NEO-EXTRACTIVISM AND 'SUSTAINABLE' CONSTRUCTION: TWO FACES OF FINANCIALIZED CAPITALISM

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Abstract

This article investigates how extractivism, operated in colonial territories, enabled the worldwide consolidation and expansion of the capitalist system, the viability of which has continued through to the present day. In order to illustrate our arguments, we have used the example of mining. We then move on to indicate the existing complicity between the construction sector, which involves the practice of architecture, and global capitalism, based on the production of commodities for export. We also demonstrate how belief in the eco-efficiency of 'green' technologies and buildings masks the externalization of socio-environmental impacts generated by hegemonic production processes, such as those that are part of the iron and steel production chain (materials we widely use in civil construction). Lastly, we analyze the emblematic case of the Piquiá de Baixo community (Brazil), through which the problems presented in this work may be better explained.

Keywords

Colonization, Neoextractivism, Mining, Civil Construction, Architecture, Sustainability.

NEOEXTRATIVISMO E CONSTRUÇÃO 'SUSTENTÁVEL': DUAS FACES DO CAPITALISMO FINANCEIRIZADO

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Resumo

O presente artigo investiga como o extrativismo, operado nos territórios coloniais, possibilitou a consolidação e a expansão mundial do sistema capitalista, sendo que continua viabilizando-o no presente. Para ilustrar nossos argumentos, usamos o exemplo da mineração. Em seguida, apontamos a cumplicidade existente entre o setor construtivo, em que a Arquitetura é praticada, e o capitalismo exportador de commodities. Indicamos ainda que a crença na ecoeficiência das tecnologias e edificações 'verdes', na verdade, mascara a externalização dos danos socioambientais gerados pelos processos de produção hegemônicos – como aqueles que compõem a cadeia produtiva do ferro e do aço (materiais que, em boa parte, empregamos na Construção Civil). Por fim, analisamos o emblemático caso da comunidade de Piquiá de Baixo (MA), em que as problemáticas apresentadas neste trabalho podem ser melhor explicitadas.

Palavras-chave

Colonização, Neoextrativismo, Mineração, Construção Civil, Arquitetura, Sustentabilidade.

NEO-EXTRACTIVISM AND 'SUSTAINABLE' CONSTRUCTION: TWO FACES OF FINANCIALIZED CAPITALISM[1]

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1. From extractive colonization to commodity-exporting capitalism

The world-system that was structured with the advance of capitalism, via colonization, depended on the consolidation of a social and international division of labor, which also brought about ecological imbalance: the differential appropriation of the global surplus produced was (and continues to be) accompanied by an unequal exchange system of environmental 'goods' and services. Since then, as we are reminded by Horacio Aráoz (2020, p. 141), an historic "abysmal difference" has been established between the 'peripheral' colonial space (subordinated and specialized in the supply of raw materials and labor) and the 'central' European space (where the expropriation of the "vital energies of the world" is converted into accumulation).

Although the ecological destruction caused by mining in the fifteenth and sixteenth centuries cannot be compared with the environmental voracity of contemporary systems, colonial mining activity, for example, required large amounts of energy – which led to the extinction of forests and other plant formations in the proximity to the mines. Many mineral fields in Spanish America

1. The case presented herein – the design and construction of a new urban complex for the resettlement of the Piquiá de Baixo community – was the result of a broad collective effort, coordinated between the local population, a group of Comboni priests, regional social organizations and all those who work at the USINA CTAH (Work Center for the Inhabited Environment) (http://www.usina-ctah.org.br/). The reflections we present herein would not have been possible without the information and reports, circulated on countless occasions through conversations with Kaya Lazarini, Flávio Higuchi, Isac Marcelino and Wagner Germano – among others, and other colleagues from USINA. We express our gratitude, in the confidence that the connection we have established between the struggle for decent housing and the fight for environmental justice will help us to better understand the scale of the problem we are dealing with.

had to be abandoned, not due to the exhaustion of their ores, but due to the scarcity of firewood for smelting (Aráoz, 2020). This signified that, along with metals, tons of natural and energy resources necessary for their extraction and processing began to be exported (Trocate; Coelho, 2020). In other words, the expansion of capitalist logic, worldwide, promoted an intense exploitation of the workforce alongside the excessive consumption of land (material) and energy. Such expansion was only possible due to the devastating extractivism operating in colonial territories.

However, at present, we observe the continuity of predatory processes originating from capitalism, or "accumulation through dispossession",[2] in order to refer to the current context (Harvey, 2020, p. 296). Through these processes, capital has managed to ensure a "*fuite en avant*" in relation to its internal contradictions, expropriating the biophysical and human resource base from areas hitherto on the margins of capitalist logic, generally located in the global South.[3] Truth be told, since the late 1980s, it has become common to promote accumulation by dispossession in 'peripheral' countries in the form of policies and structural adjustments organized by the International Monetary Fund (IMF) and the World Bank. Allied with mining and agricultural corporations, these financial institutions have privatized communal lands, divested small producers and made their ways of life unviable. Within this context, neoliberal policies, conceived by the main global powers and imposed by the financial institutions under their control, have sought to regain access and control over sources of raw materials (minerals, energy and food), fleecing countless peoples and communities with this intention (Chesnais; Serfati, 2003; Aráoz, 2020).

It is within the framework of neoliberalism, therefore, that the new peak of extractivism in the global South, experienced over recent decades and accelerated by Chinese demand since 2000, has been inserted. The Asian giant has consumed more than half (in some cases, up to 70%) of the world's main mineral resources, including steel and copper (World Steel Association, 2020). The unprecedented increase in Chinese demand for raw materials has enabled supplier countries, such as Brazil, to experience rapid economic growth, through environmentally devastating (neo)extractivism. Thus, they have been able to overcome the effects of the 2008 global crisis more quickly – a process that has been called "commodity consensus" (Acosta; Brand, 2018. p. 34). In short, to 'nourish' capitalism in its financial version, 'peripheral' territories were (re)configured as commodity exporters, intensifying the rates and rhythms of unequal exploitation of the biophysical world.

