

# HETEROGENEITY AND SPATIAL FRAGMENTATION IN THE SAO PAULO MACROMETROPOLIS: THE PRODUCTION OF BORDERS AND HOLES<sup>1</sup>

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LUCIANA RODRIGUES FAGNONI COSTA TRAVASSOS<sup>2</sup>

SILVANA MARIA ZIONI<sup>3</sup>

PEDRO HENRIQUE CAMPELLO TORRES<sup>4</sup>

BRUNA DE SOUZA FERNANDES<sup>5</sup>

GABRIEL MACHADO ARAUJO<sup>6</sup>

## Introduction

The current phase of territorialization of world capitalism is constituted by the formation and flexible institutionalization of large regions, with different functional conformations and structures of networks of cities which could be more or less polycentric. Common to the constitution of city-regions is the fact that the production of their space, specified by economic and urban-industrial attributes, generates, along with urban cohesion through complementarity and competition between cities, great territorial fragmentation, constituted by places apart from the spatial attributes which define these regions, by differences in degree and nature, or even by their symbolic construction (ALLEN et al., 2002; HAESBAERT, 2010).

The case of Sao Paulo Macrometropolis (SPMM) points to this direction of analysis, as can be seen from the documents that used it as a planning region (DAEE, 2013; EMPLASA, 2014), and among the articles that analyzed it under the most varied

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2. Architect and Urbanist, PhD in Environmental Science from the University of São Paulo (PROCAM-USP), currently Adjunct Professor at the Federal University of ABC (UFABC) affiliated to the Center for Engineering, Modeling and Applied Social Sciences and the Graduate Program in Planning and Territory Management. E-mail: luciana.travassos@ufabc.edu.br - ORCID <https://orcid.org/0000-0001-8369-8704>

3. Architect and Urbanist, PhD in Urban and Regional Planning from the University of São Paulo (FAU-USP), currently Adjunct Professor at the Federal University of ABC (UFABC) affiliated to the Center for Engineering, Modeling and Applied Social Sciences and the Graduate Program in Planning and Territory Management. E-mail: silvana.zioni@ufabc.edu.br Orcid <https://orcid.org/0000-0002-0668-6408>

4. Social Scientist and Urban Planner, PhD in Social Sciences at the Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Researcher at the Institute of Energy and Environment (IEE), University of São Paulo (USP). E-mail: pedrotorres@usp.br Orcid <https://orcid.org/0000-0002-0468-4329>

5. Bachelor of Science and Humanities and Territorial Planning at the Federal University of ABC (UFABC). E-mail: bsfernandes17@gmail.com - Orcid: <https://orcid.org/0000-0002-4419-4842>

6. Bachelor of Science and Humanities, Territorial Planning and Philosophy at the Federal University of ABC (UFABC). E-mail: gmachado140@gmail.com - Orcid <https://orcid.org/0000-0002-7043-466X>

aspects (PASTERNAK; BÓGUS, 2019, TAVARES 2018, MEYER et al., 2004; CASTRO; SANTOS JR., 2017; NEGREIROS et al., 2015), making it difficult to understand and to view the different features of its spatial dynamics in the face of the institutional fact it created.

Since the 1990s, readings on its functional aspects, demographic flows and economic relations have prevailed, as well as the social vulnerabilities linked to the unequal production of urban space. Although more recently some works have begun looking at other dimensions of the Macrometropolis (GALVÃO, 2017; TORRES et al., 2019; TORRES; RAMOS; GONÇALVES, 2019), the idea of heterogeneity and fragmentation associated with the production of space in the city-region is still barely explored in the Brazilian literature, disregarding the importance of rural areas and of environmental interest. This aspect is also limited in the international literature, which is noticeable in the theoretical and conceptual literature review elaborating on the theme in which fragmentation is treated mainly within its institutional aspects and, heterogeneity, in its intra-urban aspects.

The identification, analysis and understanding of territories that do not have intense urban-industrial relations in SPMM is essential in building resilience to climate change or even in sustaining it, since these territories contribute an important part of ecosystem services (MEA, 2003) in the region.

The present article intends to contribute to a reduction in this gap by illuminating these spaces that, while coming from urban-industrial development, are distinct both in nature and in degrees of cohesion, integration and presence in the institutional logic of planning and governance. The research is divided into three parts, the first of which aims to generate debate on fragmentation and regional heterogeneity, in particular, as intraregional processes and those linked to the production of space in city-regions, in the theoretical and conceptual spheres. To this end, it is anchored in the dialogue along with critical theory of regional studies, with classic authors such as Soja and Scott and contemporaries Allen, Cochrane, Harding and Harrison. In particular, it seeks to open the debate on the idea of territorial holes as proposed by Allen et al. (2002).

In the second part, the objective is to understand the approximation of the SPMM to the concept of a city-region and to analyze the approaches of existing studies on it, as well as to verify the presence or relevance of the diversity of spaces in them. It is observed that, in these studies, analysis of the strong integration of the urban network and economic flows predominate.

Thereafter, the proposed empirical analysis uses the results of the Population Arrangements and Urban Concentrations in Brazil survey as a first snippet (IBGE, 2016), which identifies the strength of cohesion among the São Paulo municipalities that are part of the SPMM. Thus, the municipalities not included in the arrangements were selected to identify possible holes, according to the definition by Allen et al. (2002). The characterization of the holes advances and, through spatial analysis, shows that in addition to differences in degree, these holes also have differences in nature driven by social, economic and environmental configurations.

