

Spatial dynamics and urban morphology in a medium-sized Brazilian city

Dinâmica espacial e morfologia urbana em uma cidade média brasileira

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Marcos Esdras Leite

ORCID: <https://orcid.org/0000-0002-9020-6445>
Universidade Estadual de Montes Claros, Brazil
E-mail: marcos.leite@unimontes.br

Iara Sores de França

ORCID: <https://orcid.org/0000-0002-7765-8199>
Universidade Estadual de Montes Claros, Brazil
E-mail: iara.franca@unimontes.br

Abstract

Contemporary urbanization entails urban transformations of several kinds, especially spatial and economic changes. In the Brazilian urban network, this situation is visibly expressed in medium-sized cities due to their population growth and economic growth that promote regional centralization. Therefore, this article analyzed the expansion of the city of Montes Claro from 1970 to 2020 and the transformations of the urban morphology arising from that process, through geographical data derived from satellite images. The study area was chosen due to the role this city plays in the regional urban area in Northern Minas Gerais. Besides, the attraction of people and capital to that city causes its intra-urban space to undergo an ongoing metamorphosis. As the urban area expands, the formation and consolidation of new centralizations stem from its internal dynamic. As the population density increases and economic activities expand and are relocated, new spaces for consumption and appropriation emerge, engendering new urban habitats and redefining the center and the periphery.

Keywords: Medium-Sized City; Centrality; Urban Morphology.

Resumo

A urbanização contemporânea impõe transformações urbanas de diversas ordens, com destaque para as mudanças espaciais e econômicas. Na rede urbana brasileira essa situação se manifesta visivelmente nas cidades médias, devido seu crescimento populacional e econômico que promovem a centralidade regional. Portanto, este artigo analisou a expansão da cidade de Montes Claros no período de 1970 a 2020 e as transformações na morfologia urbana decorrentes desse processo, por meio de dados geográficos provenientes de imagens de satélites. A escolha da área de estudo ocorre pelo papel que esta cidade desempenha na rede urbana regional no Norte do estado de Minas Gerais. Além disso, a atração de população e de capital para esta cidade faz com que seu espaço intra-urbano passe por uma constante metamorfose. Com expansão urbana, a formação e a consolidação de novas centralidades são resultados da dinâmica interna. Com o adensamento populacional, ampliação e realocação de atividades econômicas, novos espaços de consumo e apropriação emergem, produzindo novos habitats urbanos e redefinindo centro e periferia.

Palavras-chave: Cidade Média; Centralidade; Morfologia Urbana.

Resumen

La urbanización contemporánea impone transformaciones urbanas de diversos órdenes, con énfasis en los cambios espaciales y económicos. En la red urbana brasileña, esta situación se manifiesta visiblemente en ciudades medianas, debido a su población y crecimiento económico que promueven la centralidad regional. Por ello, en este artículo se analizó la expansión de la ciudad de Montes Claros desde 1970 hasta 2020 y las transformaciones en la morfología urbana resultantes de este proceso, a través de datos geográficos a partir de imágenes satelitales. La elección del área de estudio se produce debido al papel que desempeña esta ciudad en la red urbana regional en el norte del estado de Minas Gerais. Además, el atractivo de población y capital hacia esta ciudad hace que su espacio intraurbano pase por una metamorfosis constante. Con la expansión urbana, la formación y consolidación de nuevas centralidades son el resultado de dinámicas internas. Con la densidad de población, la expansión y la reubicación de las actividades económicas, surgen nuevos espacios de consumo y apropiación, produciendo nuevos hábitats urbanos y redefiniendo el centro y la periferia.

Palabras clave: Ciudad Media; Centralidad; Morfología urbana.

1. Introduction

Urbanization arises from a historical, social and spatial process developed after the 19th century in Europe resulting from the general urban growth defined by migration in its first phase and then, as a consequence, by the economic growth and the industrialization of countries (Singer, 1977). After that, that movement spread throughout the world and changed the political, economic structure of cities worldwide. It caused territorial and demographic urban expansion and structuration, and imposed a new lifestyle, which also makes it a cultural and ideological process, with impacts on cities and on society (Castells, 1972).

So advanced urban population growth engendered economic, social, spatial, political and cultural changes in diverse geographical scales and socio-spatial formations. In this sense, urbanization achieves big proportions and manifests itself in the social and spatial contradictions that are inherent to the development model of countries in the world capitalist system.

In the modern age, urbanization is characterized as a process with multiple dimensions and new territorial arrangements and spatial forms lodged in space and time. On this matter, Monte-Mort (1994) considers the dominant socio-spatial form that characterizes contemporary state capitalism in its diverse manifestations, from the dynamic center of the capitalist system to - and increasingly more often - the manifold peripheries that dialectically articulate themselves toward centers and sub-centers.

This New Urbanization, an ongoing process in contemporary times, spreads both demographically and spatially. It is a more advanced and dense urbanization, with a growing complexity that engenders qualitative and quantitative effects upon territories, expressing new urban forms and functions derived from it. Therefore, it is also named as Extensive Urbanization (Borges et al., 2020).

Brazil must be contextualized in this debate in its spatial geographical dimensions, preserving what is heterogeneous and singular about it in the process of production of urban centers in contemporary urbanization. In order to understand contemporary urbanization, the diversity of the Brazilian territory, including cities, new urban forms and their expressions, processes linked to it and also the characteristics of relations between cities and countryside, must be acknowledged, without enhancing the urban-rural dichotomy.