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2. This and all other non-English citations hereafter have been translated by the authors.

3. Henri Acselrad in a lecture on the topic "Capitalism and environmental crisis", Nov. 2020. Available at: https://www.youtube.com/watch?v=_cKMeGXvTK8. Viewed on: May 13, 2023.

Considering the above, it is possible to understand the consolidation of the new world order, or globalization, as a process of "recolonization" (Federici, 2019. p. 214). Ultimately, instead of connecting the world into a network of interdependent circuits, it has organized it according to a pyramidal structure, marked by the expansion of characteristic hierarchies of the international division of labor, as well as social inequalities and environmental degradation. Furthermore, it is important to realize that neo-extractivist processes are largely effectuated with the aim of obtaining the resources requested by cutting-edge industries (Federici, 2021) – especially by information and communication technologies, but similarly those resources demanded by new components and systems aimed at reducing the environmental impacts of buildings. This is to say, they reflect the 'ecologically modernized' appearance of financialized capitalism.

However, this supposed ecological modernization of the decision-making centers of global capitalism, as in the colonizing past, continues to depend on transferring the production stages that consume the most material and energy, as well as huge amounts of exploited labor, to other locations. In this context, the 'exemplary' performance data presented by certain countries and regions, or even by some companies, are supported by internal activities, which do not consider the externalization of those with high socio-environmental impact. If the performance indicators included impacts not only in the countries where final consumption occurred, but also among commodity exporters, their results would be very different (Veiga; Issberner, 2012).

As a reality that has existed since the first colonies were 'conquered', externalization has ultimately become more accentuated with globalization. Especially because, due to the greater mobility of capital, practices of "localization blackmail"[4] have emerged, thereby placing, within the global arena, possible locations for implementing future businesses in competition with one another. This type of 'auction' for spaces destined for investments in the international context, in turn, results in a generalized deregulation, which aims to reduce the costs of projects. This occurs both in social terms (through the constant reduction of wages and denial of labor rights), and environmentally (with the dismantling of public policies and the relaxation of regulations to protect the natural environment [Acselrad, 2002; Acselrad et al., 2012]).

On the other hand, capital itself is currently faced with a scenario of "world depletion", which it has helped to create (Aráoz, 2020, p. 193). Therefore, in order

4. Henri Acselrad in a lecture on the topic "Capitalism and environmental crisis", Nov. 2020. Available at: https://www.youtube.com/watch?v=_cKMeGXvTK8. Viewed on: May 13, 2023.

to respond to the growing reduction of natural stocks, it is wagering on changing methods and techniques: moving from traditional labor-intensive mechanisms, supported by the excessive exploitation of workers' bodies, to environmental-intensive technologies, whose profitability is based on the incalculable use of territorial assets (minerals, water, energy and biodiversity). Hence, the socio-environmental damage they cause is even more profound (Trocate; Coelho, 2020). In the case of steel manufacturing, due to the depletion of deposits rich in mineral concentration, large-scale industrial exploration has guaranteed the viability of operations. For the purification of ores, extremely toxic chemical compounds are used, such as sulfuric acid, mercury and cyanide, resulting in a significant amount of dangerous waste (Acosta, 2016; Aráoz, 2020). This situation is of particularly significance when we propose to investigate the specific damage generated by civil construction, in which the area of architecture is included. The current reconfigurations of the mining sector ultimately also seek to meet the needs related to the production of the built environment, which has increasingly demanded high-tech materials and components, such as steel itself.

2. Civil construction and architecture as 'accomplices' of neoextractive capitalism

The means of production used by civil construction consume large amounts of material and energy, emitting more than a third of the gases responsible for global warming (United Nations Environmental Programme, 2023). In 2019, we produced 100 billion tons of materials to meet the countless demands of the economic sectors, half of which was made up of minerals, cement, sand, clay and gravel (widely used in the construction sector). In addition, 40% of this material was intended exclusively to erect buildings. During this same period, this represented 13.5 billion tons (or 22.3%) of greenhouse gas (GHG) emissions.[5] In the case of steel, worldwide, more than 50% of this input is used in buildings and urban infrastructure works (World Steel Association, 2020), while, in Brazil, 41.2% of steel consumption occurred in civil construction in 2020.[6]

Even with the increasing alerts from the scientific community regarding the socio-environmental collapse with which we are surrounded (Intergovernamental Painel on Climate Change, 2021), the standard response from our particular area

5. CIRCLE ECONOMY. The circularity GAP report. 2021. p. 20-21. Available at: https://www.circularity-gap.world/2021#downloads. Viewed on: March 27, 2023.

6. See: INSTITUTO AÇO BRASIL. Relatório de sustentabilidade. [BRAZIL STEEL INSTITUTE. Sustainability Report] 2020. Available at: https://acobrasil.org.br/relatoriodesustentabilidade/assets/pdf/PDF-2020-Relatorio-Aco-Brasil-COMPLETO.pdf. Viewed on: March 27, 2023.

has been a kind of 'technical correction' – aided and legitimized by different environmental performance standards. However, 'green' buildings, which use high technology and have been promoted in all parts of the world as a path toward 'sustainable' architecture, also consume significant amounts of energy and material resources – such as steel, cobalt, lithium and rare-earth elements. Therefore, they continue to exert pressure on the environment, even in regions that are still in a state of preservation. Therefore, the so-called 'sustainable' construction strategies only produce a palliative effect, since their production processes depend on exploiting natural elements and workers (on and off construction sites) and are insufficient to contain the dangerous changes we have promoted in the functioning of the "climate machine", as expressed by Claudio Angelo (2016). In short, constructing more buildings, whether 'sustainable' or not, implies generating more damage and more GHG emissions.

