

CONFLICTS, VULNERABLE AREAS AND SUSTAINABILITY IN SÃO PAULO MACROMETROPOLIS¹

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Introduction

The extensive urbanization model typical of large cities in developing countries reflects industrial-based spatial dynamics and results in socio-spatial asymmetries that are mostly expressed in the illegal urban occupation of environmentally fragile areas - a fact that puts the sustainability of cities at risk.

According to Costa (2010), based on the urban sustainability debate, this issue translates into unequal capacities among countries that depend on specific social and political conditions in the contemporary scenario.

The (un)sustainability of cities results from the antagonistic relationship between economic growth and the environment, which is treated as source of inexhaustible resources to be explored (BELLEN, 2006; FARR, 2013).

The urbanization process significantly accounts for environmental degradation processes, mainly in developing country cities based on urban sprawl, on the division of cities into monofunctional zones and on the valuation of individual automotive transport. The intense urbanization process associated with the lack of socially inclusive public policies has pressed the environmental protected areas and established a strong relationship

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between environmental degradation and socio-environmental vulnerability (ALVIM; KATO; ROSIN, 2015). It is understood that the concept of socio-environmental vulnerability implies the coexistence, accumulation or spatial overlap of fragile, poor and social deprived areas, as well as situations associated with the exposure to environmental risk and/or degradation. (ALVES; TORRES, 2006; TORRES et al., 2007; ALVES et al., 2010; ALVES, 2017).

Urban occupation of environmentally vulnerable areas is as problematic as the removal of populations living in these areas. On the one hand, such occupations contribute to environmental degradation in a vicious circle, by promoting a mischaracterization process that can often lead to environmental collapse (DIAMOND, 2006). Yet, sometimes these areas are the only place in the city accessible to citizens who live under extreme poverty and risky conditions without urban and sanitary infrastructure. It is a highly complex framework that triggers both the precariousness and fragility of settlements located in these areas, as well as the complexity of legal, social, economic, cultural and urban issues resulting from the long negligence by the State towards this matter. The delimitation of protected areas,

[...] is a strategy implemented to enable the conservation of environmental goods; however, it is highly complex, since it affects, and is affected by, several ecological and social dynamics observed in different territories [...] (SCHULT; BOHN, 2014, p. 5).

São Paulo Macrometropolis (MMP - Macrometrópole Paulista) presents constant conflicts between urban occupation and fragile/protected areas, as well as evidences socio-environmental vulnerability. Since it is a complex urban-regional phenomenon whose logic is mainly associated with economic and circulation flows, the MMP aggregates a set of counties that integrate different regions institutionalized by law, such as metropolitan regions, urban agglomerations and regional units; besides, it brings together other political and administrative structures ruled by different logics, interests and agendas.

The combination between dispersion and concentration defines the contemporary macrometropolis space (LENCIONI, 2007), which spreads and concentrates in a concomitant and dialectical way (D'OTTAVIANO; PASTERNAK; BARBON, 2019). The dispersed and fragmented urbanization process faced by the macrometropolis (REIS, 2006) is guided by different dynamics that affect the territory, mainly environmental protection areas, in different ways.

The aim of the current article⁵ is to address the relationship between urban dynamics and socio-environmental conflicts expressed in the MMP territory, with emphasis on environmental vulnerability and socio-spatial inequalities; however, it does not intend to exhaust the complexity of the theme. Based on a methodology that uses the analysis of some demographic and socioeconomic indicators and their respective

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mappings relating them to urban and environmental dimensions, the article indicates that the concentration of wealth and economic flows in the MMP coexist with the environmental degradation and social vulnerability processes, not in compliance with urban and environmental policies.

São Paulo Macrometropolis: a brief description

The current article adopted the delimitation set by EMPLASA (São Paulo Metropolitan Planning Company S/A), which defines São Paulo State MMP as a macro-region that covers the Metropolitan Regions of São Paulo (RMSP – Região Metropolitana de São Paulo), Campinas (RMC - Região Metropolitana de Campinas), Baixada Santista (RMBS - Região Metropolitana da Baixada Santista), Sorocaba (RMS - Região Metropolitana de Sorocaba) and Paraíba Valley/Northern Coast (RMVPLN - Região Metropolitana do Vale do Paraíba/Litoral Norte); the Urban Agglomerations of Jundiaí (AUJ - Aglomeração Urbana de Jundiaí) and Piracicaba (AUP - Aglomeração Urbana de Piracicaba); and the Regional Unit of Bragantina (URB – Unidade Regional de Bragantina). The MMP comprises 174 counties located within a 200-km radius away from São Paulo City.