## Fragmentation and heterogeneity of the space produced in the city-region

The promotion and increase in the use of the notion of city-region around the world can give the impression of the complete urbanization of the planet, enunciated by the provocative hypothesis by Lefebvre (1970), five decades ago, and revived by, among others, Brenner and Schmid (2011). In fact, from the institutional point of view and its typologies, the phenomenon of planetary urbanization has been occurring progressively in Latin America, considered the most urbanized region in the world with about 81% of the population living in cities (UN-Habitat, 2018). Such readings, however, do not problematize the great fragmentation and territorial heterogeneity and, more than that, make other forms of spatial production invisible, different from cities or their expansion spaces (TRAVASSOS; PORTES, 2018). Several works in the field of critical theory of regional studies, focusing on the so-called Global North, point to the problem of heterogeneity and fragmentation (ALLEN et al., 2002; SCOTT et al., 2004; SOJA, 2006; FAINSTEIN, 2001) in the constitution of city-regions. If, on the one hand, metropolises or global cities expand, this process certainly does not occur in a homogeneous and equitable way. Invisibility spaces can be seen in several examples. However, such spaces, when defined only in economic function, make the process of how city-regions are politically constructed elude analysis, also disregarding the processes by which spaces are transformed into the visible (HARDING, 2007).

Allen and Cochrane (2007) challenge the idea of working with regions as physical spaces ordered by institutional scales. Referring to the case of “South East England,” the authors detail the difficulties of the official regional scale and its governance, in a bias that, transposed to the territory of the SPMM, finds fertile ground for a debate based on local peculiarities. It is not a question, as the authors point out, of marginalizing the importance of politics of scale, or even considering that a territory must have infinite or unlimited boundaries, but recognizing that “any region is made and remade by political processes that extend beyond its [administrative] limits with unequal impacts” (p. 1172).

Limits and borders matter. But it also matters how they were politically built, why and for whom. As Soja (2006) puts it, if the boundaries between the city and the suburbs were clear before, both the urban and the non-urban as ways of life and spatiality, they are becoming increasingly blurred, with new networks of interaction. However, a homogeneous urban-regional unit is not formed, on the contrary, the limits are porous and the shape is heterogeneous.

If it is possible to consider that the classic structure of the modern metropolis has been disrupted, with its clear and monocentric division between urban and rural, the fragmentation and heterogeneity that we seek to point out here has changed and continues to change the unstable forms of regional, complexly interconnected and multicultural networks. This urban-regional convergence further increases the distinctive meaning of city-region or region-city, with or without the intermediate feature (SOJA, 2006).

City-regions can be understood as fundamental gears of the territory’s financialization process (BRENNER, 2018; KLINK, 2013; BRANDÃO et al., 2018), functional spaces for capitalist reproduction, creating a kind of essential network of the global

economy, with distinct political actors on the world stage (SOJA, 2006). Or, part of the neoliberal agenda (HARDING, 2007), in consensus with Arrighi (2004), which states that capitalism is the first and only historical social system that has become truly global in scale and scope, with the appropriation of the territory for its reproduction, its axis central to its development (HARVEY, 2003).

This understanding contributes to the opposition of the dominant discourse that the city-region would induce wealth and income distribution (HARRISON, 2010). Returning to the idea that city-regions are politically constructed (ALLEN; COCHRANE, 2007; HARRISON, 2010; among others), there is, therefore, a search for a new meaning of this concept in the Global South, especially in the case of SPM from the specifics of capitalist production in Brazil.

Frey (2019) proposes three fundamental dimensions to assist in understanding the term city-region: spatial, economic and political-institutional. In the spatial dimension, the emergence of the concept of city-region is associated with the processes observed initially in Europe and North America, of expansion of a dominant city to the surroundings, with the emergence of poles of economic importance, in a polycentric structure. However, other configurations of this expansion have shown that the phenomenon is “complex and multifaceted,” which makes it difficult to build the concept itself. In the economic perspective, the region-cities are seen as “driving forces of the world economy,” and it is relevant to understand them based on their capacity for insertion and connection in the network of interconnected world cities, in the current context of globalization and reterritorialization. Finally, city-regions can also be understood from the role of the State in the implementation and prioritization of regional development policies. If the State action focused on the distribution of resources in the national territory before, today, the city-regions are priority spaces for development aimed at insertion in the global market.

This resignification of the phenomenon of urbanization which, for Harrison, should start from the understanding of a “... particular set of economic, cultural, environmental and political projects, each with its own logic,” which would allow to unveil “for which interests city-regions are necessary and for whom this new territoriality is merely contingent” (JONAS; WARD, 2007 apud HARRISON, 2010, p.18).

The concept of city-region also refers to the idea of a global city and is characterized by the existence of a set of cities, articulated in a network that is configured in areas of domination (central) and subordination (usually on the periphery of these areas), and which can extend over large spatial plots. The city-regions are important nodes of the global economic system and are the locus of a significant and growing concentration of economic activities and technological development (SCOTT et al., 2001).

Conversely, despite these city-regions being, in general, the richest areas in their countries, they also have the highest levels of inequality, even in countries of the first industrialization (FAINSTAD, 2001). This characteristic is due, as Haesbaert (2010) notes, to the fact that, when incorporating new areas into the global economic system at the local level, not only does homogenization occur, but inequality and fragmentation as well. In this sense, while certain areas, sometimes portions of municipalities within the region, reap the fruits of the wealth generated by incorporation into the global economic

system, others degrade or are despoiled, remaining outside the processes of socioeconomic development.