It is also important to note that, although the processes and means of production traditionally used by civil construction have broadened the scenario of world depletion, since they are extremely fragmented and dispersed worldwide, it is practically impossible to undertake a global assessment of the socio-environmental impacts generated by the sector. Returning to the example of steel, it should be remembered that ores make up global production networks (GPNs): i.e., their operations of extraction, processing, distribution and consumption are spread across the planet (Trocate; Coelho, 2020). Thus, while we deplete iron ore deposits in Brazil and export raw steel around the world, we frequently import the metal profiles that are used to construct our buildings. Thus, in this toing and froing of agents, workers and territories, countless socio-environmental impacts become accumulated. As this occurs with almost all construction inputs, we may have an idea of the difficulty involved in mapping the environmental consequences of the sector's activities. Faced with this reality, it remains for us to realize the centrality of the material production of space (and, therefore, of civil construction) in the economy as a whole.

In his critical historiography of architecture, Sérgio Ferro indicated that civil construction, because it is organized as manufacturing, constitutes one of the main sources of the "primitive" accumulation of capital. Indeed, the construction of defensive walls and sumptuous cathedrals in the emerging medieval cities, between the ninth and eleventh centuries, effectively contributed to securing and accumulating large sums of circulating value. Although these typologies were not created with simply economic objectives, they constituted an important locus for a seminal, accentuated accumulation of capital. If, in origin, the economic activities involved in civil construction had been conducted through "developed simple

cooperation",[7] practiced within the scope of medieval corporations, little by little, these processes enabled the emergence of a new manufacturing format for the organization of labor. This occurred rapidly on construction sites, preceded only by the textile sector, and has continued to characterize the organization of the construction sector until the present day (Ferro, 2021).

Sérgio Ferro also analyzed that the manufacturing of civil construction, since it employs a huge amount of labor and little machinery, helps to provide the economy with a large part of the masses of surplus value necessary to avoid the collapse of the capitalist system. Because of this, even after the Industrial Revolution, manufacturing production sectors, such as construction, continued to be fundamental: ultimately, replacing human labor with machines signifies losing the source of value creation. Thus, the construction sector was never fully industrialized. In order to adapt to new forms of organizing labor, innovative materials were used, which took the place of traditional techniques that underpinned the builders' know-how.

At the end of the nineteenth century, this change of 'language' served simultaneously to create a kind of simulacrum of the real subsumption of labor to capital on construction sites and to 'disarm' the sector's revolutionary workforce (Ferro, 2018). This conjuncture helps to explain the rapid expansion of iron and reinforced concrete technology at the turn of the century, resulting in the spread of the environmental inadequacy of modernism – whose architectural solutions, supported by the massive use of 'concrete-steel-glass', became hegemonic.

Thus, the definitive rupture in the autonomy of workers on construction sites, which occurred with the rise of modern architecture, also represented a rupture with the territory, the natural environment. In due course, the production processes of 'modern' construction materials and components generated countless environmental impacts (including a significant portion of global GHG emissions), while 'concrete-steel-glass' buildings, in order to maintain minimum occupancy conditions, made abusive use of conditioning and artificial lighting systems, consuming even more fossil fuels in their operation (United Nations Environmental Programme, 2023). Therefore, the 'modern architecture of oil' that has prevailed to date, like the socioeconomic system in which it originates, is unsustainable due to its very nature. Instead of adapting to different territories and biomes, it combines with capitalist accumulation, helping to raise average profit rates through the exploitation of construction sites and nature.

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7. "Simple" cooperation, because there is no institutionalized division of labor, as defined by Karl Marx. Sérgio Ferro adds the adjective "developed" to indicate the formation of the "collective worker" in this way of organizing labor in construction.

We also observe that, with the help of civil construction, capital promoted, and continues to promote, the necessary "spatial adjustments" to the overaccumulation crises that are characteristic of it (Harvey, 2016, p. 145). In the post-war period, for example, the United States mobilized a large part of its surplus capital and labor in physical structures, while China's internal modernization mega-program, supported by colossal real estate developments, constitutes the most recent version of these spatial adjustments (Harvey, 2020). From another viewpoint, while the production of the built environment enables, fosters and nourishes some type of initial capitalist development, over the years, it restricts the possibilities of accumulation, since it creates spatial barriers (Harvey, 2020). Precisely because it mobilizes so much work over long periods of time, as well as large investments, the material production of space requires some form of articulation between the State and financial capital. As a result, in the long term, the construction of landscapes ultimately reveals its speculative side, leading to the emergence of the same initial overaccumulation conditions – which, in turn, give rise to "uneven geographical developments" around the world (Harvey, 2016, p. 150).

Furthermore, according to our perception, there is a structural disconnection in the field of civil construction. Just as the capitalist mode of production, for the benefit of capital itself, specializes and divides social labor, we understand that it encourages the geographical dispersion of the sector's productive processes. As a consequence, our professional field presents a very superficial understanding of how the countless inputs and components that we use in the materialization of buildings and cities are extracted and manufactured. Therefore, the immense difficulty in mapping the global impacts of civil construction is at the heart of the process of transforming raw materials into commodities, or 'natural capital'. On the other hand, we continue specifying construction systems and designing 'green' solutions, without really being aware of the socio-environmental consequences they cause. In other words, the fact that the transformation of the natural environment into a built environment literally corresponds to the dismantling of the planet almost passes us by unperceived.

