
From mining to aerotropolis: capitalism's plateaus in Minas Gerais

Da mineração à aerotropolis: platôs do capitalismo em Minas Gerais

De la minería a la aerotrópolis: mesetas del capitalismo en Minas Gerais

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Abstract

The present work aims to contribute to the discussions about the developmentalist and neoliberal projects lined on the creation of an aerotropolis at the North Vector of the Metropolitan Region of Belo Horizonte in Minas Gerais - the Project Aerotropole Mineira - and the maintenance of minerary activities in its surroundings. Distinct logics of capital accumulation expressed at the same territory protected by federal law: the Environmental Protection Area (APA, in portuguese) Karst Lagoa Santa. We seek to track controversies between the mining and aeroportuary projects and the environment conservation legislation for the region, pointing fissures and possibilities of research.

Keywords: Aerotropolis; the Environmental Protection Area (APA, in portuguese) Karst Lagoa Santa; Mining; Metropolitan Region of Belo Horizonte; Project Aerotrópole Mineira.

Resumo

O objetivo deste trabalho é contribuir para as discussões sobre o projeto desenvolvimentista e neoliberal pautado na criação de uma aerotrópolis no Vetor Norte da Região Metropolitana de Belo Horizonte em Minas Gerais- o Projeto Aerotrópole Mineira - e na manutenção das atividades minerárias em suas proximidades. Lógicas diferenciadas de acumulação de capital expressas num mesmo território protegido por legislação federal: a Área de Proteção Ambiental (APA) Carste de

Lagoa Santa. Buscamos rastrear controvérsias entre os projetos aeroportuário e minerário e a legislação de conservação ambiental da região, apontando fissuras e caminhos de pesquisa.

Palavras-chave: Aerotrópolis; Área de Proteção Ambiental; Carste de Lagoa Santa; Mineração; Aerotrópole Mineira.

Resumen

El objetivo de este trabajo es contribuir a las discusiones sobre el proyecto desarrollista y neoliberal basado en la creación de una aerotrópolis en el Vector Norte de la Región Metropolitana de Belo Horizonte en Minas Gerais - el Proyecto Aerotrópole Mineira - y sobre el mantenimiento de la minería. actividades en sus alrededores. Lógica diferenciada de acumulación de capital expresada en un mismo territorio amparado por la legislación federal: el Área de Protección Ambiental (APA) Karst de Lagoa Santa. Buscamos rastrear controversias entre el aeropuerto y los proyectos mineros y la legislación de conservación ambiental en la región, señalando fisuras y caminos de investigación.

Palabras clave: Aerotrópolis; Área de Protección Ambiental Karst de Lagoa Santa; Minería; Región Metropolitana de Belo Horizonte; Proyecto Aerotrópole Mineira.

Introduction

In recent decades, capitalism has expanded globally and at an exponential pace, stimulating entrepreneurial individualism, informational knowledge, and the development of networks. For Castells (1996), it is under informational capitalism that several forms of communication and technology development started to integrate into new power strategies (CASTELLS, 2002). And so, after a few decades of digital utopianism, according to Morozov (2018), it becomes apparent that digital platforms are increasingly becoming a mixture of powerful devices that include hidden mercantile interests, lobbyists and world domination projects. No longer is it about applied sciences, but rather a confusing tangle that mixes geopolitics, global finances and the accelerated corporative appropriation of private data, in other words, personal behavior and relationships alike (MOZOROV, 2018).

As such, if in the evolution of capitalism the energy sources were fundamental in order to increment the productive processes, one can weave an

allegory that in modern society one of the most powerful sources of energy is the one that originates from knowledge, in which technological development is intertwined with the dissemination of information mediated by both economic and informational networks (CASTELLS, 2002; SANTOS, 2006). This logic encompasses 21st century Brazil in the technical, scientific and informational realms, with the capitalist system producing and internationalizing the area (SANTOS, 2006). With the fall of Bretton Woods and the mark of the Washington Consensus, a new global rationality is put into place: the neoliberal rationale economically marked by financing and industrial technology of directed consumerism emerges, socially through globalization and urbanistically through revitalizations and megaprojects. The aerotropolis, for instance, is a highly technological city model crated in this context, with an “[...] airport at the core and extensive surrounding business areas steered by the dynamics of the airport and their associated residential developments” (KASARDA, 2006, p. 6). The aerotropolis megaproject would be produced by Federal and private investments, markedly global and interconnected to the neoliberal spaces production.

