Sustainable Development in the Amazon: The Curse of Abundance and Large-Scale Mining

Sérgio Ricardo Siani
Adjunct professor of Business Administration
at UNIFESSPA-University of Southern and Southeastern Pará.

Samuel Carvalho De Benedicto
Professor in the Permanent Staff of the Postgraduate Program in Sustainability at the Pontifical Catholic University of Campinas, Brazil.

Josias Jacintho Bittencourt
Visiting Professor at the University of Coimbra.
Law Faculty, University of Coimbra.

Summary

The present work aims to understand the contribution of large-scale mining to the sustainable development of the Amazon, without the intention of exhausting the subject, so complex by its nature. In the light of theorists such as Celso Furtado, Alberto Acosta, Georgescu-Roegen, Ignacy Sachs and other great authors, it was discussed what is being made in the Amazon in relation to their natural goods, especially minerals. To do so, it was necessary to interview eight mining specialists, in its most diverse areas. For this, semi-structured interviews were used. It was concluded that: 1) There is no sustainable development, only economic growth, 2) The need for state interference to solve conflict between mining farmers and the encumbered land, 3) And the need to discuss environmental legislation, since small prospectors are unable to compete with large mining companies.

Keywords: Mining, Large-scale mining, Sustainable Development, Amazon.

1 -Introduction

In the 1960s, helicopters had autonomy for approximately two hours of flight time. Thus, in addition to being able to fly over the Brazilian Amazon, it was necessary to refuel the aircraft in the middle of the forest. Because of that the largest Brazilian mineral reserve was discovered by geologist Breno Augusto dos Santos, an employee of United States Steel, on July 31, 1967.

When descending from the helicopter during the refueling carrying a geologist's hammer he noticed a reddish-brown color in the area where the helicopter had landed. Soon breaking the first block of ore, he saw that it was iron ore and tried to explain his enthusiasm to the pilot: "It's all iron!" (Santos, 2010, p. 273). With his discovered it was born the mineral province of Carajás, the largest iron ore deposit in Brazil, and a conflict of the same size emerged, which extends to the day.

To explore the extraction of some mineral in Brazil, a government permit was required. And when the company that geologist Breno worked for asked for such permission, technicians working at the National Department of Mineral Production (DNPM) were surprised at the size of the area required. The government showed concerns, but after two years of negotiation the DNPM gave the concession for the extraction of ore, with the condition that it should be in partnership with a state-owned company called *Companhia Vale do Rio Doce* - CRVD (Santos, 1987).

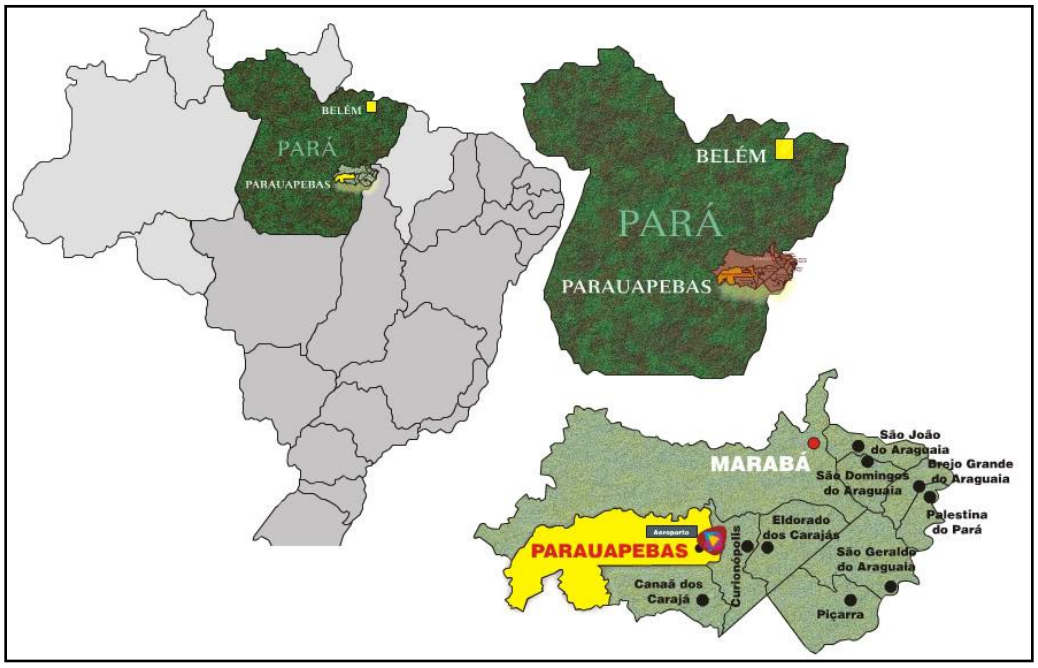
The numbers of the Brazilian Amazon are surprising by its abundance. According to IBGE (2020a) the Legal Amazon is composed by the States of *Acre, Amapá, Amazonas, Pará, Rondônia, Roraima, Tocantins* and *Mato Grosso*, as well as the municipalities of the state of Maranhão located west of meridian 44º, with a territory of 5.2 million km², corresponding to about 61% of the entire national territory.