Viscerally dependent on extractive activities, civil construction thus becomes an 'accomplice' of commodity-exporting capitalism, producing the architectural symbols of 'progress' and 'development' that legitimize it. A closer look at the Guggenheim Museum in Bilbao (considered one of the icons of contemporary architectural production), for example, reveals that its twisted curves do justice to the "spatialization of an out-of-control capitalism".[8] The more than 40 thousand

8. According to Jeremy Till in a lecture on April 22, 2020, entitled "Architecture after Architecture". Available at: http://www.jeremytill.net/read/130/architecture-after-architecture. Viewed on: March 27, 2023.

titanium panels in Bilbao (Figure 1) depended on the skill of climbers to be placed in their right position, while this metal had almost traveled around the world until it was definitively applied to the museum, thus emitting large amounts of GHG in the process. It was extracted in Australia, laminated in the United States, treated in France and cut in Italy, only to then reach Spain (ARANTES, 2010). In short, in our field of activity, increasingly shiny 'packages' attempt to overshadow the craters that appear in the wake of the processes of (re)production of capital.

Figure 1. The Guggenheim Museum in Bilbao.
Source: From the authors' personal collections (2009).

It is also important to recognize that the segmentation of the civil construction production chain, as well as the historical separation between design and construction site (Ferro, 2006; 2021), compels us to focus our attention almost exclusively on its products. Even when our research efforts go beyond the form and plasticity of the architectural symbols we design, the environmental concern in our area usually focuses on assessing whether certain construction systems or buildings rationally employ natural resources, especially energy. What we generally consider as 'sustainable' architectural production is therefore restricted to the use of accessory elements added to buildings (traditional or 'innovative'), such as: special glass and filters, solar collectors and photovoltaic panels, wind turbines and automated shutters. We rarely question the architectural typologies we build, nor the means and processes used in their creation (Ferro, 2006).

Thus, the ecological benefits attributed to new systems and components that aim to reduce the environmental impacts of buildings 'camouflage' the "ecological costs of their production" (Brand; Wissen, 2021, p. 265). Even assuming that all buildings are supplied with renewable sources – and, therefore, when in use, could be considered more 'sustainable' as they do not emit GHG –, this reasoning does not apply to the energy and materials used in their production. 'Green' buildings continue

to require the extraction of countless metals (used in the manufacture of photovoltaic panels and wind turbines, for example), which are mined using fossil fuels. In this way, alongside the "material requirements of energy transition", we should consider the "energy requirements of material transition" (Brand; Wissen, 2021, p. 266-267). Otherwise, we will contribute to the perpetuation of the same extractive model in an 'ecologically modernized' version, which shifts socio-environmental costs to other fields, such as those holding lithium and rare earth deposits.

On the other hand, as current trends in material and energy consumption, including the 'green' buildings we have produced, continue to push ecosystems to the limits of their balance, the prevailing social metabolism clashes with the last territories in which people survive through the truly 'sustainable' use of natural resources. As examples of conflicts in the Brazilian context, it is possible to mention those arising from: the contamination of workers by pollutants resulting from mining production; the loss of land and water sources by traditional populations due to the expansion of eucalyptus monocultures; in addition to the lost fishing capacity by riverside residents after implementing hydroelectric plants to meet the production of 'cheap' energy, aimed at aluminum and steel multinationals (Acselrad, 2010). In these "territorial struggles" (Acosta; Brand, 2018, p. 144), the mercantile logic is questioned, and the disputed spaces may be resignified – as occurred in the example of Piquiá de Baixo in the Brazilian state of Maranhão.

3. Piquiá de Baixo under the impacts of commodity-exporting capitalism

One experience imbued with the problems investigated herein is that of the Piquiá de Baixo community surrounding Açailândia in the state of Maranhão,[9] Figure 2. This village, made up of more than 300 families, or approximately 1000 people, settled there at the beginning of the 1960s, in an area abundant in natural resources – whose current exploitation, by mining companies, has caused immeasurable damage. The community's residents have tried, breathing in dust and soot, to survive among the industries that manufacture pig iron and steel and the railway built to transport production from Carajás to the port of São Luís – along which a huge freight train runs, almost 4 km long.

9. Information regarding this project – which served as a case study – was obtained through the direct participation of one of the authors, who followed the evolution of negotiations, project development and implementation of works to carry out the community resettlement project, in consultation with primary sources: project boards, reports, meeting minutes, among other documents.

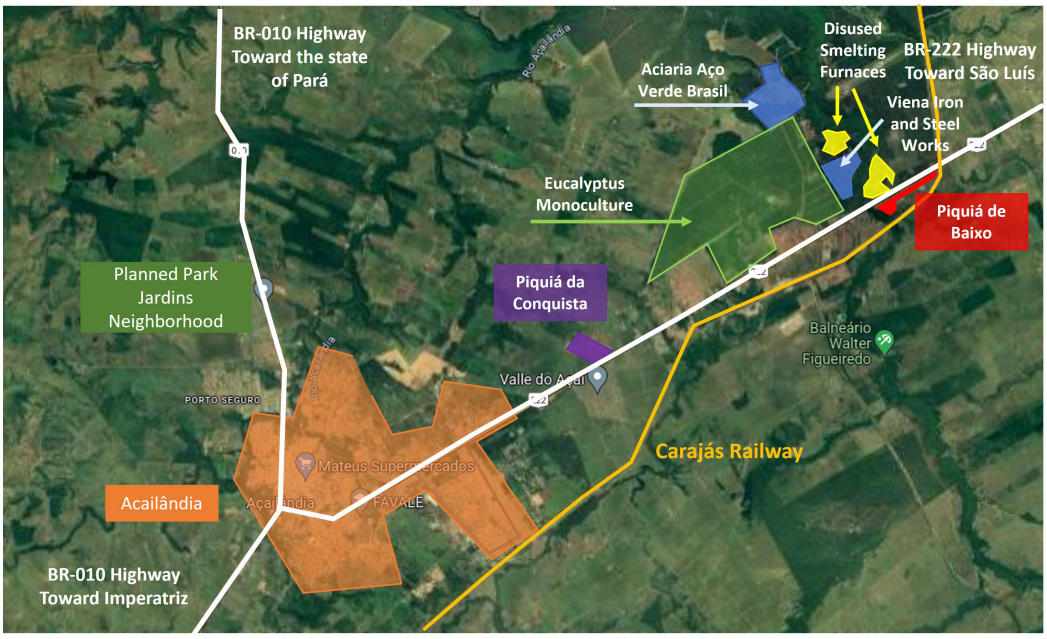

Figure 2. Map of Piquiá de Baixo and its surroundings
Source: Google Maps (2023). Modified by the authors.