In this article we will analyze a few global dynamics, in other words, between the location and the global present in the North Vector territory of the Metropolitan Region of Belo Horizonte (RMBH, in Portuguese) in Minas Gerais, more specifically in the Lagoa Santa Karst Environmental Protection Area (APA, in Portuguese). Said territory, which simultaneously possesses geomorphologic, scenic, archaeological, and environmental peculiarities, presents great economic interest, both for mining activities as well as for the presence of the most important airport in Minas Gerais: the Tancredo Neves International Airport, in the municipality of Confins.

The analyzed territory has an intense flow of people, technologies and commodities. From commodities extracted from minerals to those that use state-of-the-art technology and will be the basis of the economy of the future aerotropolis.

The territory begins to take the first steps to move from the financial capitalism stage to the informational one, but these stages are not mutually exclusive, since capitalism does not occur homogeneously in every country in the world (table 01).

Table 1 – Stages of capitalism

Hegemonic economical paradigms/ tendencies	Commercial	Industrial	Financial	Informational
Start of period (century)	XVI	XVIII	XX	XXI
Dominant System	Mercantilism	Liberalism	Keynesianism	Neoliberalism - Post Neoliberalism
Mode of Production and economy	Manual Production; trades (gold and gemstones) slave labor exploitation	Artisanal and manufacturing (small scale). First Industrial Revolution and beginning of the Second Industrial Revolution; from gold to dollar.	Fordist and taylorist factory (large scale). Second Industrial Revolution spreads to different countries in the world. Beginning of the Third Industrial Revolution or Techno-scientific Revolution; Expansion of the service society, third sector. Dollar.	Post-industrial; Manufacturing in intelligent factories or Factory 4.0; Fourth Industrial Revolution; Artificial Intelligence; Control and Surveillance Society; Dollar. Glocal
Territorial limits	Well-defined territorial borders.	New borders, especially the American colonies.	Borders still matter, but increasing globalization process post Second World War, particularly, post collapse of the Berlin Wall.	Borders become less and less important Cloud and networks connected via Banks and transnational regulatory Agencies; Globalization and weakening of the Nation-state.
Dominant work system	Slavery. Immigration to outlying countries.	Wages.	Specialized, but collective work; Development of the Welfare State. Establishment of labor legislation.	Specialized individual work; Dismantling of the Welfare State and labor legislation; Telework; Start of work Platformization; Uberization.

Source: Adapted from: CASTELLS, 2002; SANTOS, 2006; POCHMANN, 2016; SCHWAB, 2019.

As such, this article seeks to understand how the proposal of a kind of aerotropolis was established in a mining development region of Minas Gerais,

overlapping very different modes of capitalist production in the same territory. With this purpose, the article was divided into five parts: the first deals with the contextualization of the territory where the Metropolitan Region of Belo Horizonte is located; the second with the importance of mining for the North Vector of this region; the third discusses how the intention of establishing an aerotropolis in this vector arose; the fourth addresses the discussion on the formation of a possible network between aerotropolises and its consequences, and the fifth discusses which rifts and possible futures are delineated in the Lagoa Santa Karst APA.

A brief look into the political and territorial context of the RMBH

Belo Horizonte is the center city of the third most important Metropolitan Region in Brazil and one of the few capitals that was planned to be the capital of a state, namely Minas Gerais. In 2017, to assist in its metropolitan planning, a proposal for territorial restructuring was established between the Federal government and the municipalities that make up the metropolitan region, culminating in the Integrated Development Directive Plan (PDDI, in Portuguese), which established milestones that guide the municipalities, including in the revision of their Directive Plans (FREITAS, 2017).

In the PDDI it was noted that one of the fastest growing areas in the Metropolitan Region of Belo Horizonte (RMBH) is its so-called North Vector, whose economy largely revolves around the services provided by the Tancredo Neves International Airport and the mineral production of limestone. It was in this vector that a scientific expedition consisting of French and Brazilian researchers in the mid 1970s made one of the greatest archeological discoveries of that century: Luzia, considered to be the oldest fossil in South America which led to new research on the subcontinent's settlement. This was one of the milestones that helped in the creation of the Lagoa Santa Karst APA to protect the archeological and paleontological resources of the region to the north of RMBH (NEVES, PILÓ, 2008).