This abundance that inspires the title of this article refers to Acosta (2009), who remembers the question asked by Alejandro von Humboldt after travel to American lands: "Are we poor because we are rich?". To paraphrase Alejandro von Humboldt, it is worth asking: Is the Brazilian Amazon condemned to be poor because it is abundant in natural resources? Why is the state of *Pará*, despite being an important player for exporting ores to China, extremely poor?

2 - The curse of abundance in the Paraense Amazon

The abundant numbers speak for themselves, as we will see. However, initially it is worth mentioning that the largest mining-related region in *Pará* is the city of *Parauapebas* (Figure 1), the largest producer of iron ore in *Pará*, and one of the largest in the world, the mining company Vale (formerly CVRD), with China as its main customer.

Figure 1 - Location of the city of Parauapebas on the map of Brazil.



Source: Vox Popi (2020).

Data from the Brazilian Institute of Geography and Statistics (IBGE, 2020b) point to more than 200,000 inhabitants in the municipality, but only 19% of the population has a sewage network, with only 23.5% of the population working and 38.5% of the population living with less than half of a minimum wage. The neighborhoods of the periphery grow with people coming from all over Brazil dreaming of making money with mining.

But not far from this absolute poverty, we find the "*Núcleo Urbano de Carajás*" built to house Vale's employees. It looks like a first world country, with a club, cinema and airport, where you enter only with permission; a true "Apartheid", built within the American standard for 5,000 residents, with 1,274 houses without gates (Barros, 2020).

According to Carneiro (2019), this was only possible because in 1978 the then current CRVD Vale created the Carajás Iron Project (PFC) for the Federal Government, which due to its gigantism, demanding many constructions and voluminous investment, decided to expand the scope for a larger program called The Great Carajás Program (PGC), which transformed the geography of several cities in the southeast of *Pará* and *Maranhão*. All this happened in a Conservation Unit, called *Flora Carajás*.

Vale also obtained permission from the Brazilian government to build and operate the Carajás Railway (EFC), which constitutes an integrated the transportation system that connects its production in *Parauapebas* to the *Ponta da Madeira* Maritime Terminal in *São Luís, Maranhão* (Cetem, 2020).

EFC is another first world work, considered the most modern and productive railway line in Brazil (Figure 2), which transports more than sixty products, which ranges from cement to vehicles, from passengers to steel and agriculturalproducts, in addition to iron ore produced by Vale (Cetem, 2020).

Figure 2 - Carajás Railway (EFC).

Source: Via Trolebus (2020).

The geographical and socioeconomic contradiction of the region was also seen by Coelho (2015, p. 60): "The gigantic magnitude of iron ore extracted from Carajás over thirty years and the social situation of the population of *Parauapebas* comprise the brutal contradiction resulting from the private appropriation of mineral wealth".

3 - Growth, degrowth, development, underdevelopment, sustainability: After all, what are we doing?

The economist Celso Furtado warned us in the 1970s about the concept of development (although he did not use the term sustainable). The author expressed a concern regarding the "impact on the physical environment of a decision system whose ultimate goals are to satisfy private interests" (Furtado, 1974, p. 14). The author's work is a pioneer in several aspects, as observed by Cavalcanti (2001, 2003), who highlighted the author's ability to raise "unusual" questions for his time. For Cavalcanti (2010), development alone and without any adjective to complement it will automatically be sustainable, because if not, soon it will not be development.

Degrading the environment to exploit its natural resources is something that was not considered by the economist (1974). As a way to harmonize such conflicting of interests, the term "sustainable development" emerged, in the search for sustainable development in order to make capitalist development compatible with the preservation of the environment.

