluminum processing plants and looked for places to develop this activity in other countries. In 1976, the Japanese and Brazilian governments signed a cooperation agreement for the processing of aluminum in the Municipality of Barcarena, in Pará state (Lobo, 1996). To make the agreement feasible, the Government of the State of Pará issued a decree expropriating 40,000 hectares aimed at the installation of the industrial district, the Company Town "Vila dos Cabanos", the Albrás-Alunorte industrial complex, the Port of Vila do Conde and the power and light station (Chagas, 2013).

There was resistance to the expropriation, on the part of the traditional resident population, who had inherited these lands from their parents and had a dynamic of life and culture in the place and also disagreed with the format and values they received for the expropriated lots (Hazeu, 2015). The energy source for the Albrás-Alunorte complex was provided with the construction of the Tucuruí Hydroelectric Plant, entirely financed by the Brazilian government, which had its first two generating units in operation in 1984 (Rocha, 2008).

In 1985, Alumínio Brasileiro S.A (Albrás) was inaugurated, with 51% of the capital through the so-on Brazilian state capital company "Companhia Vale do Rio Doce" (CVRD) and 49% of the capital from the Japanese company Nippon Amazon Aluminum Co. Lta (NACC). Since the inauguration of Albrás, other companies have settled in Barcarena such as Alunorte, in 1995, Pará Pigmentos, and Imerys Rio Capim Caulim, from the kaolin sector, in 1996, which changed the basis of Barcarena's economy, at the time, predominantly agricultural, for industrial processing of bauxite and kaolin (Lobo, 1996).

Brazil is one of the world's largest producers and exporters of raw and processed minerals. The mining sector represents 4% of Brazil's GDP (IBRAM, 2023; Brazil, 2022a). In terms of revenue from the mining sector, iron ore (58.5%), gold ore (9.4%), copper ore (6.6%) and bauxite (2.6%) are the main substances extracted. The latter is the raw material for alumina and aluminum, produced in Barcarena. In Brazil, the aluminum industry is dominated by a small number of companies: Vale (inherits CRVD after its privatization in 1997), Alcoa, BHP Billiton, Alcan and Hydro (Acero, 1999; Palheta da Silva et al., 2017).

Norsk Hydro ASA, a Norwegian company, brings part of the ore that is processed in its industrial complex in Barcarena, through a pipeline, using a pumping system that transports the ore explored in Paragominas to the Barcarena processing plant. The pipeline has a length of 244 km, leaving the Paragominas, crossing the municipalities of Ipixuna do Pará, Tomé-Açu, Acará, Moju, and Abaetetuba, until arriving in Barcarena. On the route of the pipeline, there are also the rivers Capim, Acara Miri, Capim, and Moju, which are crossed by the equipment that has a transport capacity of 14.885 million tons of bauxite per year (de Lima Rodrigues et al., 2019). In 2010, Hydro acquired from Vale the companies Albras (Alumínio Brasileiro), Alunorte (Alumina do Norte do Brasil) and CAP (Companhia de Alumina do Pará).

The natural characteristics of aluminum of the Amazon basin and the technological and economic characteristics of the aluminum industry interact to produce the potential for a variety of positive and negative local socio-environmental impacts. Regional geology and climate have produced large, high-quality, easy-to-mine bauxite deposits near main rivers with enormous hydroelectric potential, giving the region the two main ingredients for aluminum production in the global context of depletion of both raw materials in more accessible locations (Ciccantell, 1999).

The transportation cost savings available in processing bauxite into alumina (an intermediate product) and then into aluminum in the same region are also material incentives for local extraction and processing. Electricity transport characteristics that limit transmission range provide another motivation for the development of aluminum and other electricity-intensive industries in the region (Ciccantell, 1999).

However, the positive local potential of these material and social procedures is limited by other processes. The social remoteness of the naturally determined locations of raw materials confines social processes such as linkage-based devel-

opment. The transportation characteristics of the region's main bauxite deposit, located adjacent to a major tributary of the Amazon River, which allowed ocean-going vessel access, created a strong incentive for the direct export of unprocessed bauxite. In sum, new historical materialism predicts that efforts to develop this industry by aluminum companies and the Brazilian State would result in inadequate local socioeconomic benefits and the imposition of significant social and environmental costs on the region (Ciccantell, 1999: p. 177).

4. Processing and Exportation of Mineral Resources in Para, and Collection of Municipal Taxes and Mining in Barcarena

Mining towns in the Brazilian Amazon, more specifically in Pará, have shown diverse economic dynamics and territorial organization. Each municipality has demonstrated different levels of complexity and effects induced by the implementation of large mining companies in their territories. The wealth of natural resources (mineral deposits) has driven the actions of international groups that are central to the economy of the region and, consequently, of the Pará state, which has become one of the largest collectors of Compensação Financeira pela Exploração de Recursos Minerais (Financial Compensation for the Exploration of Mineral Resources) in Brazil due to the marked presence of mining activities in several municipalities in Pará (**Figure 2**).

Global corporations, such as Vale, Alcoa, Alcan, Imerys, and Norsk Hydro ASA, among other economic enterprises, have played a key role in the regional economy, producing different socio-economic effects and environmental changes in the Pará state, including the nature of land use.

In this context, we highlight the municipality of Parauapebas in the southeast of Pará, where Vale has a strong presence, Juruti, in the lower Amazon, where Alcoa maintains bauxite mining operations, and Barcarena, where the Norsk Hydro ASA industrial complex is installed, which benefits bauxite, extracted from the Hydro Mine in Paragominas (Palheta da Silva, 2013). Juruti has one of the largest bauxite deposits in the world with reserves of approximately 700 million tons (Alcoa, n.d.). Despite this, mineral exploration in the territory of Pará is diversified, with various types of minerals, mainly iron ore (Palheta da Silva & Silva, 2016; Folhes et al., 2022).

Figure 3 shows that Pará has become an increasingly mining state. However, it has verticalized its production in a very limited way, consequently, people migrating to mining communities and towns in search of better living conditions have not experienced social mobility and stability at the same pace as socioeconomic problems. The majority of the population migrating to mining areas has too little technical expertise to be employed as skilled labor. Consequently, the zones of residence of unskilled workers, typically low-income areas, are generally not covered by basic public services to improve their standard of living. Thus, poverty has persisted in peripheral areas despite the implementation of a major development project (Palheta da Silva, 2013).

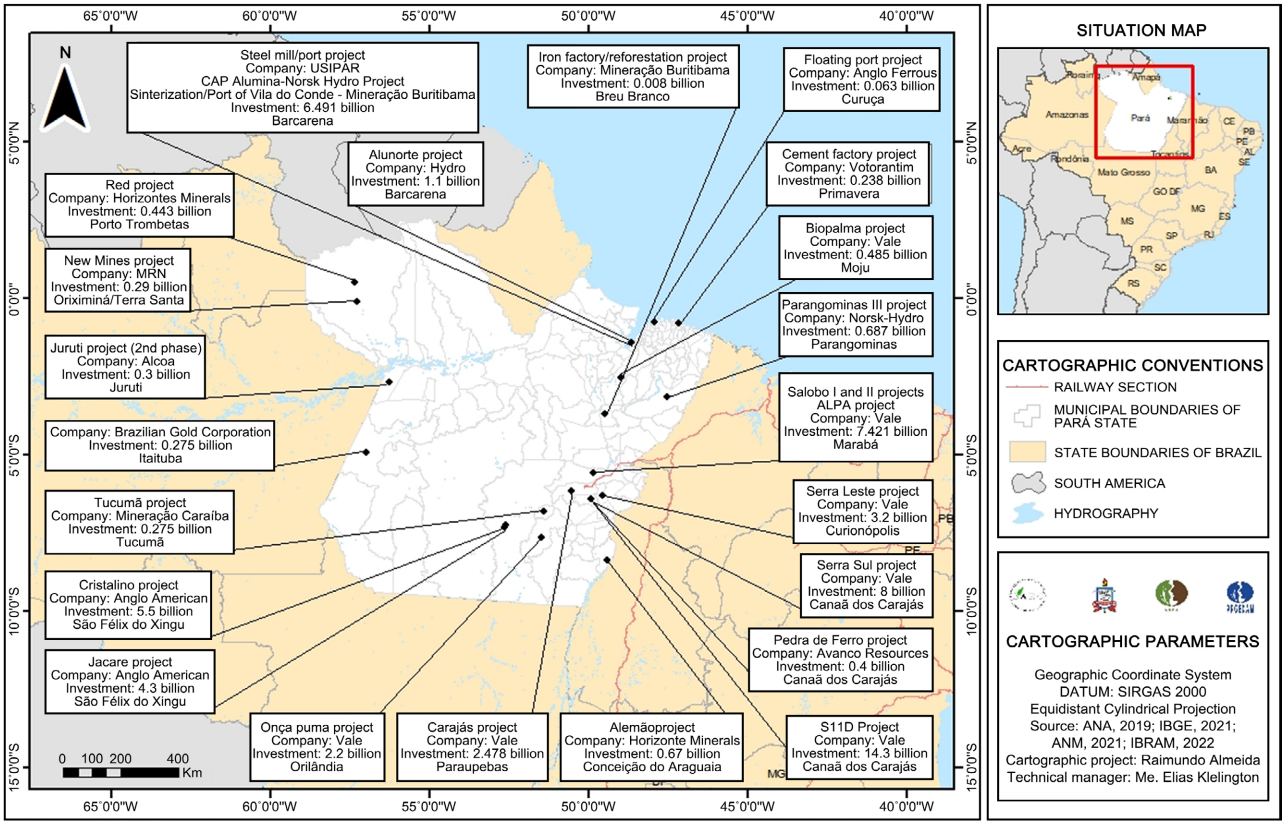


Figure 2. Mining activities in the Pará State. Source: SINMINERAL, 2023; IBRAM, 2023; Environmental Analysis and Cartographic Representation Laboratory (LARC/NUMA/UFPA). Elaboration: Authors, 2023.