Three natural elements are fundamental to the iron and steel production chain in Brazil: the iron ore itself, the wood used to produce charcoal and the water used to cool the blast furnaces. Thus, since the installation of the first pig iron blast furnaces in the Açailândia region in the 1980s, as a consequence of the Great Carajás Program, the excessive exploitation of these elements has contaminated water resources and devastated the native forest. In order to continue charcoal production, in more recent periods, it has even been necessary to plant eucalyptus – giving rise to extensive monocultures that have expelled and made the practices of small agricultural producers in the region unfeasible (Articulação Internacional dos Atingidos e Atingidas Pela Vale, 2020).

Furthermore, the technology used by the industries located there is obsolete, since it releases a significant amount of toxic particulate matter. This problem has been described in technical reports since 2007 (FIDH; JG; JNT, 2011), which have attested that the rates of skin, respiratory and vision diseases in the village are higher than the national average. Serious illnesses, such as lung cancer or cancer of other respiratory system organs, have been a frequent cause of death among the local population. There have also been deaths and fourth-degree burns in children who inadvertently came into contact with incandescent slag. This is because the hot waste from the steel industry has been dumped by trucks in unprotected, poorly signposted areas close to the town. Different types of waste also contaminate water

resources: after the pig iron blast furnaces have cooled, the heated water, containing traces of iron and other solutes, flows out through channels, and is directed again into natural sources. To complete the situation of contamination (Figure 3), there is no liquid effluent treatment network (Articulação Internacional Dos Atingidos e Atingidadas Pela Vale, 2020; FIDH; JG; JNT, 2011; FIDH; JNT, 2019).

Figure 3. Air pollution, water pollution and accidents transporting incandescent slag in Piquiá de Baixo

Source: From the collections of the Residents' Community Association in Piquiá and USINA, online[10]
Modified by the authors.

As a consequence, the Community Association of Residents in Piquiá (referred to as ACMP) began to advocate for their resettlement in a new location. Since the first mobilizations, the association has been accompanied by partner organizations, such as the Saint John the Baptist Parish in Açailândia and the Network Justice on the Rails (JNT). So many violations of the community's health also drew the attention of institutions that work to defend human rights in international bodies. Piquiá's case was presented at a thematic hearing at the Inter-American Commission on Human Rights (IACHR) in 2015, as well as by special rapporteurs of the United Nations (FIDH; JNT, 2019).

However, the residents' cause only reached the legal sphere when the Public Prosecutor's Office and the Public Defender's Office of the State of Maranhão, under pressure from the ACMP and partner organizations, opened a negotiating table to finally make the resettlement of the village viable. On the occasion, there were representatives participating in the decision-making process from Vale S.A. – mainly responsible for the situation of socio-environmental degradation in the region (Articulação Internacional dos Atingidos e Atingidas Pela Vale, 2020), the Maranhão Pig Iron Industries Union (SIFEMA), the Municipal Town Hall of Açailândia and the State Government of Maranhão (FIDH; JNT, 2019). The conflicts arising from this process are described below.

10. USINA CTAH. Reassentamento do Piquiá de Baixo [The Resettlement of Piquiá de Baixo]. Available at: http://www.usina-ctah.org.br/piquia.html. Viewed on: November 10, 2023.

3.1 The pathway of conflict toward Piquiá da Conquista

After long and troubled negotiations, the Public Prosecutor's Office signed a Conduct Adjustment Agreement (known as TAC) in May 2011, which stipulated the expropriation of land by the city of Açailândia for the resettlement of the community, the costs of which would be covered by SIFEMA. Nevertheless, the expropriation process was completed only three years later, in response to community pressure. In March 2014, as SIFEMA had not paid the landowner the agreed amount, the residents of Piquiá blocked access to three steel mills in the region for more than 30 hours. As a result, the Public Prosecutor's Office intervened once again to resolve the issue (FIDH; JNT, 2019).

In August 2012, in turn, another TAC was concluded between the Public Prosecutor's Office and SIFEMA to enable the necessary technical services to be contracted so as to develop the architectural and urban proposal for the new community of Piquiá de Baixo. The agreement also defined the ACMP as being responsible for managing the resources and selecting the consultancy, which was completed through public selection (FIDH; JNT, 2019). Among the three entities that responded to the edict, the ACMP hired USINA,[11] which adopted a methodology of *participatory process* in meetings with residents.

The final resettlement proposal (Figure 4), the result of this participatory process, structured the 38-hectare plot of land, located 7 km from the original settlement, based on a long circulation axis: a tree-lined "sidewalk" for pedestrians and cyclists, as a means of access to public equipment and collective spaces. The layout of the units creates semi-public spaces for common use at the back of the lots, with the aim of preserving the social practice of coexistence between members of the same family or friends. Each group of houses, in turn, is arranged around small squares – which have the additional role of treating wastewater from buildings, using biological systems.

11. USINA CTAH (Work Center for the Inhabited Environment) is a non-governmental organization in São Paulo, made up of professionals from different areas, who provide technical assistance for housing and planning. See http://www.usina-ctah.org.br. Viewed on: May 13, 2023.

Figure 4. Implementation scheme for the resettlement proposal
Source: Lopes (2021, p. 10).