Also, in the 1970s the Romanian Georgescu-Roegen (1971), developed the concept of "Entropy" seeking inspiration in thermodynamics to answer the question: "How is it possible for man to produce something material since he cannot produce matter or energy?", he explains that in economics, as well as in physics what is absorbed by the economic process consists of natural resources of value and what is rejected consists of worthless waste. When the author applies entropy theory to matter, Georgescu-Roegen (2012, p. 41) questions the process of nature degradation: "(mineral raw materials) is only usable for industrial activity at the price of its irresistible dissipation".

But it was with the Brundtland Report, titled "Our Common Future", in 1987, released by the UN World Commission on Environment and Development, that the expression "sustainable development" gained projection and its definition started to be considered official, where the needs of the present should not compromise future generations (Cmmad, 1991).

Sachs (2008) warns us about risk of understanding development as economic growth. Development goes far beyond the pure multiplication of material wealth but brings in its core a connection capable of repairing inequalities.

Veiga and Issberner (2012) when referring to the "Green Economy" recognize that it improves the quality of life within the limits imposed by the planet, but question whether this would be achieved by a "green growth" or a "degrowth". They suggest that there may be simultaneous growth and degrowth, and conclude (p. 130) that:

"In a sum, the contradiction between growing and degrowth should not be understood as a separation on which one should choose only on one side"

But Coelho (2015) recalls that the Amazon was not underdeveloped before international capital had influence in the region. For him, this has caused social inequality and poverty to emerge, and criticizes sustainability since it gives the idea that it is possible to grow the economy eternally, but in fact there is a limit given by the supply of natural goods, which is finite.

In addition, the mining process receives other criticisms: creating a dependence on the community and intensifying inequality in the territory (Alves et al., 2020), for being a highly monopolized segment (Trindade, 2019) and for reinforcing the conditions of underdevelopment, to the point of developing underdevelopment (Coelho, 2015).

Due to this condition of many apparent conflicts, the present paper asks: Does large-scale mining contribute to the development of the Amazon?

The study is justified, because Aráoz (2020, p. 30) when referring to mining in America as the origin of modernity, calls: "The very serious events of recent years deserve new investigations and new writings".

Therefore, this article aims to understand the contribution of large-scale mining to the sustainable development of the Amazon. Important to mention that we do not want to exhaust the issue, so complex by its nature.

4 - Methodology

As for nature, this research is characterized as applied. According to Gerhard and Silveira (2009), applied research is one that aims to generate knowledge that can be used in practice, solving problems of local interests. For Merriam & Tisdell (2016), administrators often use it to improve the way things are done.

As for the approach, the research is characterized as qualitative. Creswell (2010) states that qualitative research is the means by which we seek to understand the meaning that people or groups attribute to a social or human problem. During the research process the data should be collected in the participant's environment, and the analysis of the data should be constructed based on the particularities for the general theme.

For Godoy & Brunstein (2020) qualitative research has the following characteristics: "part of the curiosity of the researcher, the questions he wants to answer with the purpose of learning more about them, performing his work in search of answers to his questions in the real world" (p. 484) and "values the disorder that usually surrounds everyday life and assumes that a deep and thorough understanding of human experience is achieved when exploring its complexity" (p. 512).

As for the objectives, the research is characterized as exploratory. This type of research aims to develop, clarify and modify existing concepts of that research field, in order to make it more explicit. It usually involves bibliographic, documentary, interviews and case study (Gil, 2017).

As for data collection procedures, semi-structured in-depth interviews were conducted. Individual interviews are understood in depth by the qualitative technique that explores the interviewed in a structured way, seeking information, **perceptions of experienced and experts and intensity in the** answers (Duarte, 2005, our griffin), which can bring innovative ideas on the subject (Merriam & Tisdell, 2016).

In this study, content analysis was chosen as a technique for analyzing the collected data. In recent years, it has been receiving prominence among qualitative methods and gaining legitimacy. It is a rich, important data analysis technique with great potential for theoretical development in the field of administration, especially in studies with a qualitative approach. This technique allows a critical reflection, considering the context where the data were collected. The importance of content analysis for organizational studies is increasing and has evolved due to the concern with scientific rigor and the depth of research (Mozzato & Grzybovski, 2011).

The analysis path of this work took as reference the work of Laurence Bardin, currently reference literature in content analysis (Mozzato & Grzybovski, 2011). The study followed the phases of content analysis, as recommended by Bardin (2009, p. 121): (i) pre-analysis; (ii) exploitation of the material, and (iii) treatment of the results, which involves inference and interpretation.