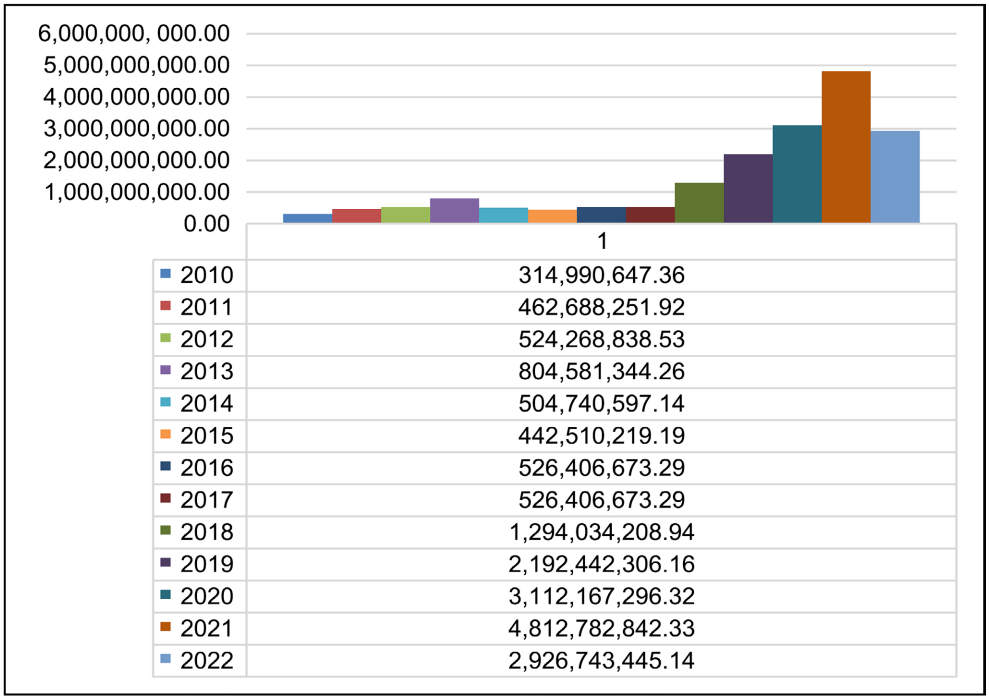


Figure 3. Revenue from financial compensation for the exploitation of mineral resources in Pará (in BRL). Source: National Mining Agency (Ministry of Mines and Energy, 2023). Elaboration: Authors, 2023.

This development industrial model that has shaped the Amazon as a whole condemns the region to an intense extractive industry holding local populations hostage to ambitious large-scale mining projects that export only the raw resources to richer countries elsewhere (Figure 4). As a result, the region misses the opportunity to make a qualitative leap in its strategic mineral sector. The Nation-State expects the current model of mineral exploitation to achieve desirable mineral-led economic sufficiency, but this research argues just the opposite.

In this sense, the operation of this companies extracting raw mineral resources, represents the trend called the New International Division of Labor (NIDL), which is intended as a mechanism for the division of labor between the rich global "North" model and the global "South" model, which is similar to previous divisions of labor. In this context, several cities in the Amazon region have been incorporated into the logic of capitalist production and the territorial division of labor, in which the Amazon works as a mere supplier of mineral raw materials to the industrialized core nations.

One of these cities is Barcarena (Figure 5), which even though it does not have mines installed in its territory, due to its geographical location, close to a large urban center (Belém, capital of Pará state) and its proximity to the Atlantic Ocean, which favors the flow of ore extracted in the Amazon to the world, was

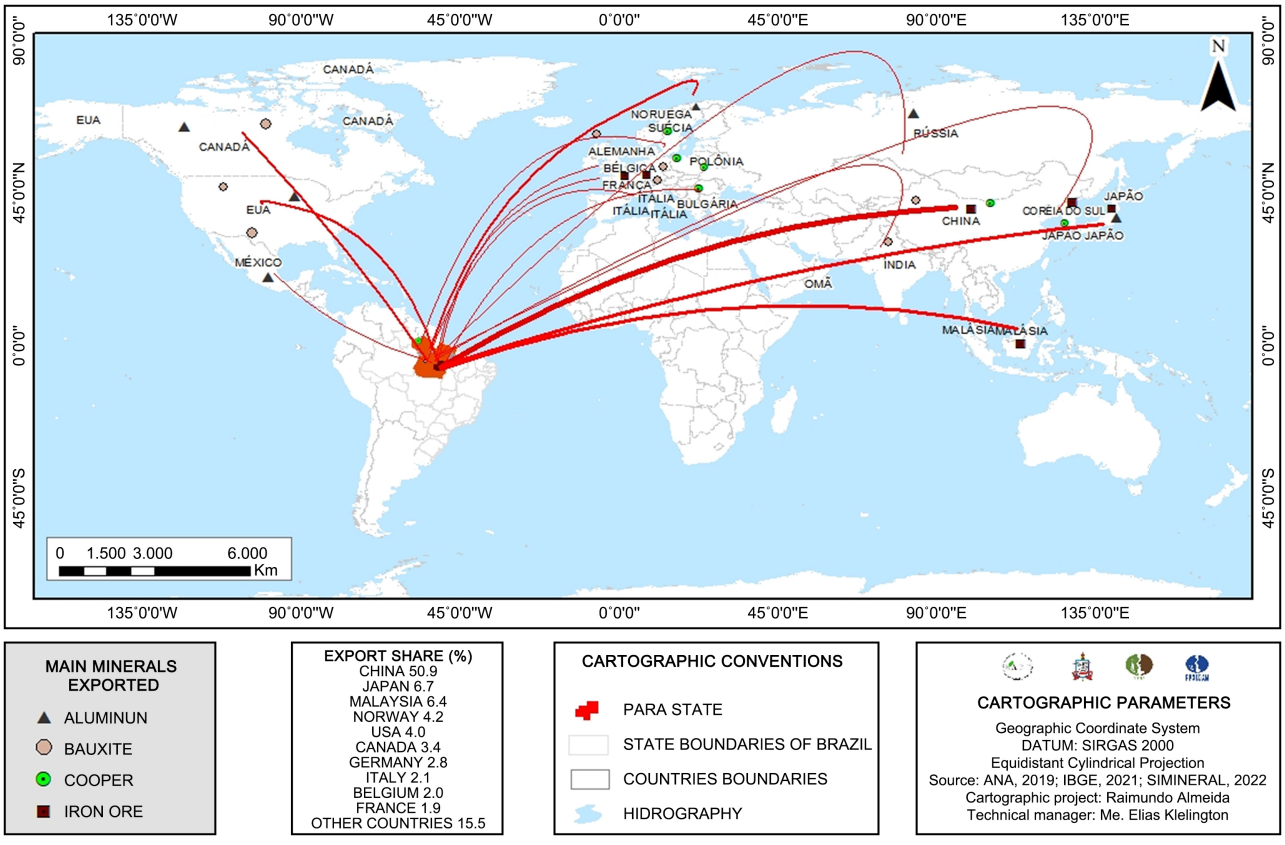


Figure 4. Destination of mineral exports of the Pará state (bauxite, aluminum, iron ore, and copper) between 2010 and 2022. Source: IBRAM, 2023; SINMINERAL, 2023; Environmental Analysis and Cartographic Representation Laboratory (LARC/NUMA/UFPA). Elaboration: Authors, 2023.