A similar understanding is found in the work of Allen et al. (2002), who propose the concept of “holes,” observing that, in the process of regional constitution and prioritization of public policies in southeastern England, the space that is formed is fragmented, both in terms of economic and symbolic flows. It results in some very interrelated and other isolated spaces, so “the type of region that appears in this conceptual approach may not be spatially continuous. There may be ‘holes,’ that is, areas ‘within’ the region that are not characterized by the mechanisms or characteristics that are part of the criteria for regional definition” (ALLEN et al., 2002, p.22). As a consequence, they note that the formation of the region’s identity will lead to the definition of public policies, which can lead to a deepening of fragmentation, configured as an increase in inequality.

Lencioni (2015), however, understands that it is integration in fragmentation that defines the totality in these regions, and that makes it possible to define the limits of a region and the relationship between fragments, given by different types of connection and complementarity. Its consistency in space is due to the heterogeneity of land occupation and use, which are different from the contiguous densification areas. The competition for natural goods and spaces conducive to urbanization, readily sensitive to fluctuations in global investments, results in the construction of what Brenner (2018) understands by “hinterlands.” This term suggests a question, since its use in urban geography serves to designate the areas of influence of a center of economic activity, yet its meaning of origin is that of areas far from large urban and metropolitan areas and devoid of their conditions and infrastructure - inland areas.

However, the processes that confer cohesion, fragmentation and heterogeneity are analyzed eminently with a focus on spatial relationships starting from and in their urban nuclei and their fragments: pendulum movements, dispersion of urban activities, production chains, transport and logistics and social inequalities. Even when they recognize other spatial results, authors like Brenner will see these areas as “mere ‘incubators’ for the production of commodities within a given terrain” (BRENNER, 2018, p. 320), due to the transformation of natural goods into forms of work, sources of water, energy and food.

From another point of view, however, rural spaces or urban-rural interfaces (GALVÃO, 2017; TRAVASSOS; PORTES, 2018) are fundamental to understanding heterogeneity, which is characterized not only by socioeconomic and cohesion differences, differences in degree, but also due to differences in nature, that is, they form relationships and ways of life different from those pointed out by the most diverse authors when explaining the formation of the city-region, allowing a different perspective of analysis.

Thus, if the current process of financialization of the territory and the rescaling of the State lead to the constitution of city-regions, pressing for a (flexible) institutionalization of regional perimeters of action, it becomes necessary to look at the new heterogeneities built in this context, which aggregate, in the different possible arrangements, territories that are not only unequal, usually resulting from the constitution of city-regions, but also more diverse, in a complexity of ways of life and functions that are scarcely considered by public policies.

Consequently, the next items intend to analyze the construction of an identity of the SPMM, which should mirror the construction of the identity of the city-region, that is, one constituted by the economic and population flows that give it cohesion, as well as trying to characterize its territorial diversity - considering its “porous border” (ZIONI et al., 2019) and its “holes” (ALLEN et al., 2002) - while also considering their differences in nature (HAESBAERT, 2010). With this, the difficulties of operating within a defined territoriality from top to bottom are evident, which makes their heterogeneities, their ecosystem services and their socio-cultural identities invisible.

### **The Sao Paulo Macrometropolis: what appears to be or what this city-region may be**

The term city-region seems to be the one that best and most broadly captures the meaning of contemporary urban formations that occur from the metropolises, integrating the flows and economic functions. Lencioni (2015), Tavares (2018), Pasternak and Bogus (2019), Zioni et al. (2019) and Torres et al. (2020), understand that the contemporary spatial formation that brings together São Paulo metropolises fits this concept. Cano et al. (2007), although questioning the strength of this arrangement as a ‘condensed metropolitan area’ (CANO et al., 2017, p. 30), stress the importance of studying it and considering the research that establishes it as a macrometropolis. Macrometropolis, often used as a synonym for city-region, was the term adopted by the Government of the State of São Paulo both in the context of road projects and water resources planning, as well as identifying a set of São Paulo Metropolitan Regions, which, like this one, present fragile institutionalization (FIRKOWSKI, 2013).

Freitas-Firkowski and Baliski (2018), in a panorama of how the concept of metropolis has been adopted by Brazilian literature, conclude that the concept of city-region tends to give evidence to the elements of intrametropolitan structure and morphology; unlike the term macro-metropolis, which is more often adopted according to its institutional nature. In both, however, they point out that the concepts do not seem sufficiently comprehensive or clear.

A particularity of the SPMM, in relation to the classic definition of city-region pointed out by Soja (2006) is that, in the case of São Paulo, the regional phenomenon is not necessarily an indistinguishable result of the industrialization and urbanization of the territory. Although the author points to the strength of the service sector, which covers “all forms of productive activity, whether in manufacturing or services,” it is important to note that the effects of deindustrialization processes still predominate in this city-region of São Paulo and metropolitan deconcentration perceived by their effects of dispersion of urban fabrics and various equipment.

These spreading vectors of the original metropolis, in a set formed by other São Paulo Metropolitan Regions, are today permeated by new facilities of logistical services, still concentrated along the axes of the centuries-old railway infrastructure and the road complex. SPMM still has exceptional advantages in the supply of electricity and covers the largest Brazilian port, facilities in the oil and gas complex and two of the busiest na-

tional airports. It stands out, therefore, for a privileged set of features and connections as compared to other Brazilian regions.

However, if on the one hand it houses, in its territories, significant forest resources, configured as protected areas or remnants of vegetation, then it is, conversely, quite vulnerable in the face of the scarcity and irregularity of its water resources, conditions that must be aggravated by climate change (MARENGO, 2007). In fact, from these special conditions of natural resources came the original conception of a strategic perimeter for the management of 'macro-metropolitan' demands for water, that is, the water macro-metropolis (DAEE, 2013).