In 2010 more than 80% of the Brazilian population lived in urban areas (IBGE, 2010). According to Zandonadi (2015), since the decade of 1990, metropolitan areas simultaneously multiplied, as the growth rates of medium- and small-sized cities increased. According to that author, such an urbanization occurred within the parameters of capitalist production, and its dynamics was based on the expansion and intensity of production standards in the global scale.

All those urban transformations develop through the action of productive agents in the urban space. In this line of thought, Maricato (2000) remarks that the urban space produced throughout history underwent metamorphoses determined by the intervention of humans, in constant alteration, with complex forms of organization, production and restructuring of such a space. For the production of modern cities, the role of technological innovations set up in means of transportation, circulation, commerce, service and infrastructure is also crucial.

The process of extensive urbanization is not exclusive to the huge metropolitan urban concentrations in Brazil. It also affects regional centers, such as medium-sized cities. However, analyses of its effects upon the diverse kinds of cities must consider their levels of complexity, besides their scale dimension. In this plan, changes on the urban morphology of medium-sized cities in contemporary times, the study object of this text, are considered among the general processes that affect such cities (Sposito, 1991).

In this context, this analysis focused on the transformations of the urban morphology, based on the process of extensive urbanization. The spatial contour of this paper is the medium-sized of Montes Claros that stands out as the main urban center of Northern, Northeastern and Northwestern Minas Gerais. Therefore, the purpose of this paper is to analyze the

expansion of the city of Montes Claros from 1970 to 2020 and the transformations of the urban morphology resulting from that process.

2. Methodology

The theoretical basis supporting this discussion covered the themes of urbanization, urban space production and urban restructuring. In order to achieve the goal of this paper, a methodology based on the analysis of spatial data was defined. Those information are derived from remote sensing, namely, spatial high-resolution satellite images. According to Henriques (2008), understanding the city through the use of remote sensing products is a complex task, since it requires interpreting the complicated interaction of artificial structures, economic activity and government policies that define the urban landscape. Considering that complexity, in this paper, the geoprocessing for processing the data about the urban space of Montes Claros, thus allowing to generate new information about the reality of this city. (Barboza; Bezerra Neto; Caiana, 2020).

In the Arc GIS 10.8 software, the images from the Ikonos satellite (2000) and the World View II (2010) and World View III (2020) satellites were georeferenced in the Universal Transverse Mercator (UTM), zone 23, DATUM SIRGAS 2000. Thus, all data extracted from those products are with the same configuration of spatial reference. Based on that, the vectorization of the urban mesh, sub-centers, specialized routes and Shopping Centers was conducted. Finally, those data were overlapped in order to organize the maps presented in this paper. This procedure resulted in unprecedented data that enabled a special analysis of the urban dynamics of Montes Claros and the configuration of a new urban morphology.

3. Results and Discussion

According to Villaça (1998, p.13), in the research field, urban morphology is rarely researched, its analysis is complex, which reveals the need for varied theoretical and methodological approaches. This is due to the fact “that it is one of the most complex notions on the intra-urban space, even for urban geographers and/or urban architects.” Urban morphology constitutes a spatial configuration integrated with the analysis of cities in the intra-urban scale, that is, the urban space, both devised by Villaça (1998) as synonyms. The understanding of a city based on its morphology comprehends historical and physical elements, together with the socio-spatial and economic characteristics and their constraints materialized in the urban structure and organization.

Bertini (2011, p.23) understands the morphology of cities based on factors that influence their territorial limitation and expansion. The barriers mentioned by the author are “topography (mountains or hills), presence of protected areas (such as areas of environmental and asset protection) and watercourses.” Main roads, in turn, are pointed as factors that foster urban expansion.

This intrinsic association of urban growth and urban morphology especially highlights medium-sized Brazilian cities, since those are cities that most attract population and consequently the ones that physically enlarge its area the most. Considering that reality, Sposito (2007) contributes, registering that medium-sized cities are undergoing important changes in the process of conformation of their urban and interurban centers. That author points out the elements and the main alterations in that process made feasible by the action of urban agents, such as the state and the capitalist segments. From the economic point of view, medium-sized cities are characterized by the same dynamics that influenced the spatial logics of metropolises.

In medium-sized cities, it is possible to see a high degree of integration with contemporary initiatives for the development of capitalism, with a considerable increase of their participation in the inter-urban division of labor. Besides, in recent decades, they've undergone an accelerated process of restructuring, based on the installation of new spaces for

commerce and services. So in that space, a multiplication of the urban center occurs, with a complexification of the spatial structure and a tendency toward the segmentation of consumer markets (Sposito, 2007; Sposito, 1991).

Based on those explanations, we project this case study on spatial dynamics and urban morphology in the medium-sized city of Montes Claros, in the scope of contemporary urbanization. For that purpose, the next item in the text presents the context of historical formation, the site and the geographical situation, besides demographic and economic aspects of Montes Claros, in order to understand its formation and current urban expansion, as well as its economic and structural dynamism.