The planning of this region involves private and governmental entities that often align their interests around megaprojects (FREITAS, 2017). To what extent can the mining activities and those related to the airport exemplify such overlapping interests and their relationship with capital accumulation? How do these activities relate to the protected space that is the Lagoa Santa Karst APA? This is what we seek to present below.

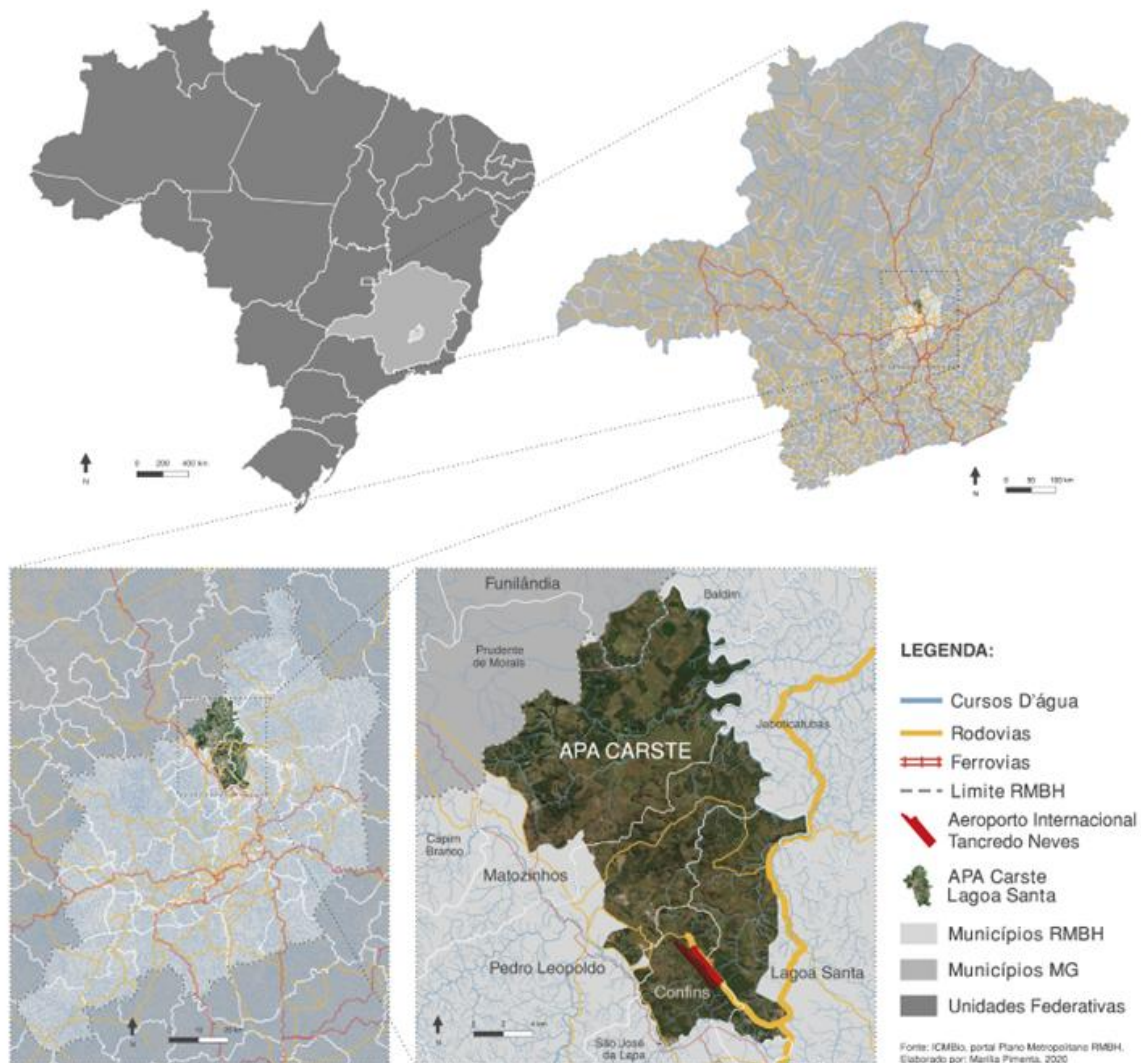
Controversy tracking: mining

The name of the state of Minas Gerais comes from the importance that its mineral deposits had for Imperial Brazil: a large portion of the gold that the Portuguese crown used to pay its debts to England in the late 17th and early 18th centuries came from Minas. The result provides a typical portrait of colonization: while industry was growing in England, with the exploitation of Brazilian ore deposits by the Portuguese metropolis, in Brazil, specifically in Minas Gerais, with imperialist exploitation via mining, remained the craters and the bodies of many workers, at the time denominated slaves. With the occupation of the Minas Gerais territory for centuries to come, the mining "vocation" of the state was used as a pretext for predatory mining exploitation of natural resources, and rarely did the profit from such activity act as a national investment. With time, other mineral resources were found for exploitation, such as limestone, which is the basis of the cement industry whose product marks in physical terms the mineral base for urban expansion.