Thus, it would be necessary to compound the understanding of the territory, with emphasis on exceptional environmental functionality, while also pointing out aspects of diversity of the city-region, those which are rarely highlighted, since environmental and cultural flows are at most seen as "negative" aspects of the metropolitan image. Thus, the SPMM is, in general, presented eminently by those urban-industrial characteristics that give it cohesion: a network of cities, deeply connected by a flow of goods and people, covering five metropolitan regions and other secondary urban agglomerations.

Recent works by Tavares (2018) and Zioni et al. (2019), reassembled the historical and conceptual facts that support the debate on the formation and institutionalization of the São Paulo Macrometropolis. The research described by Tavares establishes, from his empirical analyzes, conceptual explanations for the SPMM that cover the productive and functional aspects of the territory in formation, always from the perspective of urbanization and its process of spatial and economic expansion. Reviewing some of the authors analyzed by him, it is possible to investigate whether and how the region's heterogeneity and fragmentation were treated. In this context, the work of Lencioni (2003), Meyer et al. (2004), Emplasa et al. (2011) and, more recently, Pasternak and Bógus (2019) deserve to be highlighted.

Lencioni (2003) looked at territorial changes from the understanding that changes in productive activities are the determinants in the restructuring of space. These will establish a specific city-region, configured and reconfigured in the same territorial extension of the capitalist restructuring process. In this sense, it highlights two movements, the dispersion of the production units of large companies dependent on new factors of production - less related to the availability of raw materials and energy and more to labor and services - and the concentration of capital in the metropolitan center. It is possible to say that the heterogeneity in the production of space, in her study, is found in the intra-urban segregation of the cities that make up the region, pointing to the difference between the elite neighborhoods and the growth of the favelas. With regard to regional space, the author observes a dilution of administrative boundaries and of the limits between city and countryside, intra and interregional, all with intense material and immaterial functional relations, which gives them coherence.

In an analysis also based on productive restructuring and on the perimeters then under discussion about SPMM, Meyer et al. (2004) analyzed the productive sectors and the economic dynamics of the municipalities in the region in order to approach the debate of functional relations between them. Thus, they establish heterogeneity based on the different

relationships that each municipality establishes with the entire region, analyzing aspects of the economic and social structure and proposing a typology with 5 basic categories: agricultural, diversified, industrial, dormitory and coastal; based on the internal distribution of GDP and jobs by sectors, which produced a cartography that shows the strong presence of economic activities in some municipalities, while generating dependence on others.

In 2010 and 2011, Emplasa led, together with SEADE, a series of studies on the regionalization of the State of São Paulo, including elements that support the constitution of the current perimeter of SPMM, and which were summarized in a publication entitled “Rede Urbanization and Regionalization of the State of São Paulo” (EMPLASA et al., 2011). As its name suggests, the proposal for regionalization of the State was based on the analysis of the network of cities, their flows and hierarchy, but also on their regional structure, based on four dimensions: demographic, economic, territorial and physical-environmental and regional features. Three models were elaborated: the network and hierarchy of cities; new hypotheses about territorial cuts based on a previous study by Emplasa, in 1992; and regionalization based on spatial clusters of selected variables, without any previous hypothesis. The main indicators used were: typology of municipal GDP; growth rate of the total population; urbanization rate; pendular migration rate; and PEA by activity, which resulted in urban-functional regionalizations. It is possible to affirm that, in this model, others results from the production of the space are practically nonexistent, with the exception of the residual presence of agriculture and agro-industry, which is also not sufficient for an understanding of the rural areas.

For the SPMM, the text attests that the “new metropolization design, in which the urban complex, formed by metropolises and medium-sized cities, tends to increase the degree of interdependence from the main pole, configuring a large urban region” (EMPLASA et al., 2011: 104, our translation). It points to the heterogeneity of the territory, but also considers that of an urban nature: “precarious housing conditions, occupation of risk areas, lack of basic urban infrastructure (...)” (EMPLASA et al., 2011: 105, our translation). In 2011, the regional deficiencies pointed out were based only on the insufficiency of infrastructure, while the environmental issue was analyzed from two dimensions, the presence of Protected Areas and the availability of water for the different activities in each Water Resources Management Unit (UGRHI); in SPMM the emphasis is on industrial activity.

More recently, Pasternak and Bógus (2019, p. 433) define SPMM as a “complex of metropolises around Greater São Paulo.” In the authors’ view, it is not about the formation of a homogeneous space shaped in a “supermetropolis”, but of an extensive urban area structured in a complex system of cities around the Metropolitan Region of São Paulo. That is, although they recognize that it is not a homogeneous space, heterogeneity, here again, is established from the functional relations of integration between the municipalities and the poles. In the cartography resulting from this analysis, it is possible to verify, even, the low integration of a series of municipalities of the SPMM, as well as the lack of classification of some of them.

Thus, it is possible to conclude that the socio-spatial construct of the city-region, or SPMM, when being described almost exclusively by evidence of physical and functional aspects of urban-industrial form and flows, relegates the other territories resulting from the



production of space, areas of urban-rural or rural interface. In this sense, it is important to point out the work of Davoudi (2009), when he affirms that the city-region must be understood through a complex network of multidirectional flows and interactions - be they economic, social, cultural and environmental, visible or invisible. For it is through these interactions that it creates a multiplicity of functional limits and territorialities, including, it is possible to say, the holes.