Montes Claros, regarding its development, underwent several political, economic and social transformations since its administrative formation. On that matter, Barbosa (1995) chronologically discusses three main factors: The first was the Railway Station, inaugurated in 1926, which established Montes Claros a railway terminal, which became an important regional center due to that extraordinary boost. The second is its insertion in the operating area of the Superintendency for the Development of Northeastern Brazil – SUDENE (1960), which attracted financial and fiscal investments in the industrial sector and turned it into an actual center of convergence in Northern Minas Gerais. And finally, in addition to those elements, the investments derived from the Brazilian Support Programme for Medium-Sized Capitals and Cities - PNCCPM (1975), among others, which boosted its dynamism and affected its socio-spatial formation and urban expansion. (Pereira, 2007; França, 2007; Leite, 2006; Leite, 2011).

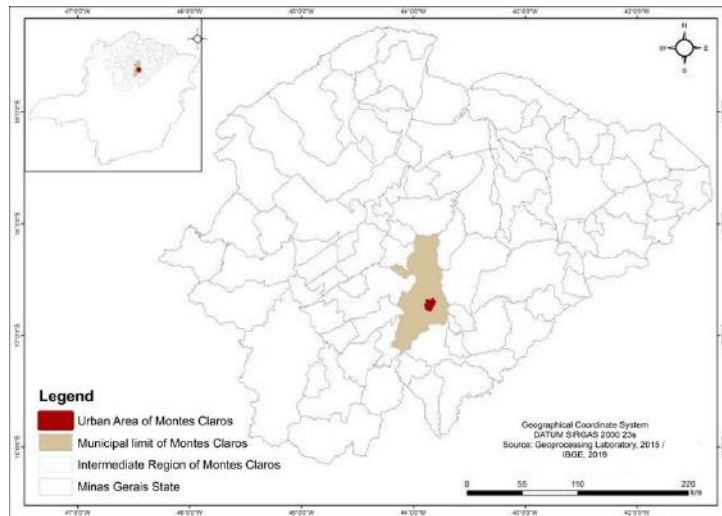
Those factors promoted the economic growth of this municipality, after the second half of the 20th century, its urban infrastructure became more dynamic and began to attract the population of Northern Minas Gerais due to its labor offer, besides its industries, tertiary sector and financial agencies.

As to territorial characteristics, the municipality of Montes Claros comprehends a territorial area of 3,576.76 km², with a demographic density of 101.41 hab/km². Administratively, this municipality comprises the city of Montes Claros and the Districts of Ermidinha, Miralta, Nova Esperança, São Pedro da Garça, Santa Rosa de Lima, Vila Nova de Minas, Aparecida do Mundo Novo and Panorâmica, besides several rural communities. Its municipal seat's ground zero lies in the coordinates 16° 43' 41" South and 43° 51' 54" West. (IBGE, 2011).

Among its geographical aspects, we may highlight the site and the situation (position), that are important factors for the development of a city, as they reveal the human occupation. According to Corrêa (2016), the location of each city involves two spatial scales: One results from its absolute location, which is its site, and the other one results from its relative location, which is its geographical position. That author distinguishes that the absolute location of the site is the floor over which the city spreads, and may be natural, altered by human action, as a general rule, or artificially produced, while the relative location or geographical position refers to the locational situation of a city regarding aspects that are external to it, involving the natural and social content of its surrounding areas.

One of the important characteristics of the municipality of Montes Claros is its geographical location and network of highways established there. Due to that, Montes Claros is classified by the Brazilian Road Plan as an important crossroad in Brazil. The convergence of those highways, that is, the geographical situation of Montes Claros, favors its intra-urban and inter-urban dynamism, displaying its articulations with other geographical scales besides the regional one. Also regarding its position, this municipality is located in the Intermediate Geographical Region of Montes Claros (Figure 1).

Figure 1 – Intermediate Region of Montes Claros/MG.

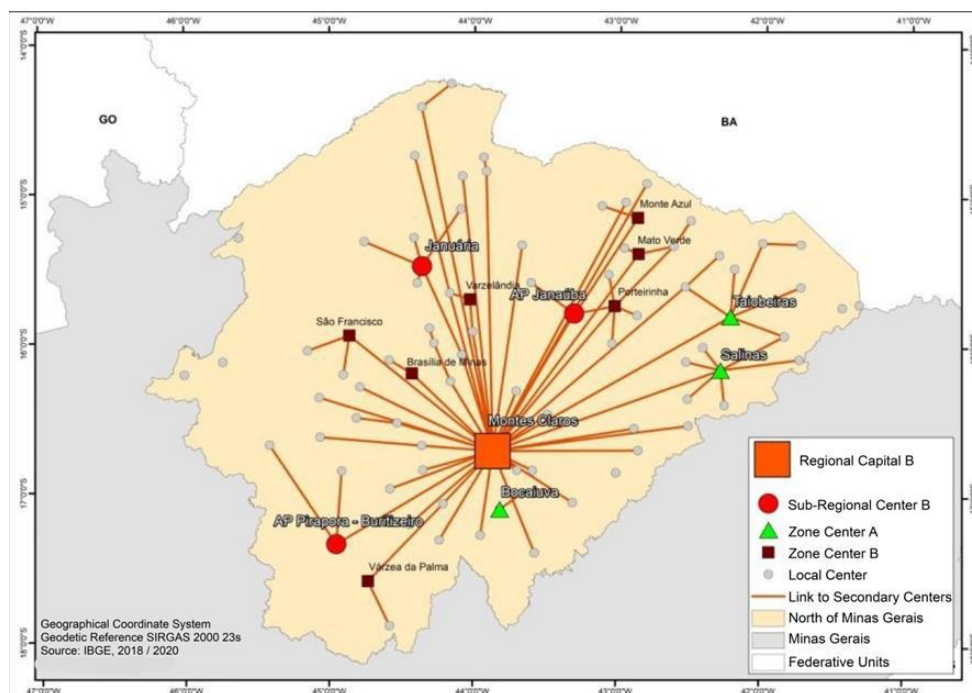


Source: Authors.