To assist the researcher who applies content analysis, Mozzato & Grzybovski (2011) recommend the creation of analysis categories. In this study, the script suggested by Carlomagno and Rocha (2016) was followed, which establishes the following steps for classifying categories for analysis: i) establishing clear rules for inclusion and exclusion in each category; ii) check whether the categories are self-excluding; iii) not leave the categories too broad;

(iv) verify that the categories contain all possible contents; v) make an objective classification and with an codification that has no subjectivity.

In this study, eight specialists in the subject of mining (called ESP) were interviewed, people who work daily with the researched theme (Table 1). The categories of analysis were not previously identified before the interviews.

Table 1 - Information about the interviewed.

Code	Training	Function
ESP 01	Geologist	President of geologists association
ESP 02	Mechanical and mine engineer	He has been working for 38 years with mining prospecting
ESP 03	Mine engineer	Works with legalization of mineral activity
ESP 04	Geologist	Mining researcher from Pará State
ESP 05	Environmental manager	President of a cooperative of mining prospectors
ESP 06	Mechanical engineer	Owner of mining
ESP 07	Geologist	Works in a public agency linked to mining
ESP 08	No college education	Owner of mining. He has been working in mining for 33 years

Source: elaborated by the authors.

5 - Results

Based on the interviews and the script suggested by Carlomagno & Rocha (2016), the following categories of analysis were generated: 5.1) Conflicts between mining companies and communities, 5.2) Mining conflicts with legislation, and 5.3) The conflict of mining companies with prospectors. The categories of analysis will be presented and discussed below.

5.1 - Conflicts between mining companies and communities

The use of the territory is at the center of the discussion between mining companies and communities since they share the same territory. According to Esp-02: "[...] mining projects when they begin to be deployed in a city completely change its landscape and its geopolitics." About the lack of information of the communities' residents, Esp-02 states that: "the population of the city does not know what mining is, does not know what the mining company is extracting underground, knows nothing, absolutely nothing!". We can still analyze, that:

The effects of mining on territorialities perceived by the damage suffered to ways and projects of life by people and communities affected by mining are not necessarily related to the disasters involving this activity, since from the realization of the surveys, to the installation and operation, the way of life is affected by economic speculation, the presence of people outside the communities, the circulation of heavy machinery, the noise of explosions and also the fear of disasters involving mining (Alves et al. 2020, p. 53-54).

Experts discuss the need for another economic matrix in the city, as the community is deeply dependent on mining companies. Knowing that natural goods are finite, Esp-06 recalls: "if tomorrow the Iron ore of this mine is finished, then you will have a ghost town." This same Expert notes that this dependency is one-way: "This is a serious problem of big mining. When the ore runs out, the partner takes his jet and will extract ore elsewhere, and if at that moment the city has not prepared for another business, it is finished." Trocate and Alves (2020, p. 22) warn that our mining model reinforces an imperialist system of our resources "without power or without knowing who to complain to".

The lack of community participation in decision-making is noticiable. In this sense, Esp-04 states: "In the Middle East when they exhaust oil, they will focus on tourism, what about the ore in our region? Are they going to become ghost towns?" Conde (2017) discusses the impacts caused by mining companies on water, land and, despite of this, local communities are not invited to make decisions. Fraser (2018) concludes that the impact that mining has on people's lives does not compensate for the amount it pays for it.

Another characteristic observed in this community-related study is linked to the local workforce. When a mining company is going to settle in, it "sells" the idea that it will hire many local people to work. However, Esp-02 explains what really happens: "every time the business expands, mining hires labor that comes from everywhere and this person doesn't come back, stays there." Since the mining movement can expand or reduce, Esp-02 continues: "when the mining movement goes down, the city suffers, economic activity goes down and people have nowhere to go or to go back to. So, they stay on the periphery, and this creates a very serious social problem."

This problem linked to labor and hiring of people from outside the mining community was also remembered by Alves et al. (2020) who explains that in the arrival of large numbers of people from other cities, in addition to interfering in the conviviality of people in that community, tends to destroy the local culture. According to Esp-01, mining companies should have this concern: "Vale is totally correct as well as other mining companies that own the underground. It is just that you have to think about the social issue, too, right? It is a very delicate subject." This is due to the large supply of cheap labor (Coelho, 2015), causing greater pressure for infrastructure and services (Owen & Kemp, 2017), and the cutting of the social functions of the mining business (Kemp & Owen, 2018).

5.2 - Mining companies' conflicts with legislation

It is up to the Union to legislate on mining in Brazil. For this, it has the National Mining Agency (ANM), which replaced the DNPM (National Department of Mineral Production). It is still the Union that has the property of the Brazilian subsoil (Constitution of 1988), thus making a distinction between the soil and the subsoil. So apparently, we have a conflict in place, because one can only own the soil not the subsoil. In order to explore the subsoil, an authorization from the ANM is required.