Throughout the 20th century, to increase competitiveness and productive efficiency in a globalized world, many companies reorganized their productive systems, and governments, such as Brazil's, modified legal systems to attract investments or expand their exports. In this case, Brazil's agricultural-exporting economic model remains focused on the sale of commodities, which account for about 25% of Brazilian exports, but without the proper technological and even logistical investments (IPEA, 2013).

In the North Vector of the Metropolitan Region of Belo Horizonte (RMBH) lies one of the largest limestone mining areas in the country. This area coincides with one of the main conservation units in the region: the Lagoa Santa Karst APA, which was established in 1990 as a federal protection device (Map 01). One of its major distinguishing features is that it is situated in a karstic geomorphology of great environmental vulnerability due to the presence of hundreds of caves, grottos, and underground waterways, which also allows for the existence of the limestone itself. However, within it, mining still occurs, considered as an activity of public utility and national interest (BRASIL, 2018). A regulatory rift between the economic interest and that of environmental protection.

Map 1- Location of the Lagoa Santa Karst APA in the RMBH



Source: Developed by M. P., 2020, at the request of the authors.

In the APA there are controversies between what is claimed to be an environmental good - a conservation unit - and an economic good - that is, the exploitation of a mineral deposit that is finite and profitable. It is very challenging, or virtually impossible, to reconcile the two demands, so although the call for sustainability has increased in recent years, the environmental costs associated with commodity production have not decreased. In the case of RMBH's North Vector, limestone exploitation comes mainly from São José da Lapa, Pedro Leopoldo, Lagoa Santa and Matozinhos (BRASIL, 2019). The last three municipalities have part of their territories located within the Lagoa Santa Karst APA. Although fragility exists from the perspective of geomorphological composition and archeological and paleontological peculiarities, in parts of the territory mining activities still prevail, as a result of economic interests outweighing the rest. This is mirrored in the conservation unit's own environmental zoning, proposed in the Directive Plan, because when established by the managing authority, the mining activities that were in operation and had permits were not affected (IBAMA, 1998).

Often times, macro-policies are distanced from local and regional contexts. As a result, the profitability of a certain activity is more important than the environmental loss or the interests of local residents. This reality illustrates that natural resources are not seen as a collective good of the nation or region, different from what is expressed by law, and, therefore, decisions regarding them are not collectivized. At the same time, the fact that natural resources are limited aggravates the situation, since the burden of complete devastation would be left to groups that do not engage in the profit-making activities, reinstating environmental racism - an inheritance from colonial times. Put simply, the discourse of sustainability is largely detached from the normative and from Brazilian macro-politics.

From an economic connotation and considering the predominance of capitalism in modern society and its influence over the life of this society, if the

Karst APA is to be perceived as a strategic territory for the market, its most precious natural resource would be the limestone. On the other hand, this conservation unit is also home to the main airport of Minas Gerais, an area that accrues lucrative activities that are also extremely valuable from the market's point of view, including for the entire RMBH. Alongside an extractive activity that employs little technology, stands another with cutting-edge technology. But, as John D. Kassarda (2012) allegorically states, one of the most important "commodities" in the new globalizing economic scenario is time (KASARDA; LINDSAY, 2012). Time as commodity: a raw material product, produced in bulk, a commodity that can be priced through the dynamics of supply and demand. Space-time can be examined based on Castells' (2002) statement: "contrary to most classical social theories, which assume the domination of space by time, I propose the hypothesis that space organizes time within the network society. (CASTELLS, 2002, p.467). So, how does this organization happen in the Karst region? This is what we intend to present in the next topic.