Montes Claros is one of the main cities in the countryside of the state of Minas Gerais, with an estimated population of 417,489 inhabitants in 2021 and urbanization rates of 96%. Besides the populational dynamism, this municipality is one of the largest economies in the state of Minas Gerais. According to IBGE, in 2019, Montes Claros had a GDP of R\$9.71 billion. Considering the GDP per economic sector, in 2019, the participation of the service sector stood out with 74%, while the industrial and agricultural sectors respectively account for 24% and 2% of the municipal GDP. (IBGE, 2017).

The research developed by IBGE called REGIC (2018) classifies Monte Claros as “regional capital B”, confirming its role in the articulation of the regional urban network and its insertion in the state and national scale. Classified by IBGE’s Influence Region of Cities/REGIC research (2018) as Regional Capital B again, Montes Claros stood out as an important center in the territory of Minas Gerais, and mainly in the network where it is located (Figure 2).

Figure 2 – Classification of the Urban Centers in Northern Minas Gerais.



Source: Authors.

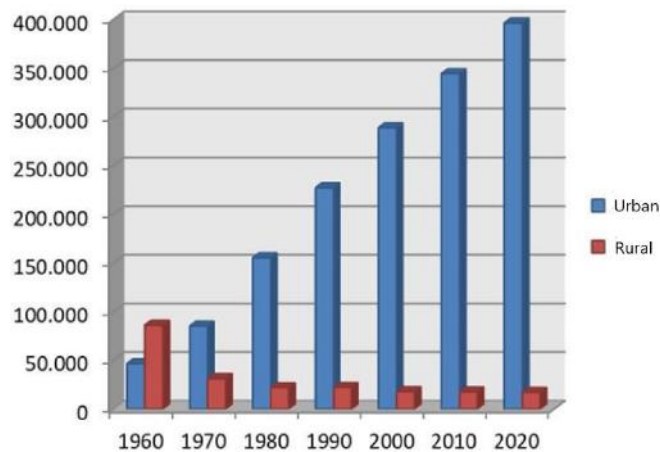
It exerts a meaningful attraction on the whole region, and it is the big reference for supply of goods and services. Its attraction in Northern Minas Gerais involves smaller centers and “is connected to the territorial structure of services of medium and high complexity it comprises, considering the state policy for health itself.” (REGIC/IBGE, 2018, p.109).

3.1 Urban Expansion and The New Morphology

The population concentration in the city of Montes Claros is the result of the economic changes that occurred in the decades of 1960 and 1970. In this moment, the economic basis ceased to be agricultural and became tertiary (commerce/services) and industrial. This transformation caused an intense migratory flow toward the urban area. In Figure 3, we may see the concentration of people in this city since the decade of 1970. Since then, the urban population has grown to the detriment of the progressive reduction of the rural population. The demographic data of Montes Claros indicate an urbanization rate of 96% in 2010 (Leite, 2011).

We must consider that IBGE's data on the urban population comprises the population of the city and the villages, that is, the seat of municipal districts. However, the reality of Montes Claros shows that the population of the city constitutes about 95% of the urban population. Therefore, this urbanization is actually concentrated in the city.