With regard to this point, it is vital to mention that, in order for Vale to finance part of the project, the multinational required that the project had 'sustainable' environmental sanitation strategies. An outsourced company, specialized in green infrastructure, was hired for this purpose, assisting in the design and detailing of the sewage collection and urban drainage system. However, after the works had begun, due to a lag in the budget forecast (given the length of time that passed between the beginning of the process and the actual contracting of the works), these solutions became unfeasible. Although we are fully aware of the benefits of biological effluent treatment systems, the situation that emerged was, to say the least, contradictory. After all, now, as a condition for the new settlement, the same company that had seriously impacted the life of the community was insisting that the project should express environmental concerns, while it had consistently disrespected them in its every-day practices.

The jointly prepared proposal was finally approved by the Açailândia Town Hall in 2013 and by the Caixa Econômica Federal (CEF) bank, which was responsible for transferring the funds in November 2014. However, the residents of Piquiá de Baixo were forced to wait another year until their resettlement project was authorized by the Ministry of Cities, so that it could be contracted through the "Programa Minha Casa Minha Vida [My Home, My Life Program] (PMCMV) – Entidades". With public financing, the aim was to build housing units and part of the urban infrastructure, which would be complemented with resources from the Vale Foundation and the Pig Iron Industries Union. Therefore, even though the rights violations had been proven to be the responsibility of Vale and companies linked to SIFEMA, the State was nonetheless responsible for bearing more than

70% of the costs of the village resettlement process, through resources from the Social Development Fund (FIDH; JNT, 2019). In other words, the logic of privatizing profits and socializing losses was adhered to.

In October 2016, the executive project, containing the technical details of the proposal, and the stages for executing the work and its budget, was again submitted to the CEF for assessment. However, it was only in September 2018 that the presented documentation was finally approved. To this end, community intervention had once again been necessary: in November 2017, approximately 50 residents of Piquiá protested in front of the CEF headquarters, in the state capital of São Luís, requesting the bank's technicians to complete the analysis of the resettlement project (FIDH; JG; JNT, 2011; FIDH; JNT, 2019).

Although the lengthy approval stages of the project were overcome and despite the efforts undertaken to obtain the financial and human resources necessary for the resettlement process, many other conflicts continued to occur during the construction of the project. To a large extent, the problems relating to the management and continuity of the works relate to their initial deficit, since, due to delays during the process of assessing the technical parts, when work began, a negative balance gradually began to accumulate. Basically, inflation rates alone increased the costs of construction inputs and labor. Thus, although alternatives were explored with a view to obtaining resources to complete the project – including, for the urbanization works of Piquiá, redirecting part of the mining royalties owed to the municipality of Açailândia –, the amount necessary for executing the work was not reached. As a consequence, the works dragged on.

Given this scenario, at the end of 2020, and due to the closure of the PMCMV-Entidades program, the Vale Foundation proposed replacing the management undertaken by the ACMP with a 'fixed-price contract', that is to say, hiring an outsourced construction company. In May 2021, in turn, the Maranhão State Government, through a new TAC, committed to building some of the public equipment foreseen in the original project.[12] It is important to note that the outsourcing of works, contrary to what Vale representatives advocated, did not correspond to greater productivity or agility in the construction processes. Should there be no further delays in the contracted construction company's schedule, it is expected that the new houses in Piquiá da Conquista will be handed over at the end of 2023.[13]

12. See https://justicanostrilhos.org/acmp-celebra-mais-um-fruto-da-sua-luta/. Viewed on: March 27, 2023.

13. Available at: https://piquiadebaixo.com.br/noticias/. Viewed on: March 27, 2023.

Considering the above, we may conclude that the example of Piquiá de Baixo goes beyond the struggle for housing typical of large urban centers, which arises from a confrontation between the "spatial practices of non-dominant groups"[14] and the speculative practices of real estate capital. The Piquiá community has been fighting for environmental justice in its very broadest sense: against the harmful effects of mining, against the current extractive model, the result of a developmental project for society that is based on the unbridled exploitation of bodies and nature. This has been a fight that condenses many others. Initially, there was a fight for the right to remain in the occupied territory, similar to that of the indigenous, the quilombolas and the traditional peoples. Faced with the impossibility of staying there, the fight for land then began, for the resettlement of the village in another less unhealthy location. At this moment, legal mobilization took on a central role, attracting the attention of several different organizations. Once the land was conquered, the fight became that of autonomy, to gain decision-making power over their own future through the design of the future neighborhood. This is when the resources themselves were solemnized, which thereby rendered independent technical assistance possible in order to project the collective dream. In the fight to make this dream come true, demands were made so that those responsible for the degradation of the original territory would bear the costs of the works. As this did not occur, the solution was to resort to financing from the federal housing program, whose 'rigid' regulations however made it impossible for an economic-financial rebalancing of the contract.

However, despite so many struggles, the example of Piquiá de Baixo lacks what is essential for the field of civil construction, in which architecture is practiced: the fight for the autonomy of workers on the construction site. While this is found to be present in other collaborative practices, it has not appeared in Piquiá, whose 'external' workforce has been mostly hired by the ACMP. Instead of the emancipatory reflections that self-managed work provides, reducing the distances between those who decide and those who execute, the heteronomy of traditional construction sites has prevailed (Ferro, 2006; 2021). The community and collective nature of the proposal is ends in the anticipation of a future through collective design. Together with the tardiness of the process and the unexpected effects of the pandemic, the absence of this fight has ultimately contributed to demobilizing the community – which has also given up managing the works at Piquiá da Conquista.

14. Henri Acselrad in a lecture on the topic "Capitalismo e crise ambiental [Capitalism and environmental crisis]", Nov. 2020. Available at: https://www.youtube.com/watch?v=_cKMeGXvTK8. Viewed: May 13, 2023.