In this sense, it is necessary to emphasize that flows of environmental resources must also be recognized in the city-region - water and minerals, food; as well as waste and pollution streams - solid waste, emissions and water, pollution. Therefore, these are much more diverse and complex relationships, which escape the concept of an economic and functional territorial arrangement (Davoudi, 2009).

In other words, as the city-region, according to Neuman and Hull (2009), integrates spaces of flows, it may seem sufficient to explain it according to axes of connectivity and territorial cohesion, as intended by the 2013-2040 Macrometrópole Sao Paulo Macrometropolis Action Plan. However, when realizing that “the fragmented postmodern metropolis may be giving way to an extended neo-modern region, where new forms of networks and spatial connectivity reintegrate the space of urban areas,” these authors suggest the need for other perspectives to expand the analysis of the spatil production process in these contexts (NEUMAN; HULL, 2009).

In the second volume of the Sao Paulo Macrometropolis Action Plan (EMPLASA, 2014), the region is observed from the network of cities, the areas of environmental protection and the complementarities that are established through the relationship between these elements. It is in the “environmental vector” that Emplasa established “geographical and environmental issues that demand public actions not only of command and control, but also those that consider environmental heritage as an ‘environmental asset’ essential for economic activity and life in the SPM” (EMPLASA, 2014, p. 31, our translation). Water production and climate regulation are considered to be the fundamental ecosystem services. However, rural areas are treated only in terms of social vulnerability, due to the classification of the São Paulo Social Vulnerability Indicator; while food production is only treated as an industrial sector.

In the Action Plan portfolio investments in public infrastructure, economic development linked to sustainability and the rural appear, especially on the topic of forest restoration -- but only taking into account agriculture -- with two programs of transition from conventional agriculture to another with an ecological base. Thus, it is possible to say that, within the plan, the relevance of the economy linked to non-urban spaces is still small as compared to other lifestyles. Furthermore, the establishment of actions unrelated to previous diagnoses may indicate a distance between the proposal and the context.

In this way, it is necessary to investigate the macro-metropolitan region beyond its deeply connected urban territories which shape the identity that has been built and which makes it difficult to look at its diversity, especially at the regional scale, considering heterogeneity and fragmentation and the constitution of holes, as established by Allen et al. (2002), but that, in addition to presenting differences in degree, also present differences in nature (HAESBAERT, 2010).

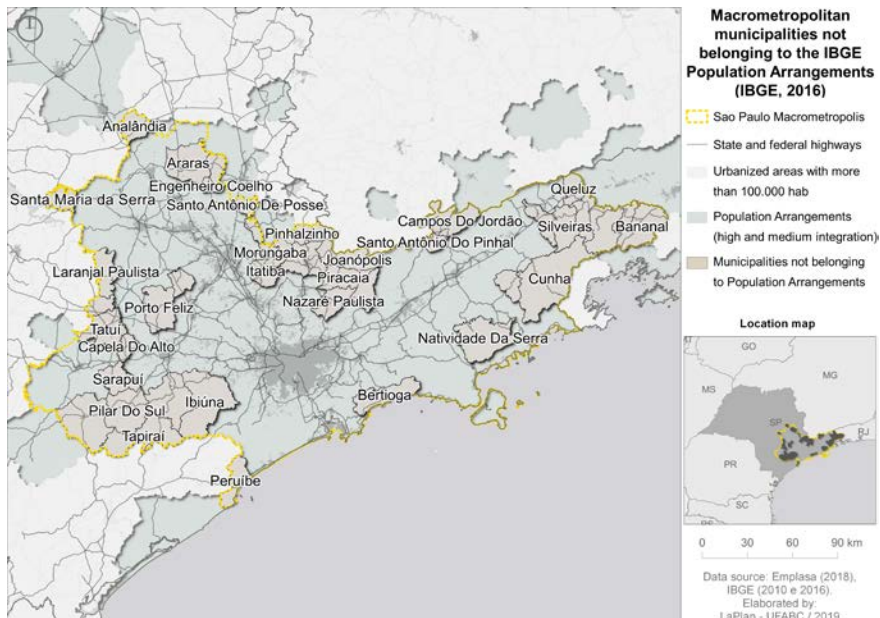
## São Paulo Macrometropolis from another perspective: revealing the holes

Considering the issues listed, and specifically seeking to reveal the production of a space that has differences in degree and nature, this section seeks an approximation of the characteristics that can explain these territories, emphasizing variables different from those that could explain their cohesion or integration to the urban centers.

To characterize the holes and bring them to the surface of the debate, the following are proposed as Territorial Units of Analysis (UTA), the municipalities that are not part of the “Population arrangements and urban concentrations in Brazil,” established by IBGE (2016), but inserted within the perimeter of the Macrometropolis established by Emplasa (2011; 2014). In this sense, although it is recognized here that both the establishment of the perimeter and its institutionalization are loose and flexible, the choice of the two approaches aim to reveal that, even considering consolidated analyzes, the various results from the production of space are not considered, which ends in the invisibility of certain areas, both in scientific terms and in public policies, territorial planning or governance.

The map below (Figure 1) shows the municipalities whose observed flows are not sufficient for them to participate in the population arrangements established by IBGE. Their location already indicates that the process that excludes them from the arrangements is not limited to the perimeter established by Emplasa (2011; 2015), but likely extending far beyond it. In this context, three clusters of municipalities stand out: southwest west, east and northeast of the macro-metropolis, in addition to other more isolated municipalities.