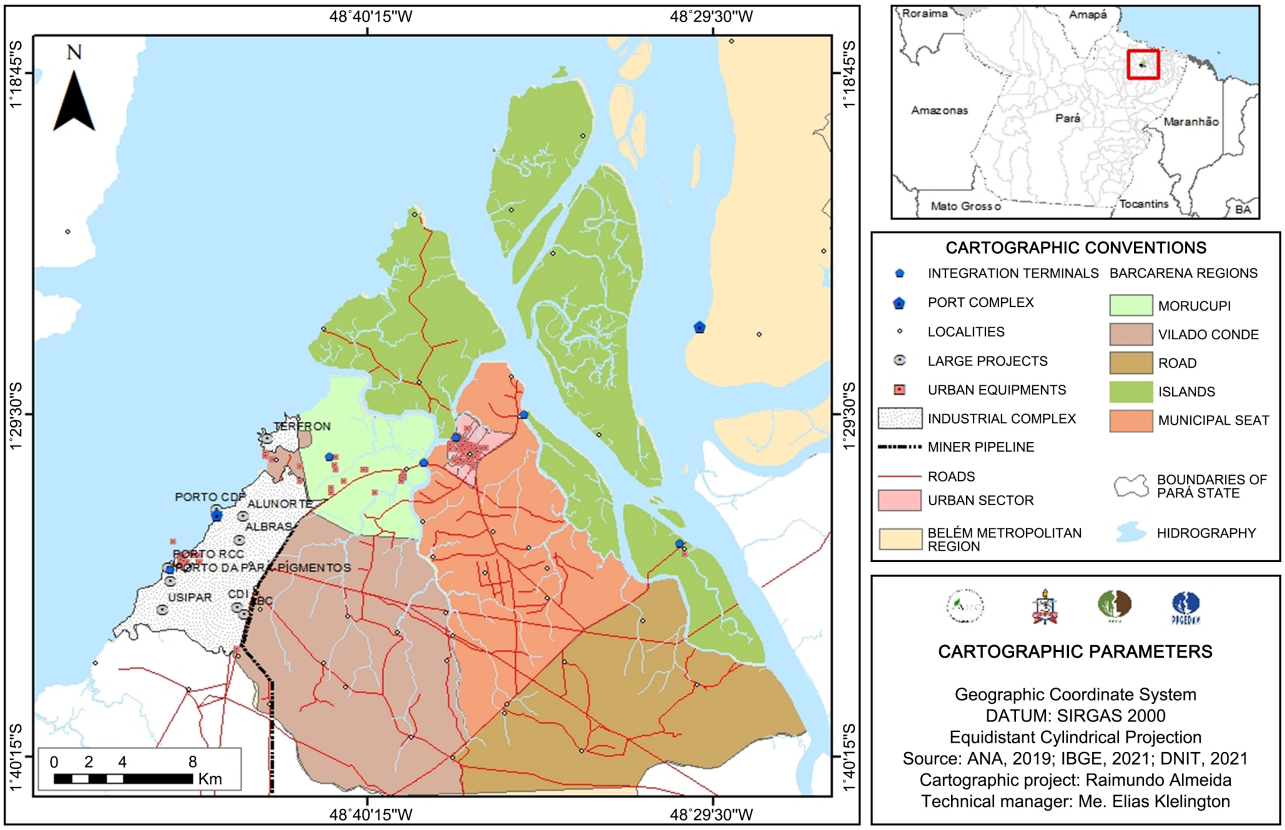


Figure 5. Location map of the Barcarena industrial complex (at Pará, Brazil). Source: Environmental Analysis and Cartographic Representation Laboratory (LARC/NUMA/UFPA). Elaboration: Authors, 2023.

chosen to house the industrial and port complex, for processing and exporting *in natura* and semi-processed ore to the countries that consume this raw material.

A typical Amazonian city that suddenly saw its economic functionality change from agriculture to the industrialization of bauxite and kaolin on a large scale, thus changing the use and land cover of the city, Barcarena became one of thirty-five other cities in the state of Pará that have some kind of mining activity.

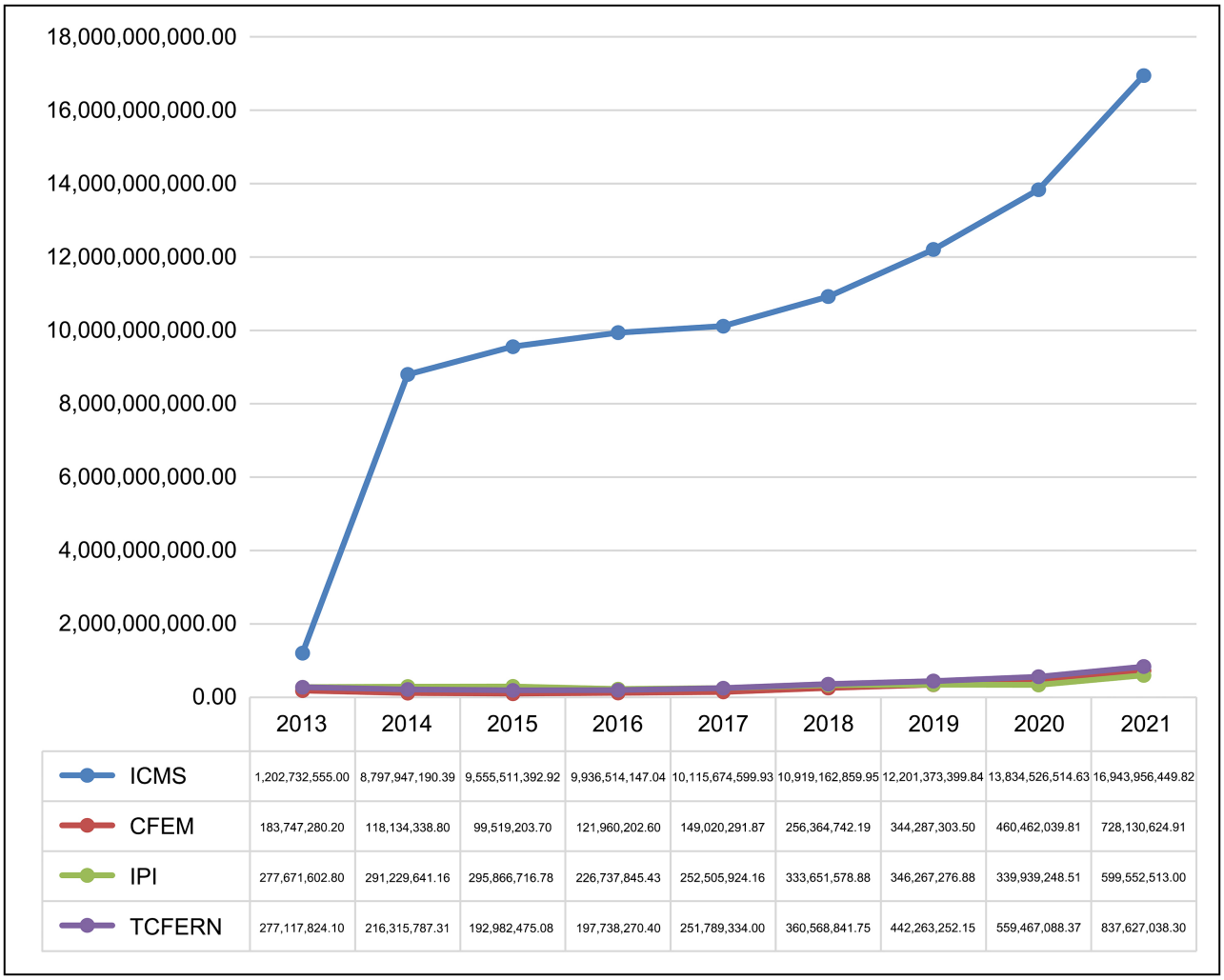
Currently, concerning municipal revenues, this study will address the Compensação Financeira pela Exploração Mineral (CFEM) (Financial Compensation for the Exploration of Mineral Resources), a resource administered by the National Mining Agency, that is levied on the company's "net revenue" resulting from the sale of the mineral product obtained after the last stage of beneficiation and before its industrial transformation.

The amount of CFEM differs depending on the mineral substance. A rate of 3% is applied for aluminum ore, manganese, rock salt, and potassium; 2% for iron, fertilizers, coal, and other substances; 0.2% for precious stones, cuttable colored stones, carbonaceous, and noble metals; and 1% for gold. The monetary resources collected through the CFEM are distributed as follows: 12% to the Brazilian State (divided between the National Mining Agency—ANM, the Brazilian Institute of the Environment and Renewable Natural Resources—IBAMA, and the Ministry of Science, Technology and Innovation—MCTI), 23% to the

state where the mineral resource is extracted, and 65% to the municipality where the resource is produced (Ministry of Mines and Energy, 2020).

The Pará state tax—Imposto sobre Circulação de Mercadorias e Prestação de Serviços (ICMS) (Tax on Circulation of Goods and Provision of Services), is another charge applicable to operations related to the circulation of goods and provision of interstate/intercity transportation services, services and communications, which is a competence of the states and the Brazilian Federal District.

Both CFEM and ICMS are fundamental instruments for collecting taxes from municipalities, especially for those that have large-scale mining activities in their territories, because the mineral exploration can multiply their municipal revenues and consequently raise the Imposto sobre Produtos Industrializados (IPI) (Tax on Industrialized Products). This would be a potentially applicable mechanism to increase regional wealth, adding value to the product and labor performed in the mining industry in the territory of Pará. In turn, the IPI is levied on taxable products produced by domestic and foreign industries (**Figure 6**).



	2013	2014	2015	2016	2017	2018	2019	2020	2021
ICMS	1,202,732,555.00	8,797,947,190.39	9,555,511,392.92	9,936,514,147.04	10,115,674,599.93	10,919,162,859.95	12,201,373,399.84	13,834,526,514.63	16,943,956,449.82
CFEM	183,747,280.20	118,134,338.80	99,519,203.70	121,960,202.60	149,020,291.87	256,364,742.19	344,287,303.50	460,462,039.81	728,130,624.91
IPI	277,671,602.80	291,229,641.16	295,866,716.78	226,737,845.43	252,505,924.16	333,651,578.88	346,267,276.88	339,939,248.51	599,552,513.00
TCFERN	277,117,824.10	216,315,787.31	192,982,475.08	197,738,270.40	251,789,334.00	360,568,841.75	442,263,252.15	559,467,088.37	837,627,038.30

Figure 6. Total revenue for the Pará state (ICMS, CFEM, IPI, and TCFERN taxes) (In BRL). Source: Ministry of Finance, 2022a, 2022b. Elaboration: authors, 2023.

From 2013 to 2021, the ICMS in the Pará state showed growth, meanwhile, the CFEM also increased and only the IPI remained stable. The growth of IPI is directly related to bauxite mining as the extractive activity that adds the most value in terms of return on profitable projects. We argue that other minerals do not add value to product and labor at the same rate, however, the value addition in mining is often low, leading to a limited ability of the state to raise more financial resources, mainly due to the current restricted network available in the production chain.