The MMP is the largest and most complex urban system in Brazil; it has 30.5 million inhabitants (IBGE, 2010), who account for 74% of the population living in São Paulo State - 8.95% of them live in subnormal clusters. In 2016, 81.9 % of the Gross Domestic Product (GDP) of São Paulo State and 26.6% of the Brazilian GDP were concentrated in this macro-region.⁶

The Macrometropolis formation process is historically associated with urbanization processes, as well as with industrial and population deconcentration processes, in São Paulo City and in the Metropolitan Region of São Paulo (RMSP), and with the displacement of the economic development of São Paulo State to its hinterlands (NEGRI, 1996; CANO, 1998; CUNHA et al, 2013). This territorial expansion process initially overflowed from the RMSP, which can be defined in different ways, namely: dispersed urbanization (REIS, 2006); concentrated deconcentration (AZZONI, 1986), polygonal development (DINIZ, 1993) and city-region (LENCIONI, 2007). In addition, it is a complex urban-regional phenomenon (CUNHA et al, 2013), whose circulation/transportation system links sets of urban centers at different scales, which appear to have integrated, although significantly conflicting, relationships, as well as economic and social flows.

The MMP has extensive road and port infrastructure, as well as intense flow of people and cargo, which reflects internal and external interactions among the main urban centers. Road, rail and airport flows highlight the strong integration and functional articulation among these urban centers, to the detriment of intra-urban relationships (CUNHA et al, 2013).

The railway network is integrated and it enables the flow of products from São

6. In 2016, MMP's GDP was R\$ 1.669 trillion; the GDP of the State of São Paulo, R\$ 2.038 trillion; and Brazilian GDP was R\$ 6.267 trillion. (Available at: <https://cidades.ibge.gov.br/brasil/sp/sao-paulo/pesquisa/38/47001?tipo=ranking>. Access on Jan 10th, 2020).

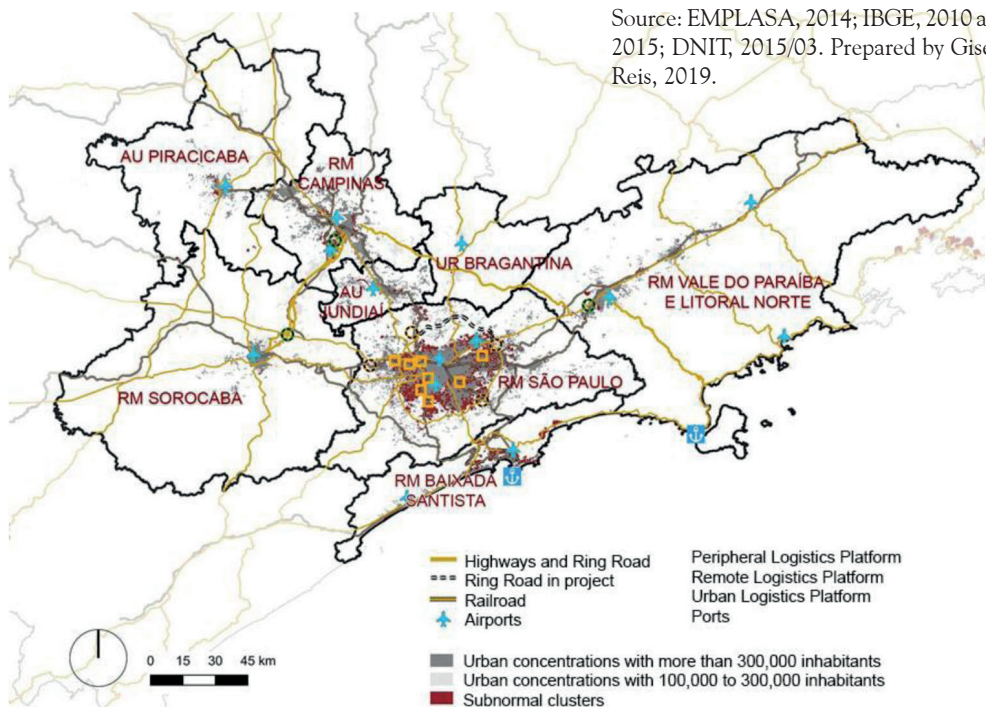
Paulo, and from other states, to the Port of Santos⁷. The airport system integrates the main international airports in the country; it accounts for 54% of the total volume of passengers and cargo transported in Brazil⁸ (EMPLASA, 2014; CUNHA et al, 2013).

Data from the Origin-Destination Survey 2017 (OD) showed that from the total of 420,200 daily trips in passenger vehicles departing from the RMSP, 69% was originated in the municipality of São Paulo and 82% of the main destinations of these external trips are to the other municipalities located in the MMP; 67% of cargo transportation (43,400 vehicles) to the RMSP departs from the MMP (METRO, 2019).