Modernity arrives to the Karst: the aerotropolis

In globalizing times, airports have become catalysts for large public and private investments, whose influence can spread for tens of kilometers around them (KASARDA, 2006). In Minas Gerais, the largest airport is the Tancredo Neves International Airport, in Confins, in the Metropolitan Region of Belo Horizonte (RMBH). It was developed during the military dictatorship in Brazil, during which there was strong government intervention in the economy. In 1972 the Brazilian Company for Airport Infrastructure (INFRAERO, in Portuguese) was created, under the Ministry of Aeronautics, to manage, implement, operate and supervise the country's airport infrastructure (BRASIL, 1972).

Seeking to expand and streamline air capacity in the state of Minas Gerais, INFRAERO established the Coordinating Commission of the Belo Horizonte

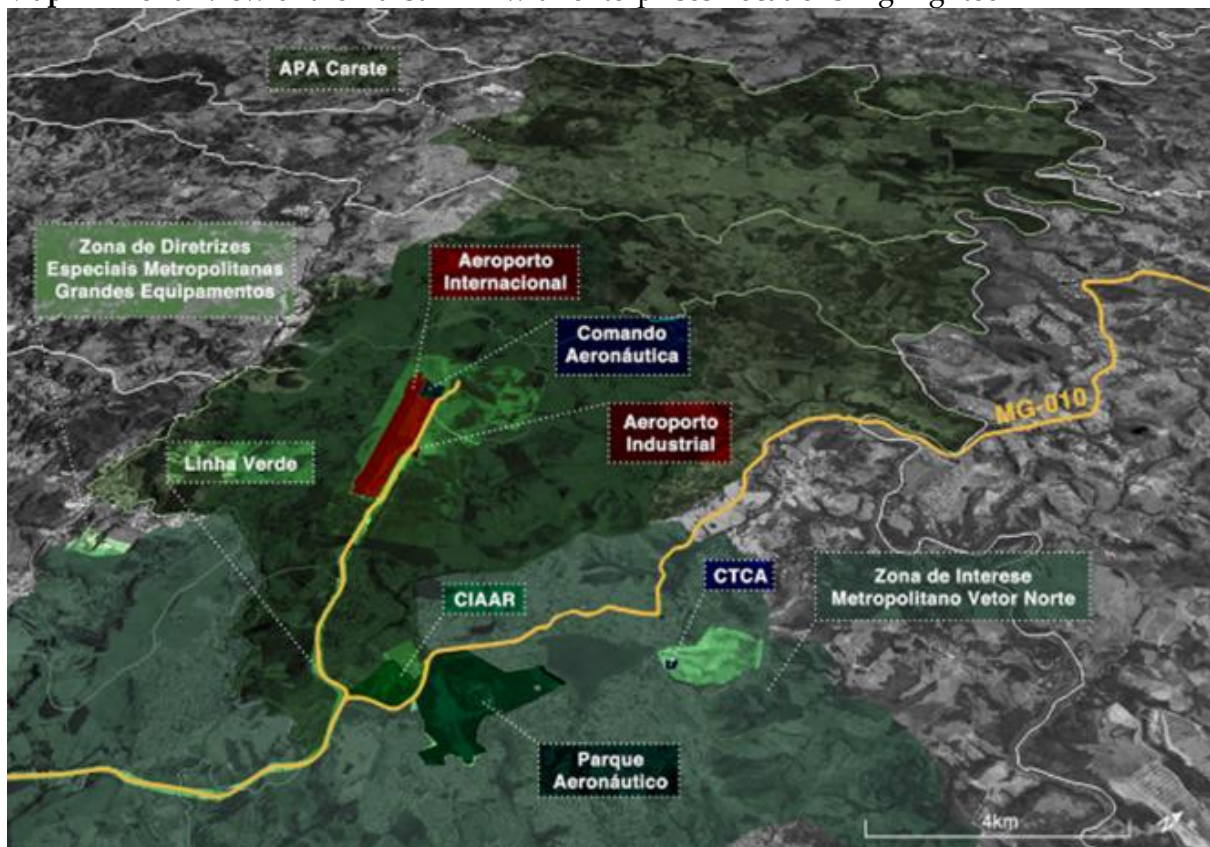
Airport Project with the objective of building an airport outside Belo Horizonte, in the municipality of Confins. Construction began in 1979, but the airport was inaugurated in 1984. The airport was located in what later became a conservation unit: the Lagoa Santa Karst Environmental Preservation Area (APA). Considering the management plan of the unit that was drafted in 1998, the possibility of establishing airport hotel services and an exhibition center near the airport was anticipated. However, as it was located roughly forty kilometers from Belo Horizonte, it ended up being surpassed in number of passengers and flights by the airport located in the Pampulha district of Belo Horizonte, over the course of the eighties. In recent years, the airport was part of the major urban projects underway in RMBH (FREITAS, 2017). After almost fifteen years, the airport went through modernization processes and subsequent bidding, which gradually increased its capacity to receive aircraft and passengers. In addition, in Lagoa Santa there were improvements in the infrastructure linked to the Aeronautical Material Park, giving support to the sector.