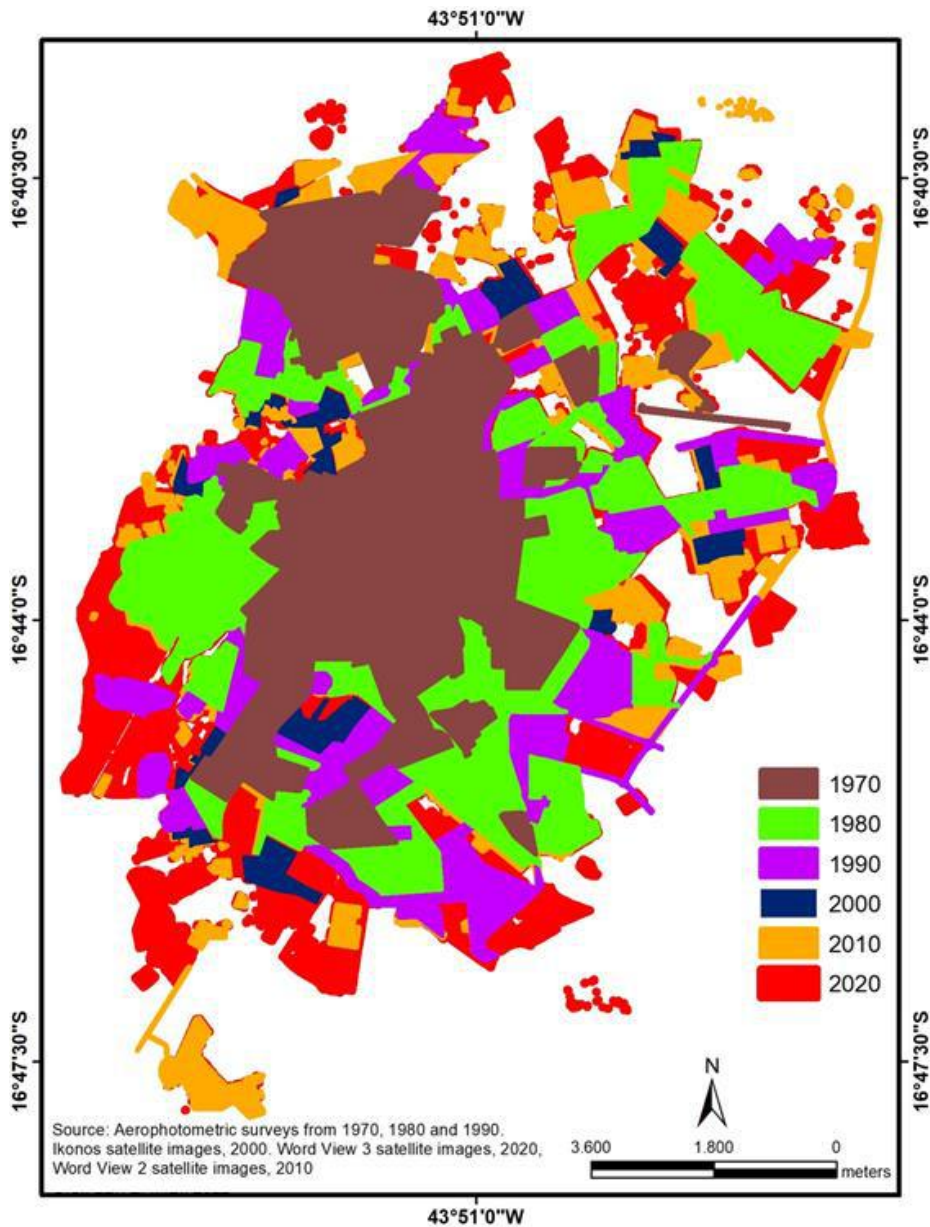
Figure 3 - Montes Claros population.



Source: IBGE, 1960, 1970, 1980, 1991, 2000, 2010 estimation for 2020.

The fast increase of the city population reflected on the increase of urban space, since the urban area, that is, the space with constructions, until the 1970s, amounted to 24.5 km², which represents 32% of the total area with buildings in 2020. During the decade of 1980, 19.8 km² were occupied, amounting to 26% of the space with buildings. Throughout the 1990s, the increase of occupied space amounted to 11.8 km² (15% of the occupied area). From 2000 to 2010, there was an expansion of the occupied space of 10.4 km² (13%). And throughout the decade of 2010, the occupation amounted to 11.2 km², that is, 14% of the occupied area of the city of Montes Claros (Figure 4).

Figure 4 – Urban Growth of Montes Claros.



Source: Authors.

It may be noted that until the 1970s, the urban area of Montes Claros was concentrated in the central part, since it was the initial spot of occupation. The few discontinuous spaces were located in the Southern area of the city, since there are highways there that connect Montes Claros to neighboring municipalities and villages.

But the establishment of the industrial district (ID) and of several industries in the 1960s attracted the neighboring municipalities' population toward the Northern part of the city, resulting in a high population densification. In the decade of 1970, the urban mesh of the city of Montes Claros was concentrated in the central area and in its surrounding neighborhoods. In its Southern area, road links toward the Major Prates and Maracañã neighborhoods stand out. In its Northwestern area, the highlight was the occupation of the Santos Reis neighborhood, which was related to the consolidation of the ID of Montes Claros. The creation of the Mário Ribeiro airport and of nearby neighborhoods such as Jaraguá must also be highlighted.

In the decades of 1980 and 1990, urban growth was spread over the whole periphery, and the expansion occurred with the occupation of areas in the urban fringe. In 1980, the urban expansion moved more intensely toward the Eastern area of the

city. There is also an important expansion toward neighborhoods nearby Serra do Mel, in the Western area. In turn, in the 1990s, there occurred a more diffuse expansion in all directions of the urban mesh.

Unlike that period, the occupation of space in the 2000s occurred through a greater densification of the urban area. So through the construction of houses, especially housing developments in the wide empty spaces of the city, such as Clarice Ataíde. That period is the period with the lowest expansion of the urban mesh.

In 2010, a recovery of the urban expansion was registered, especially the Northern and Northeastern areas of the urban mesh. In that period, public programmes such as My House, My Life (PMCMV) stand out. Such programmes enabled the creation of housing developments in those areas of the city, such as Monte São I and II.

From 2010 to 2020, the city begins to grow again toward the periphery, although it is concentrated in different areas. In 2010, the occupation of space in the Northern area stands out regarding the other areas of the city. In turn, in 2020, the Southern area was the one with the highest urban densification.