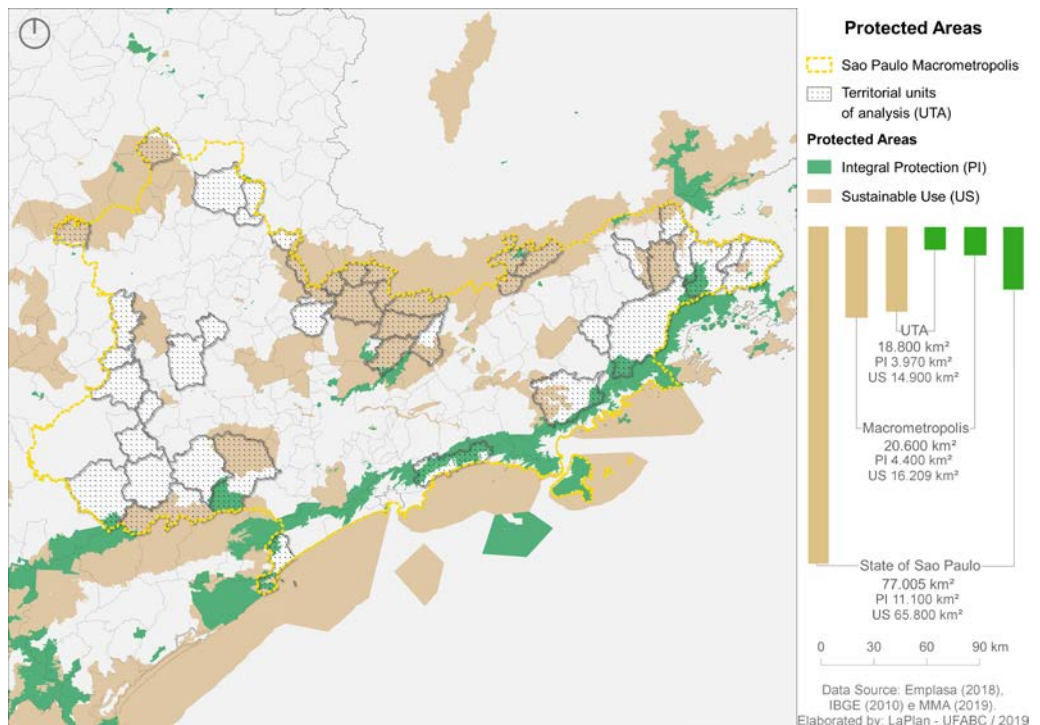
**Figure 1. Macro metropolitan municipalities not belonging to the IBGE Population Arrangements (2016). Sources: EMPLASA (2014); IBGE (2010; 2016); elaboration: LaPlan - UFABC, 2019.**



Accordingly, it is necessary to reveal these municipalities, in a first approximation, to observe whether and what relations they establish with the other municipalities, as well as beginning to understand the presence of others resulting from the production of the city-region spaces that do not mesh with the contemporary urban-industrial fabric. In this sense, a series of variables was spatialized, to analyze the differences in degree, especially income and education, and the nature of these spaces. The degree difference variables were not sufficient to explain their difference in relation to other municipalities of the SPMM, thus, the analysis focused on variables of difference in nature - the existence of vacant or second homes, the presence of Protected Areas and agricultural production and its land structure, as well as the density and nature of the infrastructures implanted there.

Firstly, the great presence of Protected Areas in these municipalities stands out, with respect to the numbers of the SPMM, 92% of the Protected Areas for Sustainable Use - especially the Itupararanga, Piracicaba and Juqueri-Mirim Environmental Protection Areas - and 90% of the Integral Protection Units - Jurupará and Serra do Mar State Parks and Serra da Bocaina National Park. In other words, an important part of environmental protection in the region is found in the holes.

**Figure 2: Protected Areas, with emphasis on UTA. Source: EMPLASA (2014); IBGE (2010; 2016); RAIS (2017); MMA (2019); elaboration: LaPlan – UFABC, 2019.**

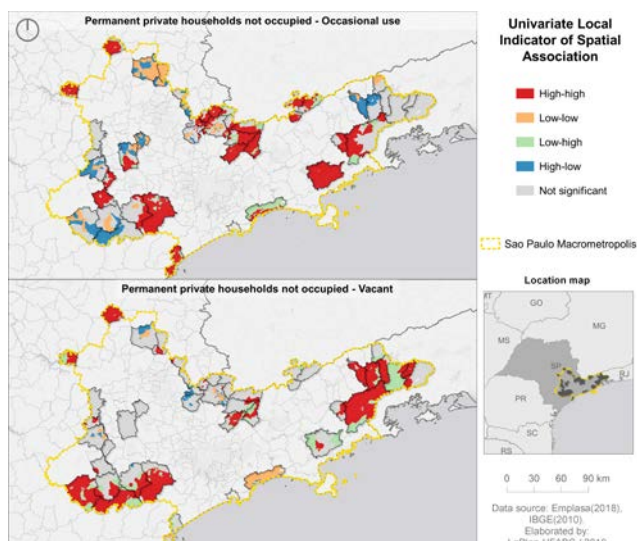


Associated with this characteristic is a relevant presence of households for occasional use, probably farms or leisure sites (Figure 3). Here, the municipalities of APA Piracicaba-Juqueri-Mirim stand out, accompanied by the municipalities of Ibiúna, Cunha and Natividade da Serra. In addition, the presence of vacant homes is also relevant in the region, both in areas where homes for occasional use are located and in the rest of the UTAs. Once the spatial autocorrelation was found in the census sectors, both for the data of permanent private households of occasional use, and for the vacant ones, it was decided to visualize the data through the analysis of univariate local spatial autocorrelation, a procedure that highlights the “hot spots” or locations among the data (ALMEIDA, 2010).