This is an important point of reflection, since the innovation that occurs in the interaction between the contributors to this joint effort, which echoes in several other experiences of this type in Brazil and around the world, refers precisely to the concrete possibility of another architectural practice for other relations of production (essential, we reiterate, in the construction of post-extractive societies). On the other hand, in Piquiá de Baixo, the work, common to the group of residents with technical assistance, is not equally reflected in the anticipation of the "collective subject" of production (Ferro, 2015, p. 23), which would help shape their internal solidarity. Therefore, the experience is incomplete. Furthermore, even if the right to housing is guaranteed through conventional means, we cannot say the same regarding the right to life.

3.2 Access to housing, with no guarantee for the right to life

Although slow and encountering different conflicts, the resettlement process of the Piquiá de Baixo community is about to be completed. However, a guarantee of the right to housing is not the only or even the most important demand of its inhabitants, who are fighting for full reparation for the violations suffered. Furthermore, the severe environmental impacts listed above also affect thousands of other residents in adjacent neighborhoods, who have not been covered by the resettlement proposal. Therefore, the future scenario is one of continued environmental contamination caused by the mining-steel chain in Açailândia – which, to a large extent, supplies the construction sector. A first shred of evidence lies in observing that the achievements of Piquiá de Baixo have resulted from the community's protest demonstrations and not from the articulation of public policies and/or the elaboration of strategies aimed at effectively resolving the problems raised. As we have analyzed, the public departments and companies involved have limited themselves to acting either when required or forced.

Besides this, steel mills located in the region have, for years, also been operating with expired environmental licenses. This is possible through the use of the automatic extension device. Regulated by Federal Complementary Law No. 140/2011,[15] this provision states that the deadline for renewing environmental licenses, when not requested by companies 120 days in advance, is automatically postponed until the final decision from the competent environmental body. Therefore, even if the State of Maranhão Secretariat for the Environment (SEMA) recognizes that the steel mills in operation there have not met the necessary conditions for renewing their operating certificates (due, for example, to the lack of controlling pollutant

15. Available at: http://www.planalto.gov.br/ccivil_03/leis/LCP/Lcp140.htm. Viewed on: March 27, 2023.

atmospheric emissions), environmental licenses are not revoked. The situation becomes even more critical when we see that the inspection reports produced by SEMA originate from the company self-monitoring: i.e., evidence regarding their environmental irregularities is produced and made available by the companies themselves, without fear of having to 'close their doors' (FIDH; JNT, 2019).

This regional situation may thus be framed within an even broader process involving the "tacit relaxation" of environmental standards in Brazil (FIDH; JG; JNT, 2011, p. 23; Acselrad, 2002; Acselrad Et Al., 2012). In this specific case, although there was no 'institutional' relaxation, by changing the laws and standards for the operation of steel mills, we have observed that licensing and supervisory bodies allow companies to operate on the very margins of the standards. Indeed, the Aço Verde Brasil (AVB) steelworks, a unit linked to Gusa Nordeste, was inaugurated in December 2015, near Piquiá de Baixo, even though the pig iron smelting was already in non-compliance with environmental licensing restrictions. While AVB has been awarded for its "carbon neutral" production,[16] the transport of incandescent pig iron, between the facilities of the old steel mill and the new steelworks, passing through the streets of Piquiá, is an additional, recurring concern for residents (FIDH; JNT, 2019).

An analysis by Luiz Marques on the difficulty in complying with multilateral pacts, aimed at reducing global GHG emissions, may help to obtain a better understanding of the current situation of environmental relaxation. Marques related an increase in the participation of state capital in sectors of the economy, including participation in the fossil fuel industry, to the State inertia in mitigating their GHG emissions. In other words, environmental policies have gradually submitted to the interests of the State's own economic assets (Marques, 2015, p. 25-26). The same occurs in the case of mining companies: by consulting the "BNDES Transparente"[17] portal, we discovered that the steel mills that produce pig iron in Açailândia have had access to bank resources, in the form of indirect loans, just as Vale has received different financing for its expansion projects since the beginning of its operations. In theory, those who access BNDES resources would need to

16. The justification for the award was: the use of reforested charcoal (we remember from eucalyptus monocultures) as the main fuel in blast furnaces, in addition to reusing hot gases in production processes and solid waste. See INSTITUTO AÇO BRASIL. Relatório de sustentabilidade [BRAZIL STEEL INSTITUTE. Sustainability report] 2020. Available at: https://acobrasil.org.br/relatoriodesustentabilidade/assets/pdf/PDF-2020-Relatorio-Aco-Brasil-COMPLETO.pdf. Viewed on: March 27. 2023.

17. See https://www.bndes.gov.br/wps/portal/site/home/transparencia. Viewed on: March 27, 2023. Also see the report entitled "Mineração e violações de direitos [Mining and the violation of rights]" on the Dhesca Brasil Platform: http://www.global.org.br/wp-content/uploads/2016/03/plataforma-dhesca_carajas.pdf. Viewed on: March 27, 2023.

comply with the entity's "social and environmental responsibility" policy, while Vale has developed its own sustainability guidebook.[18] However, such guidance is insufficient for the agents involved to adopt responsible socio-environmental practices.

Indeed, as we have seen, companies are not even held responsible for the visible environmental degradation of the territories in which they operate or for the deterioration of the living conditions of the populations that seek to survive in them. In the case of Piquiá de Baixo, the involvement of the Vale foundation and the steel mills, represented by their union, has been associated with 'voluntary' initiatives. The signing of the TACs with the Public Prosecutor's Office in the resettlement process is an example: rather than being a formal recognition of the violations committed, it is as if this financial support has stemmed from a process of cooperation, resulting from the "social responsibility" policy of the companies (FIDH; JNT, 2019).