During 2015, when the Macro-zoning of the Metropolitan Region of Belo Horizonte was developed, one of the points of interest for the formation of new centralities was the airport. And an airport as a central core development vector is a prerogative defended by Kasarda (2006), the precursor of the term Aerotropolis. As such, in the Macro-zoning of RMBH, in the Metropolitan Interest Zone (ZIM, in Portuguese) some of the main landmarks are the Green Line (MG-010) and the only International Airport in Minas Gerais, the Tancredo Neves Airport in Confins. In addition, the Aeronautical Training and Control Center (CTCA, in Portuguese) and the Air Base, both in Lagoa Santa, would be involved. Thus, this zone was characterized as a Large Equipment Special Guidelines Metropolitan Zone (FREITAS, 2017). (Map 2)

In recent years, the airport had a passenger flow of about 10 million and, in 2020, became the first Brazilian airport to be licensed by the Internal Revenue

Service as an industrial airport; the next ones are expected to be the International Airports of Rio de Janeiro and São José dos Campos, in São Paulo. The change in status to Industrial Airport will supposedly allow for tax gains for companies setting up there, in addition to boosting the import and export of products (BH AIRPORT, 2020). This change is part of the Minas Gerais Aerotropolis Project for economic development referred to as sustainable and based on technology-intensive sectors.

Map 2 – Aerial view of the Karst APA with enterprises' locations highlighted



Source: Developed by M. P., 2020, at the request of the authors.

The establishing of the first airport industrial park in the country represents a new centrality not only for Minas Gerais, but also for Brazil. As such, the airport can operate with "[...] a specialized customs system of customs warehouses on import and export, in the activities of 'storage'; 'exhibition, demonstration or operational testing'; 'industrialization'; and 'maintenance' of goods" (BRASIL, 2020, p.78).

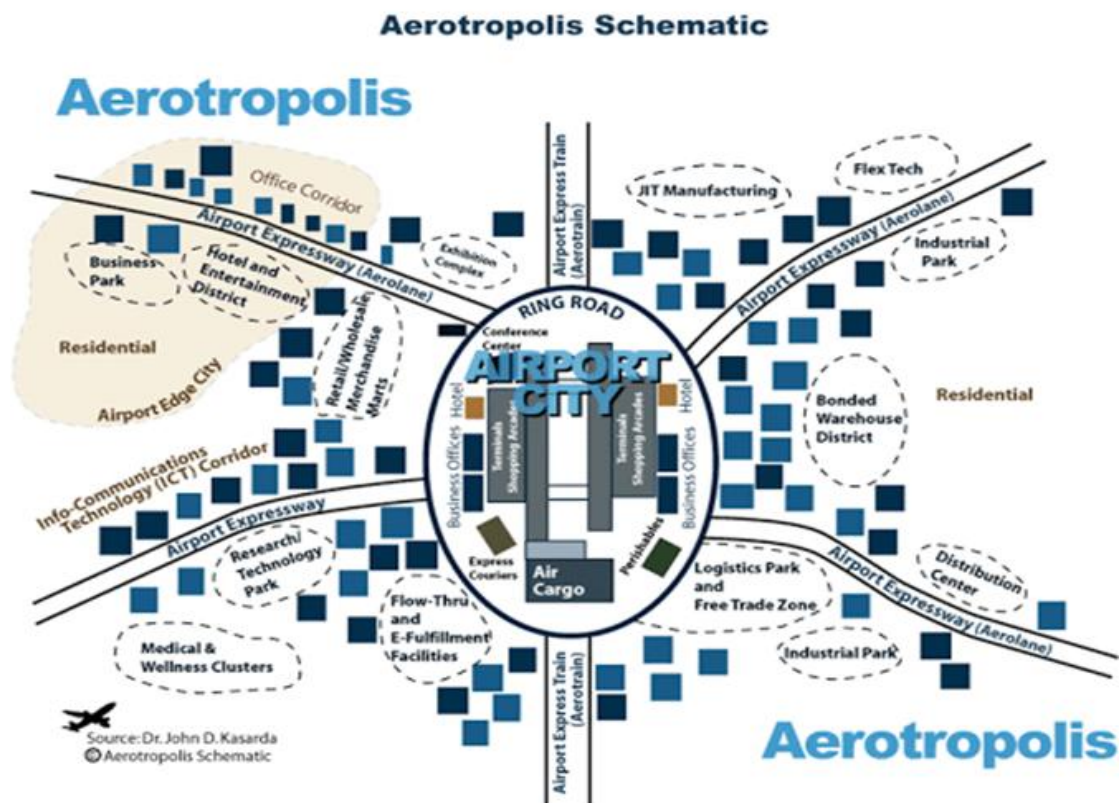
In this regard, the airport is being gradually restructured to become an aerotropolis, bringing together a large networked system in which primarily air transportation services related to warehouses, stores and high-tech companies operate (KASARDA; LINDSAY, 2012). It was John Kasarda, the creator of the aerotropolis concept, who helped the Minas Gerais governments since 2004 as a consultant regarding the airport issue, and it was he who proposed to transform the Tancredo Neves Airport into the first aerotropolis in Latin America.