In the case of large-scale mining companies, they hold the overwhelming majority of ANM authorizations. However, they make a "strategic stock", allowing themselves to start mining when they want. This is the reason for a second conflict, because the small prospectors are not always willing to wait and can try to invade lands and operate their prospectors on land owned by the mining companies. The biggest example of this is the largest open-air mining in Brazil, *Serra Pelada*, which took place on Vale's land.

The experts consulted discuss these conflicts. According to Esp-07: "Brazilian legislation regulates the use of the subsoil as follows: the entire subsoil belongs to the Union (the federal government), and only it can grant third parties the extraction of the ores found there". The conflict intensifies when the landowner wants to extract in an area that the ANM has already granted permission to a mining company, such soil is considered costly. In this sense, Esp-07 says: "[...] when a certain area has already been granted to a mining company and a prospector wants to mine there, even if the mining company is not exploring that area at that time, the person does not have that right. Even if he is the owner of the surface." The conflict follows, as Esp-03 explains: "The subsoil is granted by the Union only to one owner and, when this happens, it is called an encumbered area. This prevents others from applying for the same area with the ANM."

Alves, Ferreira and Araújo (2018) explain the perspective of mining companies, who consider the environmental license an instrument for controlling and regulating companies. However, in the context of Pará, Esp-03 explains that "it is difficult for the owner of a property to understand this logic: that although he owns the ground, he does not own the subsoil". Esp-03 adds that: "A farmer who has land with ores always says: the land is mine and no one enters! I've lived here for so many years, I bought it and paid for it here." But as many of these farmers are customers of Esp-2 (which is looking for mining), he explains to them: "the land has two owners: the top and the bottom one. The top is the owner of the land that plants grass, cocoa, among others. And there is the bottom (underground) that is the federal government. The government has the right to pass it on to whoever he wants."

But deep down what you have is a monopoly on possible mining areas, as Esp-05 explains: "there is a real mineral monopoly in our basement. Underground, mineralized areas are 100% encumbered." Esp-01 also adds that: "the subsoil of 80% of the Southeast region of Pará or even more, I do not know exactly this data, but almost all of it belongs to companies that are doing research or that is allowed to start mining those areas".

The mining company Vale always appears as the greatest example of those who make "strategic stock" of areas with permission to operate the mining but waits for an appropriate time for this. Referring to the company Esp-01, he says indignantly: "In that area it (Vale) has already done the mineral research, has already quantified how much ore it has, already has all the information and does not extract anything. It uses it as a reserve that can be used in the future." Esp-08 also states, showing that almost every subsoil in *Paraense* Amazon already has an owner: "Because most of the subsoils are required by large mining companies such as Vale and its subsidiaries". Esp-01 gives a suggestion: "what they ask (the prospectors) is for Vale to take a stand. Since it holds most of the underground, that it positions itself in relation to these commodities, whether it will extract the ores or not, so that the area can be given to someone who will work on it." However, this is an apparent contradiction, since vale (Vale, 2021) says it incorporates sustainability into its business.

We can point out that this is not a new problem. More than thirty years ago, Cordeiro and Bernardelli (1987, p. 135) denounced: "(...) Added to these negative parameters is the impotence of the National Department of Mineral Production - DNPM in containing the prospection invasions and ensuring the right of research to the holder of a permit (...)"

5.3 - The conflict of mining companies with prospectors

Despite the territorial conflict that has as an intermediary, the federal government, it is important to highlight that prospectors (small scale) and mining companies do not dispute the same thing. They dispute the same territory, but not the same ore. Esp-03 introduces the discussion stating: "Vale is a billion-dollar company. It is not going to invest in a work front to employ 30 people." And the explanation continues: "Vale's goal is one and the prospector's goal is another. Only both in the same area; Vale's goal is raw ore, deep ore, while the prospector's interest is shallow ore."

Furtado (1974) already drew attention that under the "myth of progress" industrial society would be formed within a bourgeois ideology that would create the dream of an economic development accessible to the entire population, which is actually restricted to highly industrialized countries.

Esp-06, being a prospector, but holder of some areas that has legal permission for mining the ores, says: "I have, for example, some areas here and I let the prospectors work because this is a free research, a research without risk. The moment I need to get this prospector out of here, I'll do it." According to this expert, "if geology were an exact science all the mines in the world would have been discovered. Today there are many mines that have not been discovered."