In this recent decade, 2020, the urban expansion is registered toward the fringes of the city, especially the Far Southern and the Southwestern areas, besides the Northern and Northeastern areas. It is registered that Serra do Mel is located in the Western area, a natural, physical barrier that divides the urban area from the State Park of Lapa Grande. In the slope of Serra do Mel, a recent vector of urban densification is established in Montes Claros, especially with the construction of horizontal condominiums. Those real estate enterprises are destined to the wealthy population, such as the Terras Alpha and Gran Royale Pirâmide condominiums. In turn, in the Northern and Northeastern areas, the expansion of housing developments (Moradas Montes Claros and Residencial Parque dos Ipês) is intensified for people with lower power.

The urban expansion entails a new morphology, as the city growth engenders a higher densification of certain places, greater distance from the commercial center and formation of new centers. In this context, the process of refunctionalization may also be recently noticed in Montes Claros. In the Western area of the city, at Avenida Magalhães Pinto, in the surroundings of Atacadista Villefort and Residencial Pampulha Tênis Residence, the space that harbored Coteminas fabric company, of industrial nature, was refunctionalized for a political administrative use, harboring the New City Hall since 2021.

Another big alteration in the urban morphology, verified according to soil use in the vicinity of the central area of Montes Claros, refers to the Jardim São Luiz neighborhood (Central-Western area of the city). That area was mostly residential, and in the past five years, several commercial establishments, especially restaurants and bars, besides service provider establishments, such as offices and clinics. This case must be carefully analyzed, considering the recent alterations in the Act on Soil Use and Occupation of the municipality of Montes Claros. Act n. 3031/02 regulates the Zoning of the Municipal territory, establishes categories of use and models of urban settlements, creating zones for use, occupation and division of the Municipal territory., namely: I - Residential Zone (ZR); II - Commercial Zone (ZC); III - Industrial Zone (ZI); IV - Special Sectors (SE); V - Urban Expansion Zone (ZEU); VI - Rural Zone (ZRU).

Jardim São Luiz is part of the ZR, that is, the urban soil of that neighborhood is mainly destined for housing. However, the situation found there is mostly of commercial use. That striking noncompliance with the Act on Soil Use and Occupation holds implications for society, since it compromises the ordinance of the urban space, where there is an increase of traffic of vehicles and people in a certain area of the city that was not prepared for that. Besides, there is an exemption of revenue for the municipality, as those real estates are taxed as residential areas and not as they should, namely, as commercial areas. The aliquot of the real estate taxes of the commercial real estates is higher than that of the residential real estates. Thus, the municipal revenue is harmed.

Considering what is exposed above, we verify that in Montes Claros there is an alteration of the conformation of urban centers, and thus, of their morphologies. The urban area spreads beyond the main consolidated core and beyond historically constituted areas, since the establishment of new neighborhoods and allotments. Consequently, the decentralization

of tertiary activities is manifested in the form of sub-centers in commerce and services, commercial axes, specialized routes and shopping malls. The urban expansion for housing and investments on the construction of residential spaces, housing developments and horizontal and vertical enterprises also stands out.

Therefore, Montes Claros' urban expansion's dynamics in the past three decades is not disconnected from the process of contemporary urbanization and its effects on urban morphology. So the current urbanization and city growth were what entailed those transformations in the production of the urban space in this new format.

This shows the importance of medium-sized cities as loci of investments, diverse consumptions, equipment and services, and as a space of production. Corrêa (1995) analyzes that this dynamics is associated with the demographic and spatial growth of the city, leading to the emergence of new commercial and service activities in order to meet the needs of the population beyond the central area.

New urban centers are consolidated as sources that induce and stem from that process of urban expansion. In Figure 5, the Independência, Delfino Magalhães, Esplanada, Major Prates, Maracanã, Renascença and Santos Reis sub-centers may be observed. In those places, there is a concentration of commercial and service provider structures that serve the population and also induce the expansion of new residences, housing developments, schools, health centers, creating and amplifying that urban centers.