This figure shows that the ICMS increased from BRL 70,843,982.36, in 2013, to BRL 143,968,662.42, in 2021, in the municipality of Barcarena because of the presence of the ore processing project in its territory (**Figure 6**). On the other hand, CFEM did not grow much, standing at 1.5 million BRL, considering that the municipality is not an exploiter of mineral resources. The IPI also had an increase with the ore processing operations, but, as observed in most mining states, the lack of a mining policy that prioritized verticalization of the production process adding value to the mining production chain, such growth was not significant.

The Fundo de Participação dos Municípios (FPM) (Municipality Participation Fund), which is closely linked to the number of inhabitants, jumped in most of the mining cities. The value of the revenue in Barcarena, for example, increased significantly in the period studied, going from BRL 27,757,911.88, in 2013, to BRL 49,940,887.17, in 2021, which means an increment of 65% over the 10 years in a municipality with the presence of a mineral project, as well as presenting a higher growth rate compared to the Pará state in the same period (**Figure 7**).

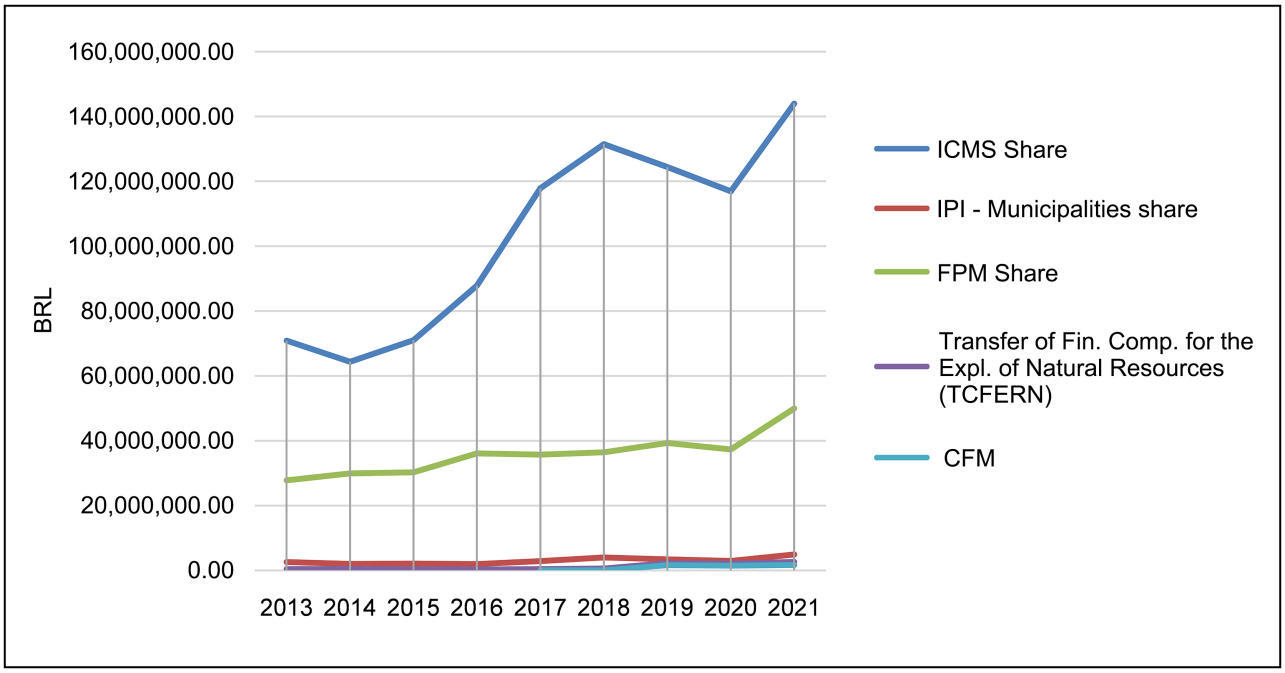


Figure 7. Total ICMS, CFEM, IPI, FPM, and TCFERN taxes for the Barcarena municipality in the period 2013-2021. Source: Ministry of Finance (2022a, 2022b). Elaboration: Authors, 2023.

However, this FPM growth was not accompanied by better infrastructure conditions to serve society. The challenge for municipalities affected by mining in the Pará state, the case of Barcarena, is to promote beneficial profit for society through the economic resources obtained from mining activities. However, what we have seen in most of the municipalities affected by mining in Pará are cities that face serious socioeconomic problems, such as increased violence, health services that do not serve everyone, unemployment, low schooling, etc.

The wealth of mining would be the solution to emerge in the middle of the Amazon cities endowed with urban infrastructure and able to meet the needs of the society that lives there in search of the "benefits" of development projects. However, despite the growth in production and tax collection in the state of Pará (Table 1), low-income suburbs and mining towns are emerging, areas marked by poverty and subject to all kinds of conflicts and social constraints. Usually, the conditions of infrastructure and urban equipment are insufficient to meet the demands of people who come to live in these areas and are not able to enter the mining labor market, who end up being easy targets for social illness and increasing the rates of urban violence and crime in these areas, as discussed below.

5. Mining Implications in Barcarena

In short, there was no planning to receive the number of migrant workers, who, attracted by the possibility of work and better living conditions with the implementation of the ore processing megaproject, headed to Barcarena. It is up to the municipality to build its infrastructure to meet the demand of the local community and the migrant population that arrives in it, attracted by the "Large Projects", since, with the population growth, the existing and new infrastructure

Table 1. Budgetary revenues of the municipality of Barcarena (in BRL).

YEAR	ICMS Share	IPI—Municipalities share	FPM Share	TCFERN	CFEM
2013	70,843,982.36	2,582,810.41	27,757,911.88	394,514.10	0,0
2014	64,369,455.67	2,003,736.40	29,945,428.62	447,084.01	0,0
2015	70,991,035.45	2,099,426.73	30,252,487.20	335,716.49	0,0
2016	87,840,846.80	1,948,608.07	36,103,767.12	302,479.13	0,0
2017	117,834,864.32	2,881,029.55	35,707,348.06	397,609.82	1025.46
2018	131,460,772.54	3,980,296.51	36,434,620.30	606,414.33	381.59
2019	124,399,771.82	3,407,208.39	39,320,405.76	2,230,679.11	1,624,834.19
2020	116,930,724.10	2,929,287.71	37,303,119.77	2,088,471.36	1,488,305.09
2021	143,968,662.42	4,943,777.42	49,940,887.17	2,627,825.33	1,662,441.80
Totals	928,640,115.48	26,776,181.19	322,765,975.88	9,430,793.68	4,776,988.13

Source: Ministry of Finance (2022a, 2022b). Elaboration: Authors, 2023.

is not enough to supply the newcomers increasing number. Thus, Barcarena is an example of growth without infrastructure, in areas where large mining projects have been implemented. Urban problems are not different from other cities in Pará, which have also received Large Projects in their territories (Fenzl et al., 2020).

The lack of planning before the "arrival of the stranger" (Martins, 1993), on the Amazonian debate, and in the city of Barcarena in particular, is related to the geographical conditions of the Northeast region of the Pará state, which has proximity to the Atlantic Ocean and, from a logistical point of view, it is more economical to export the ore extracted in the Amazon to other countries of the world, as shown in **Figure 8**. In general, residents of nearby cities who decide to cross the borders in search of better life opportunities in the mining cities are unable to achieve their goals and end up moving to the outskirts of these host cities and low-cost areas located near the city centers.

The news of the arrival of a large ore processing project in Barcarena stimulated direct and indirect migration. In turn, the periphery, which grew as a result of the Major Project, was left without adequate urban infrastructure and basic sanitation, being subject to all kinds of problems, such as health, for example.