If the prospector had access to the areas that allowed him to work legally, it would be something that would move the local economy much more, as Esp-03 comments: "for example the small miner and the prospector do not buy diesel oil from the refinery, they buy it at the local gas station, just around the corner." In this sense, Esp-08 recalls: "the mining activity would be very good because it allows a better socialization of the economy in the municipality. It distributes the income of the prospector, the impact of the prospectors is noticeable. A good idea would be to legalize the prospectors. For the city it would be much better." However, it seems that greed reigns, and for Rudke et al. (2020), it was in the 20th century that minerals began to be exploited on a large scale, searching for any ore that generates revenue.

But as Sachs (2009) recalls, the spatial or territorial dimension in relation to sustainable development refers to the need for a harmony in human activities together with modern technologies, without excessive concentration in the metropolitan regions of cities, which has not been happening in Pará.
Sachs (2009) also draws attention to the economic dimension, where the formal and informal economy should work together for sustainable development. However, in this case, there seems to be no harmony between prospectors and mining companies, which does not contribute to the microeconomy of cities located in mining areas.

But after all, what would be the solution to the conflict between mining companies and prospectors? According to Esp-01, the solution necessarily needs to go through a government intermediation. In this sense, the Expert says: "look I will not do anything (with the permits I have to plough – referring to the big mining companies) I want to have a good relationship with the community I will pass the underground authorization to this cooperative (of prospectors) this would greatly improve the issue of relationship with the community, right?!" However, this is very difficult to happen. In dealing with this theme, Trocate & Alves (2020, p. 23 and 24) highlight that the current model of mineral exploration in Brazil (neoextractivism), is "rooted in corporate strategies of companies to maximize profits", exposing a " contradiction of the territorial fracture, with regions richer in mineral goods that, at the same time, become the poorest regions, that is, establishing regional inequality through the enjoyment of wealth and consumption". According to the authors, this contradiction causes problems, such as:

On the one hand, waste of nature in the installation of the mineral problem, on the other hand, exclusion of benefits by a predatory elite that prevents the popular sectors from accessing the possible riches, in addition to the territorial ruin and the absolute exclusion of the use and consumption of mineral goods, which will be transformed by the exhausted nature (Trocate & Alves, 2020, p. 21) .

6 - Final Considerations

The study had as its starting point a question asked by Alejandro von Humboldt, and reported by Acosta (2009): "Are we poor because we are rich?" Based on this question, the study raised two questions: Is the Brazilian Amazon condemned to be poor because it is abundant in natural resources? Why is the state of *Pará*, despite being an important player for exporting ores to China, extremely poor?

The study points out that Alejandro von Humboldt and Acosta were right. Our abundance makes us poor. We are trading our iron ore, which needs to be remembered, is a finite ore, for what? For the tax paid by mining companies called CFEM (Financial Compensation for the Exploitation of Mineral Resources), which is around 2% to 3% of revenue and the balance of trade, since the ores exported to China have a significant impact,helping the trade balance (exports minus imports) to stay positive. But the question that goes unanswered is: Is this rewarding for Brazil?

If this is rewarding, why has Europe stopped mining on its territory even without having finished its ores? Why do the inhabitants of *Parauapebas* in *Pará*, being the largest municipality collecting CFEM, suffer from so many basic needs?

In this context, it is important to recover the objective of this work so that we can reflect on the light of these disturbing questions: understand the contribution of large-scale mining to the sustainable development of the Amazon.

The first contribution of this work is to understand that large-scale mining has not been bringing development to the region. As seen, economic growth is not development. When a mining company settles in a city, it promises jobs and development for the city. However, it seems that neither of these two promises end up being fulfilled, because mining work requires state-of-the-art technology and employees experienced in such technology, which is rarely achieved in the community where it is installed. There is no point in growing the local economy, if this growth is not divided within the population, and if such growth will be in the hands of people who do not belong to the local community.

The second contribution is to understand that for large mining companies it is easy to expand their business, because the winds blow in their favor. The more gigantic the task may seem, the easier for them. They have an infrastructure that does not seem to give small businesses room. For this, state interference is necessary. Prospectors move the local economy because their purchases are made in retail. On the other hand, large mining companies depend on the import of equipment and a supply chain that does not favor the local economy, with wholesale demands. This fact contributes to the underdevelopment of the cities where the mining companies are operating.

The third contribution is to question the use of environmental licensing as it is done nowadays. Whether it is a regulatory instrument of the State, or whether it is an instrument of land control in the hands of multinational companies. Allowing a "strategic stock" of areas, without moving the local economy, waiting for the day that the "owner" of that license decides to exploit it, knowing that this will not develop the local economy, seems something that needs to be reviewed by the authorities.