While the ACMP was fighting for the Piquiá da Conquista project to be definitively approved, Vale expanded its mineral extraction capacity – especially after the inauguration of the S11D mine in Canaã dos Carajás, in the southeast of the state of Pará. To adapt the capacity to transport the extracted metals, predominantly intended for export (in part, aiming to meet the immense construction demand in China and the global North), it was necessary to double the Carajás Railway (EFC), generating more socio-environmental impacts along the route. On the other hand, during the period, the steel sector in Açailândia suffered a serious crisis, as Russian and Ukrainian companies became the main suppliers of this commodity on the world market, leading to a drop in export prices for national pig iron. In March 2017, when iron ore from Canaã was already passing through Piquiá, two steel mills in the region were sold to Suzano Papel e Celulose, interested exclusively in the forestry assets of the pig iron. As a consequence, the deactivated plants began to deteriorate with no preventive measures being adopted regarding contamination in the surrounding area (FIDH; JNT, 2019).

Piquiá therefore constitutes an enlightening example of the actions of international capital, the exporter of commodities. While the ACMP and its partner organizations attempted to meet the community's health and housing demands, big capital – in this case, involved in the mining-steel chain and with the consent of various spheres of the State – compromised the residents' right to life. At the same time, architects, comfortably accommodated in their offices, a safe distance from the conflicts in Piquiá, continue to choose structural elements, frames and steel

18. Available at: https://vale.com/pt/web/esg/home. Viewed on: March 27, 2023.

panels to compose buildings – without questioning where they have come from or what damage their production processes have caused. At most, they seek to justify the supposed 'sustainability' of their designs, whether of a traditional or bold nature, with the argument that such metal profiles make it possible to optimize time on site and that they could perhaps be recycled in the future. Some of them, aiming to reduce the environmental impacts of their projects, also specify devices to optimize water and energy consumption, ignoring how much water and energy has been used to manufacture those same components and systems.

As revealed, since the spread of modern architecture, the hegemonic production of our 'shelters' has been based on standardized 'concrete-steel-glass' solutions, dependent on mechanical air conditioning and lighting systems. Even with the development of devices that try to resolve the environmental inadequacy of this production, we hardly ever question the architectural typologies that have begun to be widely built around the world, much less the high human and natural capital necessary in order for them to materialize. By designing with a focus on results, we continue to erect buildings that are practically indifferent to their mode of production and their socio-environmental impacts. However, maintaining the historical rupture between design and construction site (Ferro, 2006) represents serious irresponsibility given the current situation of depletion in the world.

In addition to an increase in GHG emissions, in the specific case of steel, there are also impacts associated with the exploration of iron ore deposits itself, as demonstrated by the most recent, acute disasters in Minas Gerais (Trocate; Coelho, 2020). However, as we are part of the current logic, marked equally by the alienation of work and nature, we fail to understand our part in the responsibility for the collapse of the dams. Thus, in exercising our profession, even if it is unconscious, we are 'allies' of capital. With the example of Piquiá, we have sought to demonstrate how, still today, 'modern' materials and components, initially developed to meet the formal innovations of architecture and the need to submit construction sites to capital (FERRO, 2018), serve the logic of the expropriation of labor, associated with the overexploitation of natural resources and environmental contamination.

4. Considerations

Our present moment reproduces and aggravates the economic and social history, written down by capitalism, of successive waves of the expropriation of traditional peoples and the exploitation of the territories they occupied. In view of this, we need to emphasize that the scarcity attributed to nature, prevalent in the hegemonic discourse, conceals the socioeconomic and geopolitical dimensions of the environmental problem. This is because the multiple natural elements are unevenly distributed across the planet and are disputed by social groups with

conflicting interests. It is precisely the conflicts between mobilized social groups (in general, with the aim of preserving their ways of existence) and corporate and governmental interests (with a view to maintaining continuous patterns of economic growth) that have based the debates on the preservation versus exploitation of natural resources.

As we have also seen, one aspect that hides the alleged eco-efficiency of 'green' products and buildings refers to the production stages that require the most material and energy, in precarious work situations, being transferred to other parts of the planet: nothing more than the externalization of socio-environmental damages. Therefore, we reiterate that, when assessing the eco-efficiency of products and buildings, we need to consider the entire production chain. If we fail to do so, we remain 'accomplices' of the extractive model, packaged in 'sustainable' clothing. Ultimately, as we have analyzed, the hegemonic socioeconomic system only became possible due to the existence of colonial relations (both in the past and present). So that the populations of the North and the elites of the global South could maintain their styles of production and consumption, they requested and continue to demand access to "the totality of the planet's resources" (Lang, 2016, p. 28), to the natural assets, to labor and to the environment's capacity to absorb pollution and waste.

In the case of civil construction, due to the fragmentation and worldwide spread of its production chain, we are practically oblivious to the relationship between the buildings we produce and the destruction of "culturally territorialized ecosystems" (Aráoz, 2020, p. 131). In other words, consciously or not, we have become complicit in this predatory logic. The case of Piquiá de Baixo (MA) is emblematic in revealing the countless conflicts that may emerge in our field of activity, subject to and allied with extractive capitalist dynamics. After all, in Piquiá, the same sector that consumes large quantities of minerals that contaminate the territory, also builds houses so that part of the affected population may survive.

The tremendous irony of the resettlement process refers to the fact that the residents of the community found themselves forced to accept, from the hands of those who had removed their right to live in their place of origin, compensation, which had little or no impact on the overall gains of the companies, and did not correspond to the real harm caused by their activities there. The amount of resources invested in constructing new homes is negligible, especially when compared to what Vale and other companies in the mining-steel chain extract in value from the region, or the magnitude of resources needed so that the affected communities are able to live with dignity, and not just survive.

Given the above, it is necessary to ask ourselves whether our discourses and practices have contributed to the continuation of capitalist accumulation,

or whether, to the contrary, they have enabled us to create 'gaps' that counteract the depletion of the planet's vital sources and unequal spatial dynamics, typical of financialized capitalism, the exporter of commodities. Thus, we insist on the need to understand architecture beyond the design of buildings, focusing on the processes and means that enable the "transformation of space through human work" (Kapp; Baltazar, 2021, p. 14).

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