It is possible to observe a group of municipalities in the southwest-west that present a high percentage of vacant households, especially in the Itupararanga APA, permeated by few exceptions from sectors with lower values; a similar movement occurs in the municipalities of Vale do Paraíba. It is also relevant to highlight that, although there are some locations and neighborhoods that present high values, both for occasional households and for vacant households, such similarity is not always reproduced, which can be seen in the municipalities of Araras, Conchal, Engenheiro Coelho and in the microregion of Bragança Paulista. There, while few census sectors have shown significant spatial autocorrelation for vacant households, the same does not apply for occasional use. In the municipalities mentioned, low values can be observed, with low neighbors, permeated by few high ones. In the microregion, the patterns change significantly, presenting large groups of high-high values.

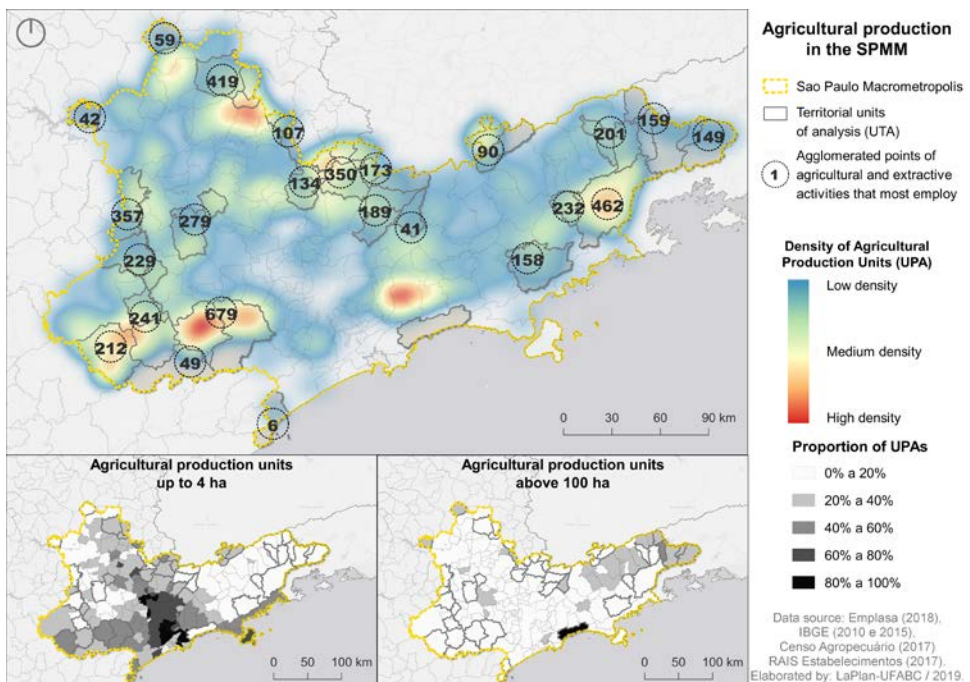
Although these data are out of date, as they are still related to the 2010 Demographic Census, this fact deserves further research on a local scale, including monitoring, since it may indicate economic stagnation and an emigration process, which may confirm the idea that for “holes” there is no definition of regional development strategies.

**Figure 3: Presence of households for occasional use and vacant in the selected AWUs. Sources: EMPLASA (2014); IBGE (2010; 2016); elaboration: LaPlan - UFABC, 2019.**



Finally, and even more relevant for explaining the nature of the space production in these municipalities, is the agricultural activity (Figure 4). The observation of the density of Agricultural Production Units in the SPMM perimeter allows us to affirm that, with the exception of the municipalities of the Alto Tietê Production System, in the Metropolitan Region of São Paulo; there is a strong correlation between the holes and the productive activities of this sector. However, it is also possible to observe that their presence in these municipalities likely does not result in spaces or similar relationships between them, since the juxtaposition between the present data of companies - considering the 15 sectors that had the largest amount of declared employment ties are based on data from establishments of the Annual List of Social Information, RAIS (BRASIL, 2017), which operate in these territories, and on the land structure, given by the proportion of small and large properties - shows, for example, that the municipalities of Vale do Paraíba and those to the west are quite diverse. The former - with the exception of Cunha - have a relatively smaller number of companies and Agricultural Production Units, but the proportion of large units stands out from the rest of the analyzed UTAs. The municipalities to the west are characterized by the presence of small Agricultural Production Units and a large number of companies. The other data from the Agricultural Census (IBGE, 2017) also help to show these differences, while in the Paraíba Valley, livestock remains the main activity, the municipalities to the west are major producers of fruit and vegetables.

**Figure 4. Agricultural production in the Sao Paulo Macrometropolis. Sources: EMPLASA (2014); IBGE (2010; 2016; 2017); RAIS (2017); elaboration: LaPlan - UFABC, 2019.**



This brief analysis allows us to say that the territories that are characterized as holes in the SPMM, more than difference in degrees, present great differences of nature in relation to the rest of the Macrometropolitan municipalities. Following the analyzes of Galvão (2017) and Travassos and Portes (2018), the observations made here seem to indicate that these are rural territories or urban-rural interfaces, with all the characteristics that these authors indicate and that will be important for the provision of a series of ecosystem services, in particular climate regulation, water and food production services. In addition, the need to deepen these studies on a tighter scale is highlighted, since the production of holes and borders is not strictly linked to municipal administrative limits.

## Final considerations

Historically, the production process of the space successively related to the municipality of São Paulo, the Metropolitan Region of São Paulo and the SPMM, has been analyzed and considered for its urban-industrial characteristics, considering all the changes that this great region suffered, both from the point of view of the cities present there, and from the regional space. This specific view linked public action in territorial planning and governance, which is clear when analyzing the existing planning instruments and speeches regarding SPMM.