Finally, it should be noted that Vale was sold in an auction that the federal government made in 1997 for $3.1 billion and that its net profit (not even revenue) was, in the January-March 2021 quarter, $5.546 billion. Which makes us wonder if we Brazilians can keep what is ours. Whether it is the companies and/or the ores. However, this is a suggestion for future work.

7 - References

Acosta, A (2009). La maldición de la abundância: un riesgo para la democracia. Revista de analisis político, v. 9, p. 103-115, marzo-abril.

Alves, et al. (2020). Comunidades atingidas e territórios afetados pela mineração: realidades e resistências. In: Alves, et al. (Orgs.). Mineração: realidades e resistências. 1. ed.São Paulo: Expressão popular, p. 41-102.

Alves, W., Ferreira, P., & Araújo, M. (2018). Sustainability awareness in Brazilian mining corporations: the case of Paraíba state. Environment, Development and Sustainability, v. 20, n. 1, p. 41-63.

Aráoz, H. M. (2020). Mineração, genealogia do desastre: O extrativismo na América como origem da modernidade. São Paulo: Editora Elefante.

Bardin, L. (2009). Análise de conteúdo. Lisboa: Edições 70.

Barros, C. J. (2020). Parauapebas entre o céu e o inferno. Repórter Brasil. Parauapebas, 02 de jan. de 2007. Available in: <https://reporterbrasil.org.br/2007/01/parauapebas-entre-o-ceu-e-o-inferno/>. (20 mar. 2020).

Carlomagno, M., & Rocha, L. (2016). Como criar e classificar categorias para fazer análise de conteúdo: uma questão metodológica. Revista Eletrônica de Ciência Política, v. 7, n. 1, p. 173-188.

Carneiro, M. S. (2019). Mineração, siderurgia e desenvolvimento na Amazônia Oriental:um balanço da experiência do Programa Grande Carajás. In: Congilio, C. R., Bezerra, R. and Michelotti, F. (Orgs.). Mineração, trabalho e conflitos amazônicos no sudeste do Pará.1.ed.Marabá, PA: iGuana, p. 98-121.

Cavalcanti, C. (2001). Celso Furtado e o mito do desenvolvimento econômico. Trabalhos para discussão, n.104/2001, Recife, PE: Fundação Joaquim Nabuco.

Cavalcanti, C. (2003). Meio ambiente, Celso Furtado e o desenvolvimento como falácia. Ambiente & Sociedade, v. 6, n. 1, p. 73-84.

Cavalcanti, C. (2010). Concepções da economia ecológica: suas relações com a economia dominante e a economia ambiental. Estudos avançados, v. 24, n. 68, p. 53-67.

Cetem (2020). Estrada de Ferro Carajás afeta comunidades tradicionais do Pará, Maranhão e Tocantins. CETEM. Brasília, 09 April, 2013. Available in: <http://verbetes.cetem.gov.br/verbetes/ExibeVerbete.aspx?verid=22>. (19 Mar. 2020).

Coelho, T. P. (2015). A questão mineral no Brasil - vol. 1: Projeto Grande Carajás: Trinta anos de desenvolvimento frustrado. Marabá:Editorial iGuana.

Cmmad - comissão mundial sobre meio ambiente e desenvolvimento (1991).Nosso futuro comum. Rio de Janeiro: Fundação Getulio Vargas.

Conde, M. (2017).Resistance to mining.A review. Ecological Economics, v. 132, p. 80-90.

Cordeiro, A. A. C.,& Bernardelli, A. L. (1987). Atividade Mineral na Amazônia. In: Fernandes, F.R.C. et al. (Orgs.). A questão mineral da Amazônia: seis ensaios críticos. Brasilia: MCT CNPQ, p. 135-179.

Creswell, J. W. W. (2010). Projeto de pesquisa: métodos qualitativo, quantitativo e misto. 2. ed. Porto Alegre: Bookman.

Duarte, J. (2005). Entrevista em profundidade in: Duarte, J.; Barros, A. (Orgs.). Métodos e técnicas de pesquisa em comunicação. São Paulo: Atlas, p. 62-75.

Faustino, M., & Amador, F. (2016). O conceito de "sustentabilidade": migração e mudanças de significados no âmbito educativo. Indagatio Didactica, v. 8, n. 1, p. 2021-2033.