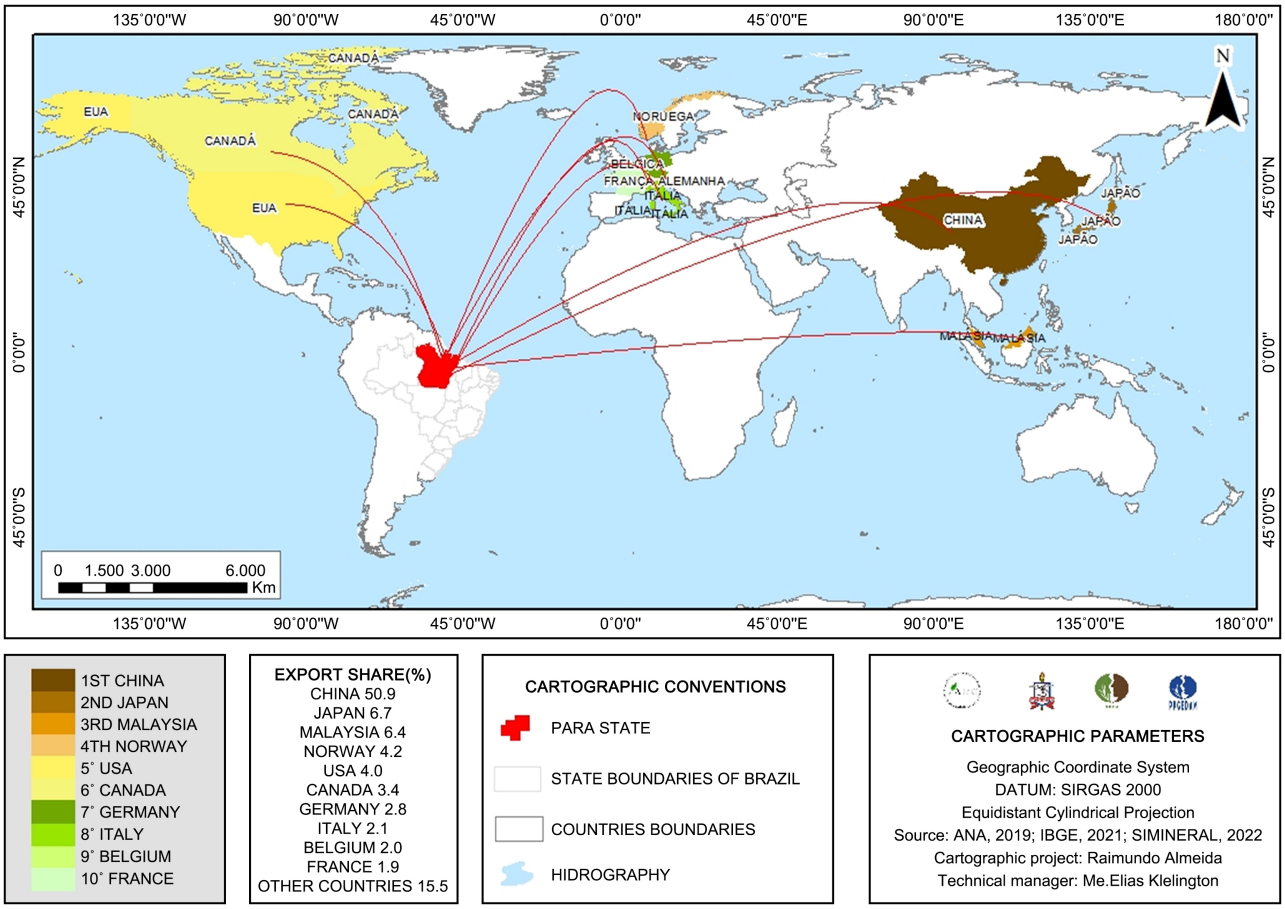


Figure 8. Destinations of ore exports from the Pará state. Source: SINMINERAL, 2023; Environmental Analysis and Cartographic Representation Laboratory (LARC/NUMA/UFPA). Elaboration: Authors, 2023.

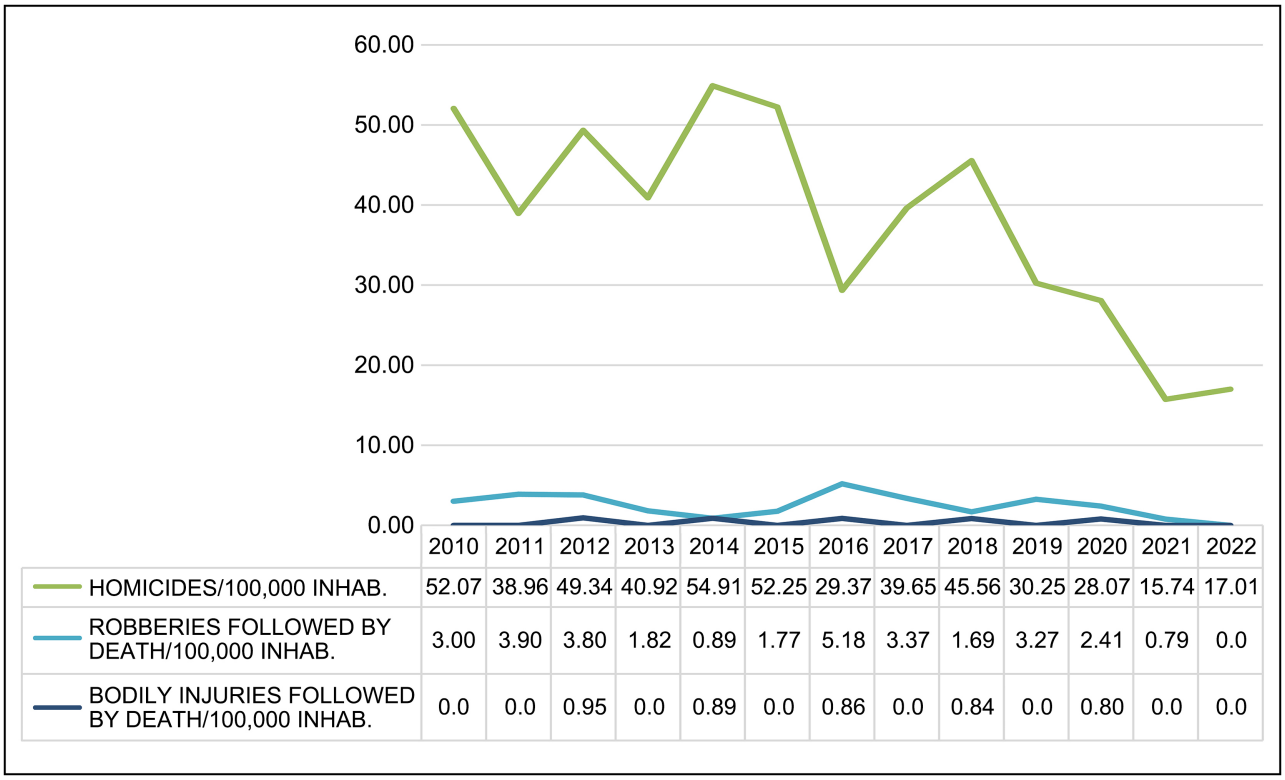
Tax collection from mining activities has not enabled social justice in the municipality and the processing of mineral wealth has not resulted in substantial benefits for Barcarena's population. The main challenge is to address the various social and environmental problems that usually arise from human pressure on the territory, such as the high incidence of crime and violence in the study area. In this case, the cities that receive large projects have historically assumed responsibility for these problems, since the infrastructure created by the projects does not meet the social demands emerging from the enterprise and ends up generating more problems than solutions, mainly due to the pressure of population growth on existing demand and insufficient services.

Despite the increase in tax revenues, as shown in the numbers above, we can observe an increase in the crime rate from the incidence of criminal types (IC) (homicides, murders, bodily injury followed by death, robbery followed by death, trafficking, rapes, thefts, physical injury, and traffic homicides, deaths and injury). The survey of 100,000-inhabitants crime data allows the comparison in the selected period, also serving as one of the perceptions that the increase in tax collection has not favored the formulation of public policies aimed at security issues (policies capable of positively interfering in reducing the incidence of violence and implementing actions that quickly meet people's needs in terms of sanitation, lighting, social inclusion projects, support for urban organization to support growth, etc.), and/or that represents the improvement of the public security apparatus, as we will demonstrate.

This figure shows a reduction in the amounts of homicides/100,000 inhabitants (52.07, in 2010, to 17.01, in 2022), robberies (3.0, in 2010, to 0.0, in 2022), and bodily injury followed by death (0.0, in 2010, to 0.0, in 2022) (**Figure 9**). Within the period, the year 2014 stands out with the highest homicide rate (54.91), and the year 2011, with the highest rate of robbery (3.9), while the crime of bodily injury followed by death, presented only for the years 2012, 2014, 2016, 2018, and 2020, had the rate of 1 per 100 thousand inhabitants.

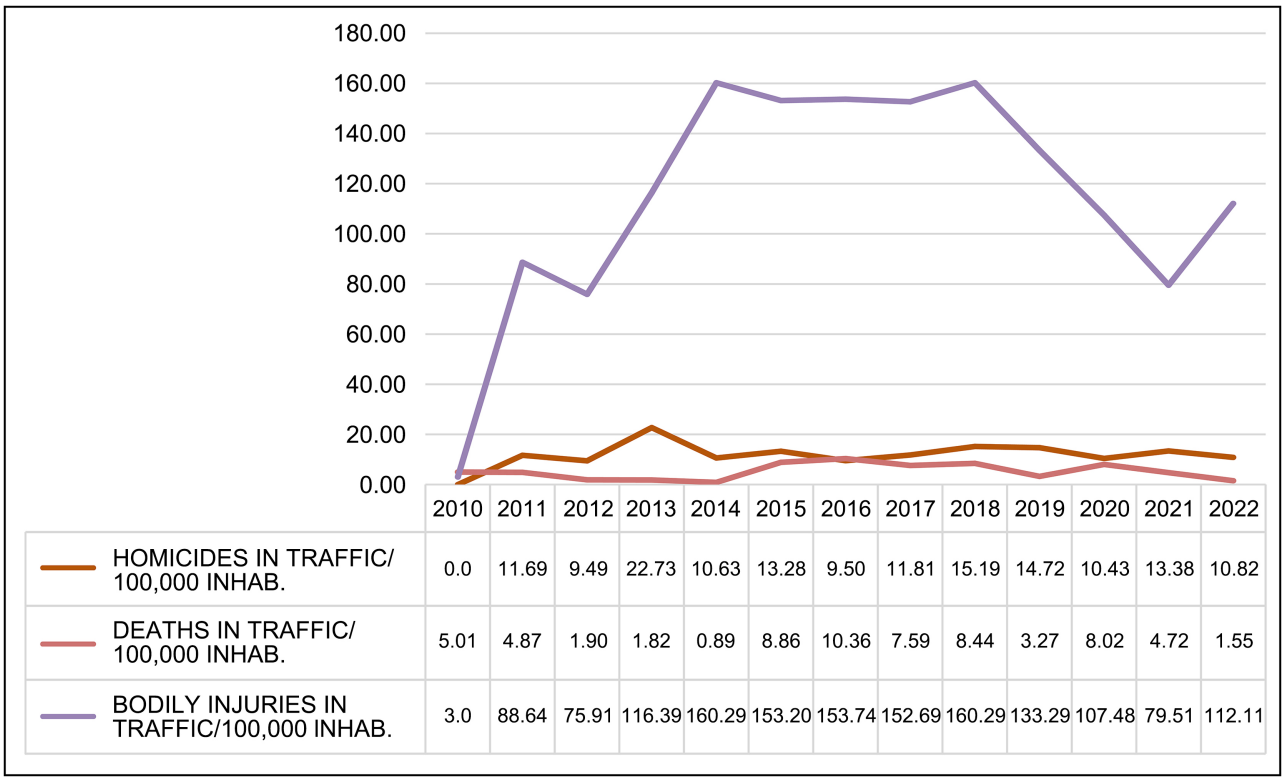
In **Figure 10**, we see an increase in road traffic homicide from 0.0, in 2010, to 10.82, in 2022, with a peak in 2018 (15.19) and the lowest point in 2010 (0.0), while road traffic death per 100,000 inhabits had a reduction from 5.01, in 2010, to 1.55, in 2022, and traffic injury per 100,000/inhabit; Had a significant increase from 3.0, in 2010, to 112.11, in 2022, with a peak of 160.29 occurrences in 2014.