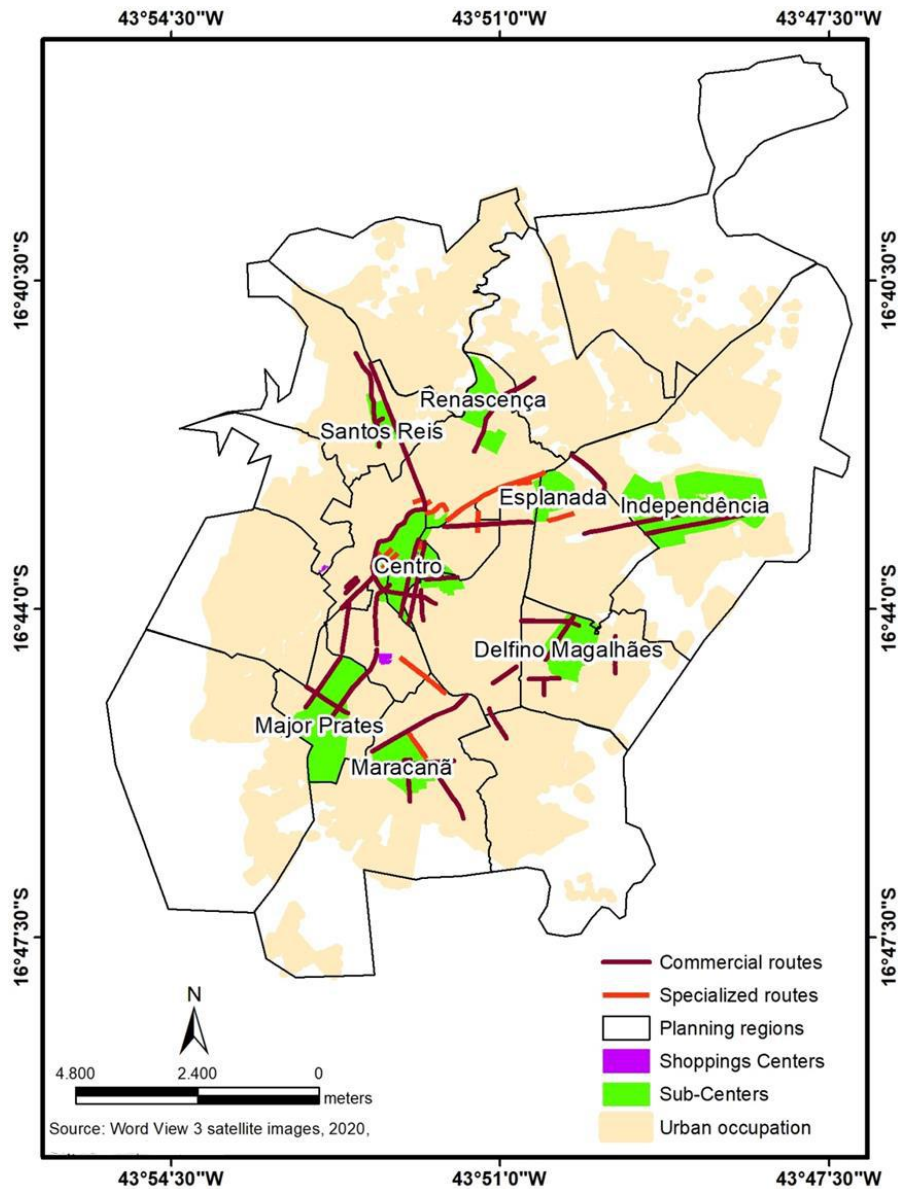
The consolidation of sub-centers causes an urban expansion in the areas where they are inserted. For example, the complexification of commerce and services in the Major Prates and Maracanã neighborhoods certainly contributed to the urban expansion in the Far Southern area of the city. And the structuration of the Independência and Delfino Magalhães neighborhoods also amplifies the attractiveness of the Eastern area of the city for the construction of new dwellings.

Due to the urban expansion, varied commercial axes are structured in the city. Such axes connect mainly the central area and its consolidated surroundings to the new centers, that is, to the sub-centers in commerce and services (Figure 5). Those axes concentrate the structures of commerce and services, either in the central area and its surroundings, or in the main sub-centers. We may notice the absence of those axes in the urban fringes. Those are more recent areas of urban expansion, with less consolidated commercial and service provider structures, and they are under the influence of the sub-centers.

The urban expansion of Montes Claros is part of and results from the process of space production promoted by the action of diverse urban agents, especially real estate promoters, along with the state. Those elements moved by the strategy of capital accumulation realize and direct huge investments and establish equipment and urban infrastructure in the developing areas of the real estate market, in which the reproduction of capital is fast.

Consequently, the capitalist city expands and reproduces through the action of different agents, logics and interests that lead to a new urban morphology. They are configured by the emergence of sub-centers, varied commercial axes, with the establishment of supermarkets and shopping malls, among other commercial forms, for non-central areas that are conceived as spaces of accumulation and appreciation. Characteristic real estate enterprises such as housing developments and vertical and horizontal condominiums are also derived from the territorial growth, due to capitalist actions of transformation of the urban space, and thus establish new areas for appreciation of the urban space. In turn, the standards of consumption, production, dwelling and services of the capitalist city are redefined.

Figure 5 – Sub-Centers of Montes Claros.



Source: Authors.

If we consider Montes Claros within this scope, the transformations of its morphology reveal the capitalist production of space that reproduces itself based on processes of decentralization of tertiary activities and formation of new urban centers. It is important to register that dynamics gives, creates, recreates and expands itself based on traffic made feasible by systems of transportation (collective and particular) and communications, and also by changing its structure as it redefines the city center and periphery.

Within this framework, urban morphology is materialized in this complexity that involves the urban today in its processes and social, political and cultural dynamics regarding the production of space. Following the logic of capitalist accumulation, those elements show the extensive urbanization already addressed by Monte Mor (1994), in which it is a process characterized by the urban fragmentation, extension, segmentation and involution. Thus, the urban fabric moves, advancing toward a contemporary urbanization with deep transformations on the understanding of the process of production and on the economic and spatial organization of the city and of contemporary society.

4. Conclusion

Montes Claros modified its urban space in the last few decades with the population growth and the expansion of the urban mesh, culminating in transformations of its morphology. Contemporary urbanization expands throughout the whole urban fabric, becoming more dense and complex.

Since 1970, this city has undergone an intense process of urban expansion, with new neighborhoods, allotments, housing developments and horizontal and vertical condominiums boosting its urban growth. The Northern, Southern and Eastern parts have been the main focus of amplification of the urban fabric since the 2000s.