Fraser, J. (2018). Mining companies and communities: Collaborative approaches to reduce social risk and advance sustainable development. Resources Policy. https://doi.org/10.1016/j.resourpol.2018.02.003

Furtado, C. (1974). O Mito do Desenvolvimento Econômico. Rio de Janeiro: Paz e Terra.

Georgescu-Roegen, N. (1971). The Entropy Law and the Economic Process. Cambridge, MA: Harvard University Press.

Georgescu-Roegen, N. (2012). O decrescimento: Entropia, ecologia e economia. São Paulo, SP: Senac.

Gerhardt, T. E., & Silveira, D. T. (2009).Métodos de pesquisa. Porto Alegre: Editora da UFRGS.

Gil, A. C. (2017). Como elaborar projetos de pesquisa. 6. ed. São Paulo: Atlas.

Godoy, A. S., Brunstein, J. (2020). Análise de dados nas metodologias qualitativas. In: Brunstein, J. et al. (Orgs.) Análise de dados qualitativos em pesquisa: múltiplos usos em administração [livro eletrônico]. São Paulo: Editora Mackenzie; Rio de Janeiro: Editora FGV.

Ibge - instituto brasileiro de geografia e estatística.Amazônia legal. (2020a). Available in: <https://www.ibge.gov.br/geociencias/informacoes-ambientais/geologia/15819-amazonia-legal.html?=&t=o-que-e> (26 Mar. 2020).

Ibge - instituto brasileiro de geografia e estatística.Relatório de cidades 2019.(2020b). Available in <https://cidades.ibge.gov.br/brasil/pa/parauapebas/panorama> (15 Mar. 2020).

Kemp, D., & Owen, J. R. (2018).The industrial ethic, corporate refusal and the demise of the social function in mining. Sustainable Development, v. 26, n. 5, p. 491-500.

Merriam, S. B., & Tisdell, E. J. (2016).Qualitative research: A guide to design and implementation. 4th ed. San Francisco, CA: Jossey Bass.

Mozzato, A. R.; Grzybovski, D. (2011).Análise de conteúdo como técnica de análise de dados qualitativos no campo da administração: potencial e desafios. Revista de Administração Contemporânea, v. 15, n. 4, p. 731-747, jul./ago.

Owen, J. R.; Kemp, D. (2017).Social management capability, human migration and the global mining industry. Resources Policy, v. 53, p. 259-266.

Que, S. et al. (2018).The status of the local community in mining sustainable development beyond the triple bottom line. Sustainability, v. 10, n. 6, p. 1749.

Rudke, A. P. et al. (2020). Impact of mining activities on areas of environmental protection in the southwest of the Amazon: a GIS-and remote sensing-based assessment. Journal of environmental management, v. 263, p. 110392.

Sachs, I. (2009). Caminhos para o desenvolvimento sustentável. Rio de Janeiro: Garamond.

Sachs, I. (2008). Desenvolvimento: includente, sustentável, sustentado. Rio de Janeiro: Garamond.

Trindade, J. R. B. (2019). Empresas transnacionais, territorialidade e impactos ambientais na região amazônica oriental brasileira. In: CONGILIO, C. R.; Bezerra, R.; Michelotti, F. (Orgs.). Mineração, trabalho e conflitos amazônicos no sudeste do Pará,1. ed. Marabá, PA: iGuana, p. 15-48.

Trocate, C., & Alves, M. S. (2020). Análise de conjuntura política, Econômica e social da mineração no Brasil e os enfrentamentos necessários. In: ALVES, et al. (Orgs.). Mineração: realidades e resistências. 1. ed. São Paulo: Expressão Popular, p. 17-40.

Vale. (2021). Sustentabilidade. Amazônia. 2021. Available in: <http://www.vale.com/brasil/PT/sustainability/Paginas/amazonia.aspx>. (14 Mai. 2021).

Veiga, E.,& Issberner, L. (2012). Decrescer Crescendo. In: LÉNA, P.; NASCIMENTO, P. L. (Orgs.). Enfrentando os limites do crescimento: sustentabilidade, prosperidade e decrescimento. Rio de Janeiro: Garamond, p. 107-134.

Viatrolebus.(2020). Novo trem da Estrada de Ferro Carajás começa operar em Setembro.Belém, 27 de ago.de 2015. Available in: <https://viatrolebus.com.br/2015/08/novo-trem-da-estrada-de-ferro-carajas-comeca-operar-em-setembro/> (21 Mar. 2020).

Vox popi (2020).Mix de Sabores. 2020. Available in: <http://voxpopi.blogspot.com/2016/01/parauapebas-mix-de-sabores.html> (29 mar. 2020).