Finally, **Figure 11** shows the records of robberies/100,000 inhabitants., which decreased from 1830.58, in 2010, to 945.62, in 2022, with a peak of 1830.58 incidences in 2010. These numbers are similar to the thefts, which had 1501.12, in 2010, falling to 1141.24, in 2022, with a peak of 1568.35 in 2019. In the same period, drug trafficking grew by more than 100%—from 24.03, in 2010, to 53.35, in 2022, with the highest score in 2015 (94.76). The quantity of rapes/100,000 inhabit had a growth of more than 50%, going from 42.06, in 2010, to 67.27, in 2022, peaking in 2019 (79.32). It is worth mentioning the COVID-19 pandemic in the years 2020 and 2021, which reduced the frequency of certain crimes.



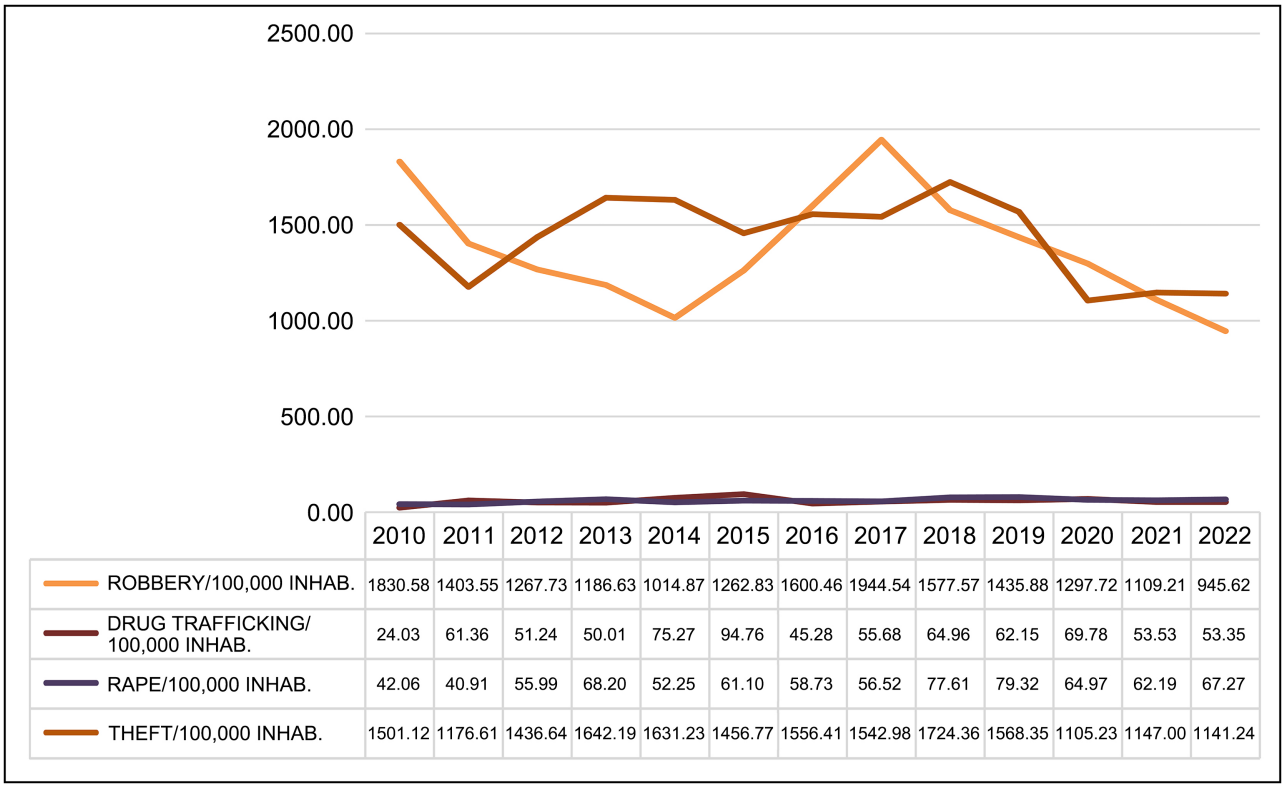
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
HOMICIDES/100,000 INHAB.	52.07	38.96	49.34	40.92	54.91	52.25	29.37	39.65	45.56	30.25	28.07	15.74	17.01
ROBBERIES FOLLOWED BY DEATH/100,000 INHAB.	3.00	3.90	3.80	1.82	0.89	1.77	5.18	3.37	1.69	3.27	2.41	0.79	0.0
BODILY INJURIES FOLLOWED BY DEATH/100,000 INHAB.	0.0	0.0	0.95	0.0	0.89	0.0	0.86	0.0	0.84	0.0	0.80	0.0	0.0

Figure 9. Numbers of homicides, robberies followed by death, and bodily injury followed by death in the municipality of Barcarena for the period 2010-2022. Source: Pará (2022). Elaboration: Authors (2023).



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
HOMICIDES IN TRAFFIC/ 100,000 INHAB.	0.0	11.69	9.49	22.73	10.63	13.28	9.50	11.81	15.19	14.72	10.43	13.38	10.82
DEATHS IN TRAFFIC/ 100,000 INHAB.	5.01	4.87	1.90	1.82	0.89	8.86	10.36	7.59	8.44	3.27	8.02	4.72	1.55
BODILY INJURIES IN TRAFFIC/100,000 INHAB.	3.0	88.64	75.91	116.39	160.29	153.20	153.74	152.69	160.29	133.29	107.48	79.51	112.11

Figure 10. Numbers of homicide, death, and bodily injury crimes in traffic in the municipality of Barcarena for the period 2010-2022. Source: Pará (2022). Elaboration: Authors (2023).



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ROBBERY/100,000 INHAB.	1830.58	1403.55	1267.73	1186.63	1014.87	1262.83	1600.46	1944.54	1577.57	1435.88	1297.72	1109.21	945.62
DRUG TRAFFICKING/ 100,000 INHAB.	24.03	61.36	51.24	50.01	75.27	94.76	45.28	55.68	64.96	62.15	69.78	53.53	53.35
RAPE/100,000 INHAB.	42.06	40.91	55.99	68.20	52.25	61.10	58.73	56.52	77.61	79.32	64.97	62.19	67.27
THEFT/100,000 INHAB.	1501.12	1176.61	1436.64	1642.19	1631.23	1456.77	1556.41	1542.98	1724.36	1568.35	1105.23	1147.00	1141.24

Figure 11. Numbers of robbery, drug trafficking, rape, and theft crimes in the municipality of Barcarena for the period 2010-2022. Source: Pará (2022). Elaboration: Authors (2023).

In summary, the data indicate an increase in crime rates per hundred thousand inhabitants in the period considered, from January 2010 to December 2022, for the criminalities of homicide and injury in traffic, drug trafficking, and rape. On the other hand, the homicides, robberies, and bodily injuries followed by death, deaths in traffic, robbery, and theft showed a decrease in their occurrences, however, despite robbery and theft crimes are well above the level perceived by the World Health Organization as acceptable (10/100,000 inhabitants).

The data indicate that the increase in revenues has not been transformed into public security policies that could address the problems arising from the social disruption caused by migration, resulting in increased violence. In the fieldwork, we identified that the increase in these cases is mainly due to: 1) availability of labor and higher rates of unemployment in the municipality; and, 2) lack of public policies aimed at education and security linked to minimizing the adverse impacts of "development" projects, which leads us to consider that current public security policies have not met the population growth caused by the implementation of the mining project.

With the concentration of mining investments in municipalities, such as Barcarena, migrant populations tend to concentrate more intensely in peripheral areas with the possibility of expansion of these spaces. In this sense, we assume that there will be an increase in revenues in the coming years, accompanied by increased violence and criminal and illegal activities. In addition, the population

is expected to increase in the next years due to the migratory flow, as a consequence of new mineral enterprises linked directly and indirectly to the processing of ore and the non-conversion of the resources collected in these enterprises to improve the living conditions of the local population.