The implementation of the aerotropolis is related to new market strategies and power spheres that operate in the North Vector region, with the process being under the coordination of the Metropolitan Region of Belo Horizonte's Development Agency (ARMBH, in Portuguese), as noted by Freitas (2017). With this strategy, the airport follows the profile of modernization such as those that occurred in the aerotropolis cities of Memphis in the USA, Amsterdam in the Netherlands and Hong Kong in China (KASARDA; LINDSAY, 2012). Locations that are also very significant as financial and services centers (CASTELLS, 2002).

The aerotropolis, as the name implies, is a city that has the airport as its primary center. In this type of urban planning model, closely linked to neoliberalism, development radiates from this multimodal core, which would be the airport, with wide highways and arterial roads and different development collars, permeated by green areas (Map 3).

The agility of the proposed dynamics falls within the globalized dynamics metaphorically alluding to the financial capital, which would be this "new economy" that demands "connectivity, speed and agility". Le Corbusier's modernism is a great inspiration for this city model, where the large boulevards occupy as significant a space as the neighborhoods or rings sectorized by function (KASARDA, 2006).

Map 3 – Generic model of an Aerotropolis proposed by Kasarda



Source: Aerotropolis. Available at <http://aerotropolis.com/>. Access on: 20 dez. 2020.

The core is the modern airport aesthetic, interwoven with the plurality of services of a shopping mall (KASARDA, 2006). It has several international flights to decrease the time and cost for the circulation of goods, especially those that employ high technology, favoring the profitability of the companies operating in the area. Companies are the flagship of the aerotropolis, to the extent that their presence is indispensable to materialize the urbanistic model. Some of these companies would be involved in the fourth phase of the Industrial Revolution, such as nanotechnology and biotechnology (SCHWAB, 2019). The Tancredo Neves International Airport would therefore have the structure of a city, integrating part of one of the new centralities of the Metropolitan Region of Belo Horizonte, which would have the Tancredo Neves International Airport as the irradiating core of the urban-economic development pattern in the North Vector.

With the possibility of the foundation of the aerotropolis, another market has caught the attention of investors in the North Vector: the aerospace market. It is expected that there will be the creation of an aerospace complex in the vicinity of the airport, for example, with the installation of the Aerospace Technology and Training Center (CTCA, in Portuguese) in Lagoa Santa, which is already under construction.

Controversy arises precisely because of the location of this neoliberal project in the protected territory, considering that this planning choice is liable to omit the environmental and cultural peculiarities of the region, given that the aerotropolis is linked to modern revitalization projects, typically neoliberal, in which the traditional is obsolete and replaced by more profitable simulacra.

The government, in the form of the RMBH Metropolitan Agency, acts directly in favor of the construction of the mega-project Aerotrópole Mineira ("Minas Gerais Aerotropolis"), by, for example, transforming the airport into an industrial airport. Although Kasarda (2006) defends that "[...] Until today, most of the Aerotropolises have evolved spontaneously" (KASARDA, 2006, p. 11), in the case of the Aerotrópole Mineira Project, we can see the active participation of the Neoliberal State in the form of mega-projects with private partnerships that privilege corporate profit, strategically inserted in the metropolitan fabric. It seems of interest that the sustainable development discourse proposed by the aerotropolis contrasts with the conservation discourse proposed by the conservation unit in which it is located. Here we can see rifts that place in contradiction different government plans for the same territory.