This process caused the main center to be consolidated, and it soon provoked the emergence of new centers. All this process is made feasible by the development and dynamization of public and private means of transportation. The decentralization of tertiary activities as a recurring process in medium-sized cities makes the intra-urban organization more complex. This spatial process is materialized in Montes Claros under many forms. Among them, there are the sub-centers in commerce and services, varied commercial axes, specialized routes and shopping malls. Those areas harbor an ensemble of commercial establishments, service providers and urban equipment that serve the local and regional population, which also work as a space for private investments.

Therefore, the exposed scenario on the reality of Montes Claros reveals that the expansion of the city and the consequent alteration of the urban morphology are resulting from the logic of reproduction of the city itself by urban agents, boosted by the process of capital accumulation and by new ways of consumption.

From the results and discussion presented in this article, new works can be carried out with complements of the data generated. In this sense, we recommend a research to analyze the environmental, social and economic transformations of the city of Montes Claros generated by the urban growth mapped in this work. Another research derived from this may discuss the formation of specialized economic areas in the urban area of Montes Claros.

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References

- Barbosa, W. de A. (1995). *Dicionário Histórico-Geográfico de Minas Gerais*. Belo Horizonte: Itatiaia Ilimitada
- Barboza, E. N., Bezerra Neto, F.C. & Caiana, C. R. A. (2020) Geoprocessamento aplicado na análise dos efeitos da urbanização no campo térmico em Fortaleza, Ceará. *Research, Society and Development*, 9(7), e57973731, 2020. DOI: 10.33448/rsd-v9i7.3731. <https://rsdjournal.org/index.php/rsd/article/view/3731>.
- Bertini, G. da C. (2011). Pitangui: rede urbana e zoneamento morfológicofuncional de um centro urbano emergente de Minas Gerais. 242p. Dissertação (Mestrado em Tratamento da Informação Espacial). Pontifícia Universidade Católica de Belo Horizonte.
- Borges, I. M. S., Lima, C. A. O., Fernandes, A. C. G., Nunes, E. A. C., Alves, Álisson E. F., Nunes, E. A. C., Nunes, F. Juliana B., Rocha, A. L. S. da, Santos Junior, C. N. dos, & Batista, C. dos S. (2020). The urbanization process and its environmental impacts in the City of Fagundes, Paraíba: historical outline. *Research, Society and Development*, 9(8), e345985196. <https://doi.org/10.33448/rsd-v9i8.5196>
- Castells, M. (1972). *Uma questão urbana*. Ed. Paz e Terra.
- Corrêa, R. L. (2016). Processos, formas e interações espaciais. *Revista Brasileira de Geografia*. 61(1), 127-134p.
- Corrêa, R. L. (1995). *O espaço urbano*. 3ª ed. São Paulo: Ed. Ática.
- França, I. S. (2007). *A cidade média e suas centralidades: O exemplo de Montes Claros no Norte de Minas Gerais*. 256p. Dissertação (Mestrado em Geografia) – Instituto de Geografia, Universidade Federal de Uberlândia.

- Henriques, C. D. (2008). *MAPUTO, cinco décadas de mudança territorial: o uso do solo observado por tecnologias de informação geográfica*. Lisboa: Cooperação Portuguesa.
- IBGE. (2017). *Divisão Regional do Brasil em Regiões Geográficas Imediatas e Regiões Intermediárias*. Coordenação de Geografia: Rio de Janeiro.
- IBGE. (2008). *Regiões de Influência das Cidades – REGIC*. Available at: <http://www.sidra.ibge.gov.br>.
- IBGE. (2000). *Enciclopédia dos Municípios Brasileiros*. Rio de Janeiro.
- Leite, M. E. (2006). *Geoprocessamento aplicado ao estudo do espaço urbano: o caso de Montes Claros*. 177 p. Dissertação (Mestrado em Geografia) - Instituto de Geografia, Universidade Federal de Uberlândia.
- Leite, M. E. (2011). *Geotecnologias aplicadas ao mapeamento do uso do solo urbano e da dinâmica da favela em cidade média: o caso de Montes Claros/MG*. 279 p. Tese (Doutorado em Geografia) - Instituto de Geografia, Universidade Federal de Uberlândia.
- Monte Mór, R. L. M. (1994). Urbanização Extensiva e Lógicas de Povoamento: Um Olhar Ambiental. In: SANTOS, M.; SOUZA, M.A.; SILVEIRA, M.L.. (Org.). *Território, Globalização e Fragmentação*. São Paulo: HUCITEC-ANPUR.
- Pereira, A. M. (2007). *Cidade média e região: o significado de Montes Claros no Norte de Minas Gerais*. 350p. (Doutorado em Geografia) – Instituto de Geografia, Universidade Federal de Uberlândia.
- Rodrigues, N. M. ., Rodrigues, C. E. F. ., & Rodrigues, C. R. . (2022). The lack of urban drainage in brazilian cities. *Research, Society and Development*, 11(6), e54911629652. <https://doi.org/10.33448/rsd-v11i6.29652>
- Singer, P. I. (1977). *Desenvolvimento e crise*. 2.ed. Rio de Janeiro, Paz e Terra.
- Sposito, M. E. B. (1991). O centro e as formas de expressão da centralidade urbana. *Revista de Geografia*. 1(10), p.1-18.
- Sposito, M. E. B. (2007). *Cidades médias: espaços em transição*. São Paulo: Expressão Popular.
- Villaça, F. (2001). *Espaço intra-urbano no Brasil*. São Paulo: Studio Nobel.