It is important to realize that, even though the potential of municipal revenues has increased, it was not enough to provide an improvement in the quality of life of the population of these municipalities, including the resident population before the enterprise. Some points have already been discussed earlier in the paper, but it is worth highlighting some others:

1) The company town implemented in Barcarena was not enough to meet the housing demand of the project, since it was directed only to people who got jobs in the enterprise; immigrants who did not get jobs in the enterprise were integrated into the existing urban fabric, which somehow enables the emergence of new spaces integrated into existing urban areas;

2) As in all mining and infrastructure projects implemented in the Amazon region, Barcarena registered a strong migratory flow, even exceeding the project's capacity to absorb directly or indirectly the stream of people. The situation usually worsens even more after the implementation of the production facilities (basic infrastructure of the operation) ends up with the formation of a "pocket of unemployed people" that often awaits a new phase of expansion of the company or industrial plants and operations;

3) The structure of Barcarena has not kept pace with the prominent demand for public services, education, health, sanitation and sewage, transportation, drinking water, public safety, etc. after the beginning of the mining operation, therefore the population's clamor for basic services persists, which in a way ends up bringing the local public power into disrepute and reduce its influence on the daily lives of the city's residents;

4) The implementation of the project in Barcarena was not accompanied by regional planning, which generates land disputes, both in rural and urban areas. Mainly, the municipality was not well equipped to receive this nature of the industrial enterprise, which favored the outbreak of several conflicts of interest over land ownership, leading to increased violence.

It is noteworthy, from these issues, that some challenges become inherent in understanding the current situation of public security in Barcarena. For example, there has been a huge and disorganized growth in the city, therefore new urban spaces emerge each time or simply have their areas expanded far beyond the capacity of the State to ensure a smooth functioning, through the creation of adequate urban infrastructures and the providing of services to meet the growing demand of the population.

Another important issue concerns the change in the organization of the city and its integrated spatial planning. Although a model of an ore processing city was not foreseen to meet the demand caused by the project, as a strategy to disengage potential workers' struggles and militant unionism, what happened in

the case of Barcarena was the establishment of urban space heterogeneity, with the rise of new areas that concentrate part of the population with better living conditions and that are surrounded by populous and degraded neighborhoods, contributing to the formation of spaces of segregation, conflicts, and contradictions (Chagas, 2013). Explicitly, this configuration brings to light areas sought by criminals for the practice of delinquency.

In addition, there is a lack of adequate urban infrastructure and services to meet the growing demand of the city's population and address issues, such as the fulfillment of constitutional rights that depend on public power, such as basic education, health, basic sanitation, etc., as well as the credibility of local government. Moreover, the State, as an innate territorial agent (Raffestin, 1980), by not occupying its territory, ends up strengthening several other regional and local social actors that begin to dispute the power and influence of the territory, such as neighborhood associations, community centers, churches, and worship houses, merchants or even crime agents (Vieira et al., 2015).

In this sense, criminals start to control and establish new features in the city, with the practice of crimes, such as theft, robbery, drug trafficking, homicides, etc. Generally, there is a direct relationship between these crimes, with drug use and trafficking as the common thread, establishing an escalation of violence and lawbreaking at the local level.

In general, mining activities are likely to attract investment and development of these resources in the region, however, local socio-economic benefits are possibly being limited, as a result of the low verticalization of production in the region, and significant negative impacts on local populations and ecosystems that are anticipated (Ciccantell, 1999).

Finally, the mining projects implemented in the Amazon region, especially in the Barcarena region, ended up not providing the expected number of direct and indirect jobs projected during the planning, construction, and execution of the works. In general, the construction of Large Projects generates thousands of jobs for unskilled workers and large profits for contractors, but it is not a stable and long-term source of economic growth and diversification for a region with primary beneficiation of raw ore, despite massive investments (Ciccantell, 1999).

The expectations of the local population and the surrounding municipalities went far beyond the improvements brought by the ore processing enterprise in Barcarena. There are reports of families who abandoned their land in search of better living conditions in the city, meanwhile, others were simply evicted after threats or even by the death of family members. In this case, the city often appears as the only possibility of maintaining life. With this, we also have an increase in rural exodus, which leads to a growing number of migrants coming to the municipality in search of employment and public utilities, which ends up not happening, creating a mass of unemployed workers with a very low hope of integrating their constitutional rights to housing, education, health, safety, sanitation, and others.

The challenge for these cities is to use mining resources to solve the socio-economic and environmental conflicts that result from these large projects, try to take advantage of the integration of other activities, and use mining as a means—and not as an end—of socio-territorial development. The State needs to resist external pressures and promote integration policies, verticalizing the mining activity in Pará state, to complement its production chains, thus adding more value to the work and the product.

6. Final Considerations

Since its "discovery" by Europeans, Latin American countries have had a capitalist market economy, as it has always been involved in the exchange of goods with the capitalist countries of Europe and North America. This exchange has been unequal because this region has historically been dependent on the major capitalist countries. Its present stage of underdevelopment must be, in large part, the result of these historical relations (Porter, 1999).

Incorporation based on raw material wealth remains a central component of the globalization of the capitalist world economy, offering limited benefits and imposing significant economic, social, environmental, spatial, cultural, and political burdens on the regions of its extraction and processing, as new historical materialism argues (Ciccantell, 1999). The bauxite, aluminum, and alumina ore processing industry established in the municipality of Barcarena is an important example of the consequences of incorporation into the world economy based on the wealth of raw materials, as this paper demonstrates.

The implementation of large development projects in the Brazilian Amazon has intensified the demographic boom in several communities located in mining regions, since these projects have often attracted several workers to the territories—primarily, in search of employment. Typically, large commodity-based projects in the Brazilian Amazon have introduced a small managerial and technical middle class and a small but well-paid working class, while attracting thousands of extremely poor and unskilled construction workers.

Importantly, these new residents typically maintain economic, social, and cultural ties to their places of origin, and receive paid travel for periodic home visits as a key benefit for enticing professional, technical, and managerial workers. Specifically, opportunities and jobs for local populations are quite limited, since only a small number of local or even regional residents possessed the education, skills, and training required for labor or management positions on these projects (Ciccantell, 1999: p. 188).

Thus, the large mining projects are related to the expansion frontier of international capital in Latin America, a strategy that goes from the local to the international level, aiming mainly at the international export market for mineral resources. Barcarena is part of this context of geopolitics and the global economy of mineral resources, and it is in this perspective that one can understand the integration and incorporation of mining activities developed in the municipalities

of Pará and the international market.

Many municipalities without proper planning are strictly dependent on the flow of capital resulting from mineral exploration programs and have only one form of revenue: the money obtained by the presence of mining activity, together with CFEM, ICMS, IPI, and FPM taxes, that is linked to the existence of international companies in Brazil. The local government and especially the Nation-State seem to have forgotten or do not make a point of rethinking the role of mining companies and multinationals operating in the country and the multiplier effect generated by the incidence of these projects. The Pará state will receive, in the coming years, many investments from mining operations in Brazil and it is necessary to reconsider the development framework that takes into account the local community and direct and indirect impacts caused by these projects.

In this sense, we argue that the debate on mineral extractive industries and production chains should be on the agenda of a national industrial public policy. Future political decisions on development projects, such as these, should consider that it is no longer acceptable to continue exporting mineral resources almost "in the wild", with very little added value in product and labor. This economic pattern leaves mining states satisfied only with tax revenues collected through CFEM, ICMS, IPI, and FPM taxes from profitable projects and does not produce significant growth.

The wealth in our rich deposits rightfully belongs to Brazilian citizens. Major foreign mining companies should compensate the State and the community for the exploitation of mineral resources, given the intrinsic value arising from their non-renewable nature. The transportation characteristics of the region's main bauxite deposit, located adjacent to an important tributary of the Amazon River that allowed access by ocean-going vessels, create a strong inducement for the direct export of unprocessed bauxite.

Thus, the current bauxite exploitation model employed in the region has resulted in restricted socio-economic benefits for the local population, with significant communal and environmental costs being forced upon the municipality. The limited local socio-economic benefits generated from the tax increase are constrained by the inadequate amount of processing done in the region.

Current development practice is based on two questionable but unquestioned beliefs: 1) rapid GDP growth is the key to development because all human benefits derive from economic growth; and 2) the rapid GDP growth will result from technology transfer and industrialization, achieved through market and/or State institutions. Critics note that GDP growth has generally not "trickled down" to benefit the poor, as expected (Porter, 1999).

If we continue to accept this current export model of our "islands of syntropy", we will all lose. In addition, the Nation-State will stop collecting even more revenue and, consequently, society will end up not advancing with the investments that could potentially arise from the verticalization of the mineral pro-

duction chain and the social benefits made possible by the revenues collected from the mineral sector.

Funding

Research developed based on the results of the project "Environmental Modeling of Territorial Impacts of Mining in the Paraense Amazon," agreement No. 021/2022, from the Amazon Foundation for Studies and Research Support (FAPESPA), and with funding values from the project "Mapping of the territorial impacts of large mining enterprises in the Brazilian Amazon (2010/2020)" originating from the National Council for Scientific and Technological Development (CNPq).

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

Acero, L. (1999). *Environmental Management in the Bauxite, Alumina, and Aluminum Industry in Brazil in Mining and the Environment: Case Studies from the Americas* (pp. 223-266). International Development Research Center.

Becker, B. (2004). *Amazônia: Geopolítica na virada do III milênio.* Garamond.

Chagas, C. A. N. (2013). *O mito da cidade aberta: Vila dos Cabanos, urbanização e planejamento urbano na Amazônia.* GAPTA/UFPA.