The territory in "aerotropic network": under the dystopian perspective of a conservation unit

Different production techniques are unequally distributed throughout the global space and cause economic and social inequalities, as Milton Santos stated

when researching the globalization process (SANTOS, 2006). Taking this statement into consideration for the Karst APA territory, certain activities such as mining still follow a more traditional technical system of production and employ a less specialized workforce, while other activities such as those involving the airport sector involve modern techniques and a highly specialized workforce. In this sense, the formation process of the aerotropolis would carry in itself the reformulation of part of the territory still focused on mining into a technical-scientific-informational territory and increasingly artificialized (SANTOS, 2006). This transformation would be focused on a specific point of the territory, with uncertainty as to how the modernization coming from the aerotropolis would propagate to the rest of the territory of the RMBH North Vector, especially over the Karst APA, and as to what sort of modernization it would be.

The aerotropolis may expand the connection of this archaeologically and paleontologically ancestral territory to the modernized territories of other aerotropolises, such as those of the Netherlands, China and the United States. The aerial connection would form what we here propose to call an " aerotropolis network". This aerotropolis network is a super network that would interconnect the aerotropolises through the various airports that compose them, stimulating an acceleration of time and the shortening of distances between locations and economies that were not previously directly connected.

The question is: whose interests will this network serve primarily? Is it for the good of society as a whole or for the benefit of a select few groups that will gain access to more technology and profitability, more political and economic influence? Taking into account the other species that inhabit the territory, will what little remains of the cerrado biome in the conservation unit be gradually destroyed to expand the areas surrounding the aerotropolis, resulting in an increasingly artificialized territory and swallowing up the areas of sites thousands of years old? Would the challenges arising from an aerotropolis network encompass the

everyday life of local residents, and how will they respond to these challenges? We do not know the answers, except that there is little room for utopias.

Final Considerations

Milton Santos (1998) stated that the globalization process began in the 16th century with the great navigations, undergoing several phases until the emergence of capitalism where the speed of expansion was accentuated, amongst other reasons, due to the evolution of science and techniques. This changed work relations, manufacturing methods, induced the creation of fads and disposable and quickly replaceable products and, above all, alienated mankind (SANTOS, 1998).

In this globalized scenario the specificities of each location count as part of the strategies for attracting investments (SANTOS, 1998; 2006). This is the case of the aerotropolis. They are part of a chain of global relations, involving territorial, economic and political issues, shortening distances, in a process in which time comes to dominate the territory. For Kasarda (2013), the aerotropolis embodies the globalization process in the early 21st century. It integrates several places and holds strategic structures for important sectors of the economy such as ease of access, fast transportation, and variety of services offered (KASARDA, 2013).

Kasarda's discourse defends the aerotropolis as a development model of the neoliberal city and insists on a distorted conception of sustainability, without addressing how local and traditional cultures and economies would be inserted in such a city model - and, based on the experience of neoliberal megaprojects, these themes are abandoned.

The overlapping of two such distinct projects for the same region materializes the power struggle. As the aerotropolis is a model of civilization, according to Kasarda's speech (2006), and supported by the government in the form of the Aerotrópole Mineira Project, it is worth asking: what is the sustainability advocated by the model? As there is hardly any mention of the conservation of

fauna, flora, culture, local or traditional economy and knowledge, what kind of sustainability does the urban planning of the aerotropolis refer to? Which rifts will manifest in the relationship between population and territory, through the globalization of the region's production?

We conclude this article with the intention of having raised some issues that the Minas Gerais Aerotropolis Project presents to the territory of the North Vector of the Metropolitan Region of Belo Horizonte (RMBH), in particular regarding the conservation unit of the Environmental Protection Area (APA) Lagoa Santa Karst. Many others need to be questioned, among them we highlight 1) the role of mining in the development of the aerotropolis amid karst geomorphology; 2) the dimensions of inequality that are imposed in the face of such a proposal for urban planning and glocal development; 3) the popular opinion and participation in relation to this Project and 4) what dystopias and utopias materialize from such a horizon?

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