In the case of SPMM, the two-way interconnection between the economic and institutional political dimensions pointed out by Frey (2019) is clear, and it is challenging to understand which movement is the more pioneering, that of the State aiming for the formation of the city-region, its focused insertion in the global market or the appropriation of the territory itself as an inexorable part of the driving forces of the world economy, an important part of the global capitalist system.

Some space was opened within this context, to environmental protection, but still in a strict sense, without considering, in this planning scale, the development demands that are essential to its maintenance, especially because they are, mainly, Protected Areas of Sustainable Use, which must guarantee the possibility of different forms of spatial production.

Preliminary analyzes carried out in this article reveal holes, which present complexity and specific characteristics that deserve further study to understand their relations with other municipalities, their roles in the macro-metropolis, their contribution to the provision of ecosystem services - including climate regulation and the possibility of adapting to climate change - and its capacity to shelter ways of life different from those linked to the urban-industrial space.

The recognition of these spaces is essential for territorial planning and governance to adjust their focus to a regional system that has differences in degree - fully recognized - but also important differences that support it. The holes also highlight non-priority spaces on the SPMM planning agenda, the margin for investments in the São Paulo Macrometropolis Action Plan, consequently contributing to greater regional imbalance and the production of inequalities and not the opposite.

In addition, it is necessary to continue investigating the limits and scope of the

concept of city-region, the social and political construction of its “fragile” borders, to provide the basis for a new territorial policy and innovation in governance practices (FREY, 2019), through the construction of coalitions for change (HARDING et al., 2006, apud ALLEN, 2007) and the recognition of diversities, which is key for the reduction of territorial inequalities.

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Original Article

# HETEROGENEITY AND SPATIAL FRAGMENTATION IN THE SAO PAULO MACROMETROPOLIS: THE PRODUCTION OF BORDERS AND HOLES

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LUCIANA RODRIGUES FAGNONI COSTA TRAVASSOS  
SILVANA MARIA ZIONI  
PEDRO HENRIQUE CAMPELLO TORRES  
BRUNA DE SOUZA FERNANDES  
GABRIEL MACHADO ARAUJO

## HETEROGENEITY AND SPATIAL FRAGMENTATION IN THE SAO PAULO MACROMETROPOLIS: THE PRODUCTION OF BORDERS AND HOLES

**Abstract:** The article aims to reveal the heterogeneities and fragmentations of the produced space in the Sao Paulo Macrometropolis, unveiling the characteristics of its holes - territories that, on one hand, do not make up the urban-industrial arrangements that give identity to this city-region, yet they do provide ecosystem services and enable other ways of life. The article arose from a conceptual survey about this city-region, focusing on the vision of heterogeneity, fragmentation and symbolic construction, and reflects on the identity and produced space in the Sao Paulo Macrometropolis (SPMM) to support the empirical analysis of the region. Through spatial analysis it presents the characteristics of territories of the Macrometropolis that are not brought to light analytically, nor are they the focus of public policies, despite their regional importance.

**Keywords:** Sao Paulo Macrometropolis; heterogeneity; city-region; spatial planning

## HETEROGENEIDADE E FRAGMENTAÇÃO ESPACIAL NA MACROMETRÓPOLE PAULISTA: A PRODUÇÃO DE FRONTEIRAS E BURACOS

**Resumo:** O artigo tem como objetivo revelar as heterogeneidades e fragmentações do espaço produzido na Macrometrópole Paulista, desvelando as características de seus buracos, territórios que, por um lado, não compõem os arranjos urbano-industriais que conferem identidade a essa cidade-região, mas, por outro, provêm serviços ecossistêmicos e dão lugar a outros modos de vida. O artigo parte de um levantamento conceitual sobre cidade-região, com foco na visão de heterogeneidade, fragmentação e construção simbólica, e reflete sobre a identidade e o espaço produzido na Macrometrópole Paulista (MMP), para embasar a

análise empírica da região. Por meio de análises espaciais, apresenta as características dessas áreas, territórios da Macrometrópole que não são trazidos à luz de forma analítica, bem como não têm merecido atenção das políticas públicas, apesar de sua importância regional.

**Palavras chave:** Macrometrópole Paulista; heterogeneidade; cidade-região; planejamento territorial

## HETEROGENEIDAD Y FRAGMENTACIÓN ESPACIAL EN LA MACROMETROPOLIS PAULISTA: LA PRODUCCIÓN DE FRONTERAS Y AGUJEROS

**Resumen:** El artículo pretende revelar las heterogeneidades y fragmentaciones del espacio producido en la Macrometrópolis Paulista, desvelando las características de sus agujeros, territorios que, por un lado, no conforman los arreglos urbano-industriales que dan identidad a esta ciudad-región, pero, por otro lado, proporcionan servicios ecosistémicos y dan paso a otras formas de vida. El artículo parte de una encuesta conceptual sobre la ciudad-región, enfocándose en la visión de heterogeneidad, fragmentación y construcción simbólica, y reflexiona sobre la identidad y el espacio producidos en la Macrometrópolis Paulista (MMP), para apoyar el análisis empírico de la región. A través del análisis espacial, presenta las características de estas áreas, territorios de la Macrometrópolis que no salen a la luz analíticamente, y que tampoco merecen la atención de las políticas públicas, a pesar de su importancia regional.

**Palabras clave:** Macrometrópolis Paulista; heterogeneidade; ciudad-región; planificación territorial

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