Ciccantell, P. S. (1999). Making Aluminum in the Rainforest: The Socioeconomic Impact of Globalization in the Brazilian Amazon. *The Journal of Developing Areas, 33,* 175-198.

da Silva, C. N. et al. (2023). The Way of Life in Amazonian Communities: An Example of the Application of Participatory Mapping in São Caetano de Odivelas (Pará, Amazônia, Brazil). *Revista Observatorio de la Economia Latinoamericana, 21,* 3808-3832. https://doi.org/10.55905/oelv21n6-040

de Lima Rodrigues, A. C. V., Felipe, A. M. P. F., & da Silva Souza, J. A. (2019). Simulação de condição de fluxo em duto circular transportando polpa de bauxita de Paragominas (PA) na presença de aditivo modificador de viscosidade. *Revista Matéria, 24,* 1-9. https://doi.org/10.1590/s1517-707620190004.0825

Donadelli, F. M. M. et al. (2010). *Alcoa Brazil's New Sustainability Model for Mining: An Independent Review.* Columbia University.

dos Santos Leite, A. (2018a). Aprendizagem territorial, cooperação e inovação em espaços rurais: O caso da aglomeração ceramista de eldorado dos Carajás (Pará/Brasil). *Revista Caribeña de Ciencias Sociales, 7,* 1-23. https://www.repositorio.ufpa.br/jspui/handle/2011/14895

dos Santos Leite, A., Soares, D. A. S., & Soares, A. A. S. (2018b). Desenvolvimento local e gestão de recursos naturais em São Miguel do Guamá (Pará/Brasil): Aprendizagem territorial, cooperação e inovação no arranjo produtivo local de indústrias ceramistas. *Revista Observatorio de la Economia Latinoamericana, 16,* 1-41. https://shre.ink/2NZg

dos Santos Leite, A., Soares, D. A. S., & Trindade, J. R. B. (2016). Renda mineral e grande capital na Amazônia: A exploração das Minas de Carajás pela Companhia Vale. *Leitu-*

ras de Economia Política, 24, 55-78. https://shre.ink/2NMn

Fenzl, N., Sombra, D., Canto, O. do, Farias, A., & Nascimento, F. (2020). Os 'Grandes Projetos' e o processo de urbanização na Amazônia brasileira: Consequências sociais e transformações territoriais. *InterEspaço: Revista de Geografia e Interdisciplinaridade, 6,* e202002. https://doi.org/10.18764/2446-6549.e202002

Ferreira, S. C. G., Córdoba, D., Sombra, D., & Costa, F. É. V. (2023). Patterns of Injustices in Water Allocation Mechanisms in the Brazilian Amazon: Palm Oil Expansion and the Reshaping of Hydrosocial Territories. *Environmental Science and Policy, 147,* 79-88. https://doi.org/10.1016/j.envsci.2023.05.020

Folhes, R. T., do Canto Lopes, O., Sombra, D., & Lobato, M. G. (2022). A configuração da mineração e o ordenamento territorial nos municípios de Juruti e Santarém na Amazônia brasileira. *Revista Brasileira de Planejamento e Desenvolvimento, 11,* 1113-1136. https://abre.ai/fYmr

Gester, L. C. G. et al. (2023). Impactos socioambientais na Amazônia paraense: uma análise na comunidade de Curuperé (Barcarena, Pará, Brasil). *Cuadernos de Educación y Desarollo, 15,* 6164-6196. https://doi.org/10.55905/cuadv15n7-017

Gusmão, L. H. A., Sombra, D., & Vale Costa, F. É. (2020). Análise dos conflitos por água no espaço agrário paraense (2013-2016). *Sociedade e Território, 32,* 47-69. https://doi.org/10.21680/2177-8396.2020v32n2ID21142

Harvey, D. (2004). The 'New' Imperialism: Accumulation by Dispossession. *Socialist Register, 40,* 63-87. https://socialistregister.com/index.php/srv/article/view/5811

Hazeu, M. T. (2015). *O não-lugar do outro: Sistemas migratórios e transformações sociais em Barcarena.* Ph.D. Thesis, Federal University of Pará. https://shre.ink/98Kr

IBGE (Instituto Brasileiro de Geografia e Estatística) (2023). Censo Demográfico 2022. https://censo2022.ibge.gov.br/panorama/

IBRAM—Instituto Brasileiro de Mineração (2023). *Mineração em números.* IBRAM. https://shre.ink/2zLP

Lima, L. M., da Silva, C. N., de Paula, C. Q., & Soares, D. A. S. (2020). Large Hydroelectric Projects in the Araguari River Basin: Territorialities, Impact and Resistance of Amapá's Fishing (Amazon, Amapá, Brazil). *International Journal of Development Research, 10,* 38681-38689. https://shre.ink/aIX3

Lobato, M. M., Sombra, D., de Miranda Rocha, G., & da Silva Mota, G. (2022). A modelização gráfica da Amazônia e uma proposta de interpretação da fronteira: as dinâmicas territoriais de Marabá e do sudeste do estado do Pará (Amazônia/Brasil). *Planeta Amazônia: Revista Internacional de Direito Ambiental e Políticas Públicas, 14,* 19-42. https://abrir.link/p6pMK

Lobo, M. A. A. (1996). *Estado e capital transnacional na Amazônia: O caso da ALBRÁS-ALUNORTE.* NAEA/UFPA.

Martins, J. S. (1993). *A chegada do estranho.* Hucitec.

Mathis, A. et al. (1997). *Riqueza volátil: A mineração do ouro na Amazônia.* CEJUP.

Ministry of Finance (2022a). *Sistema de informações contábeis e fiscais do setor público brasileiro.* https://siconfi.tesouro.gov.br/siconfi/pages/public/conteudo/conteudo.jsf?id=40103

Ministry of Finance (2022b). *Estatísticas Fiscais do Governo Geral.* https://shre.ink/nKH6

Ministry of Mines and Energy (2010). *Plano Nacional de Mineração 2030.* https://shre.ink/2Idw

Ministry of Mines and Energy (2020). *Boletim do Setor MINERAL 2020.* https://shre.ink/nKwt

Ministry of Mines and Energy (2023). *Arrecadação da CFEM.* Observatório da CFEM. https://shre.ink/2Iqt

Monteiro, M. A., & Coelho, M. C. N. (2008). As políticas federais e reconfigurações espaciais na Amazônia. *Novos Cadernos NAEA, 7,* 91-122. https://doi.org/10.5801/ncn.v7i1.38

Palheta da Silva, J. M. (2013). *Território e mineração em Carajás.* GAPTA/UFPA.

Palheta da Silva, J. M., & Silva, C. N. (2016). Juruti: Uma comunidade amazônica atingida pela mineração. *GEOgraphia, 18,* 128-148. https://doi.org/10.22409/GEOgraphia2016.v18i36.a13746

Palheta da Silva, J. M., Silva, C. N., Neto, A. O., & do Nasciment, F. R. (2017). Conflicts over the Use of Territory in the Mineral Amazon. *Mercator, 16,* 1-18. https://doi.org/10.4215/rm2017.e16023

Pará (2022). *State Secretariat for Public Security and Social Defense. Lesão no trânsito 2022.* https://shre.ink/nKK3

Pará (2023). *State Complementary Law no. 164, of April 5, 2023. Amends Complementary Law No. 027, of October 19, 1995.* https://shre.ink/9gei

Peet, R., & Hartwick, E. (2009). *Theories of Development. Contentions, Arguments, Alternatives.* Guilford Press.

Portelli, A. (2016). *História oral como arte da escuta.* Letra e Voz.

Porter, M. (1990). *The Competitive Advantage of Nations.* Free Press.

Porter, M. E. (1999). Competição: Estratégias competitivas essenciais. Gulf Professional Publishing.

Raffestin, C. (1980). *Pour une Géographie du Pouvoir.* Litec.

Rocha, G. M. (2008). *Todos convergem para o lago!: Hidrelétrica Tucuruí, Municípios e Territórios na Amazônia.* NUMA/UFPA.

Santos, M. (2017). *Toward an Other Globalization: From the Single Thought to Universal Conscience.* Springer. https://doi.org/10.1007/978-3-319-53892-1

Simmons, C. S. (2005). Territorializing Land Conflict: Space, Place, and Contentious Politics in the Brazilian Amazon. *GeoJournal, 64,* 307-317. https://doi.org/10.1007/s10708-005-5809-x

SINMINERAL—Sindicato das Indústrias Minerais do Estado do Pará (2023). *Pará Mineral.* SINMINERAL. https://shre.ink/nKDx

Soares, D. A. S. (2021). *Produção do espaço, dinâmicas territoriais e vetores técnicos na zona costeira do estado do Pará: Uma geografia da subsunção e das exterioridades: uma geografia das águas.* Ph.D. Thesis, Federal University of Pará.

Soares, D. A. S., dos Santos Leite, A., Lobato, M. M., & de Castro, C. J. N. (2016). Usos do território em Paragominas (PA): Espaço Geográfico e Classes Sociais. *Revista Tocantinense de Geografia, 5,* 1-29. https://shre.ink/aIjS

Sombra, D., da Silva, C. N., Furtado, I. U. F., & de Goes, A. L. P. (2022). Atividade pesqueira e produção do espaço naamazônia atlântico-estuarina: Vigia de Nazaré, Pará, Brasil. *Mares: Revista de Geografia e Etnociências, 4,* 77-98. https://shre.ink/aIXg

Spariosu, M. I. (2006). *Remapping Knowledge: Intercultural Studies for a Global Age.* Berghahn Books. https://doi.org/10.2307/j.ctv3znztw

Vieira, D. C. M., da Silva Santos, C., & Chagas, C. A. N. (2015). Território e produção desigual do espaço urbano: uma análise cartográfica da territorialização da violência. *Boletim Amazônico de Geografia, 2,* 161-180. https://shre.ink/nKQq