The highways cutting the MMP region⁹ are like “avenues” where individual transport flow prevails due to the large flow of people, goods and services among the urban centers composing it. Certain sections of these highways are occupied by industries and logistics centers, whereas others stand out for the presence of horizontal and vertical condominiums where families presenting different income profiles live in.

A high-capacity public transportation system capable of integrating counties and regions is virtually non-existent. Figure 1 illustrates the relationship between flows and the occupation of MMP cities and regions.

Figure 1 - São Paulo Macrometropolis: Urban Spot, Road System, Transportation and Logistics System (2015)



7. The Port of Santos is the main port in Latin America; it accounts for 11% of exports and 21% of imports in the country (EMPLASA, 2016).

8. Congonhas (São Paulo), André Franco Montoro (Guarulhos) and Viracopos (Campinas) Airports.

9. Road systems: Anhanguera / Bandeirantes; Dutra / Airton Sena / Carvalho Pinto - East; Presidente Castelo Branco and Raposo Tavares - West; Imigrantes / Anchieta - South; Regis Bittencourt - Southwest.

The economic and socio-occupational structure of the MMP is quite diversified and complex, since it comprises modern high-tech activities developed in different business branches. Data provided by IBGE (2016) have indicated that the RMSP has been progressively losing importance, although it remains the main economic center of the MMP and of the state itself. Accordingly, the relative GDP and industrial participation in the Metropolitan Regions of Campinas and of Paraíba Valley/Northern Coast stands out. The RMSP accounts for 54.5% of the State's total GDP; it is followed by RMC (12.8%), RMVPLN (5.3%), RMS (3.9%), AUJ (3.4%), AUP (3.2%), RMBS (3.1%) and URB (0.6%).

Another important MMP feature lies on the monthly nominal income of householders per household, which can significantly change, according to data from the 2010 Census. Overall, the mean income of householders living in most MMP counties ranges from 1 to 3 minimum wages. Some large- or mid-sized counties located in the main road axes perform industrial activities or present high concentration of high-standard residential condominiums/allotments. They also present high concentration of households whose income ranges from 3 to 5 minimum wages, a fact that indicates the great economic health of these areas, namely: São Paulo, Guarulhos, Santo André, São Bernardo do Campo (RMSP); Campinas, Itatiba, Indaiatuba and Valinhos (RMC); Jundiaí (AUJ); Santos (RMBS); São José dos Campos, Taubaté, Pindamonhangaba and Lorena (RMVPLN); Sorocaba and Itu (RMS); Piracicaba, Araras and Limeira (AUP); and Atibaia (URB). Santana do Parnaíba (RMSP) and Vinhedo (RMC) counties recorded mean householders' income higher than 10 minimum wages at the time of the 2010 Census; this outcome has evidenced income concentration in counties where families live in high-standard residential condominiums/allotments.

Studies carried out by *Observatório das Metrôpoles*¹⁰ (Metropolis Observatory) have emphasized that larger counties, and the ones located along the road system connecting RMSP, MRC, AUJ (Anhanguera-Bandeirantes), MRVP (Dutra - Airton Sena) and RMBS (Anchieta-Imigrantes), concentrate the employed population with the highest incomes - this population belongs to the upper and middle socio-occupational groups; they present high schooling level and high/medium professional qualification. On the other hand, urban centers located far from the main road system - in these same regions - mainly concentrate working and popular socio-occupational groups, who have lower education, qualification and income levels (BÓGUS; PASTERNAK, 2016). This brief MMP description summarized the essential role played by this macro-region in integrating economic dynamics, flows and large population concentration. However, its territory occupation model reflects concerning social and environmental conditions, as presented below.

10. Socio-occupational categories of MMP are defined in the methodology developed by *Observatório das Metrôpoles* - Metropolis Observatory (RIBEIRO, L.; RIBEIRO, M. 2013).

Urbanization and environment: conflicts and socio-environmental vulnerabilities in São Paulo Macrometropolis

According to data provided by EMPLASA (2016), more than 1.4 million people live in high socio-environmental vulnerability areas in MMP counties. This scenario becomes evident when MMP's environmental protection and preservation areas are taken into consideration, since they cover 20% of protected areas in São Paulo State, namely: state parks such as Serra do Mar and Cantareira; federal environmental protection areas in Paraíba do Sul Basin and Mantiqueira Mountains; state environmental protection areas in Piracicaba and Juqueri-Mirim, Corumbataí-Botucatu-Tejupá; as well as Cantareira and Várzea do Rio Tietê systems. In addition, Spring Protection and Recovery Areas (APRMs - Áreas de Proteção e Recuperação dos Mananciais) cover 54% of the RMSP.

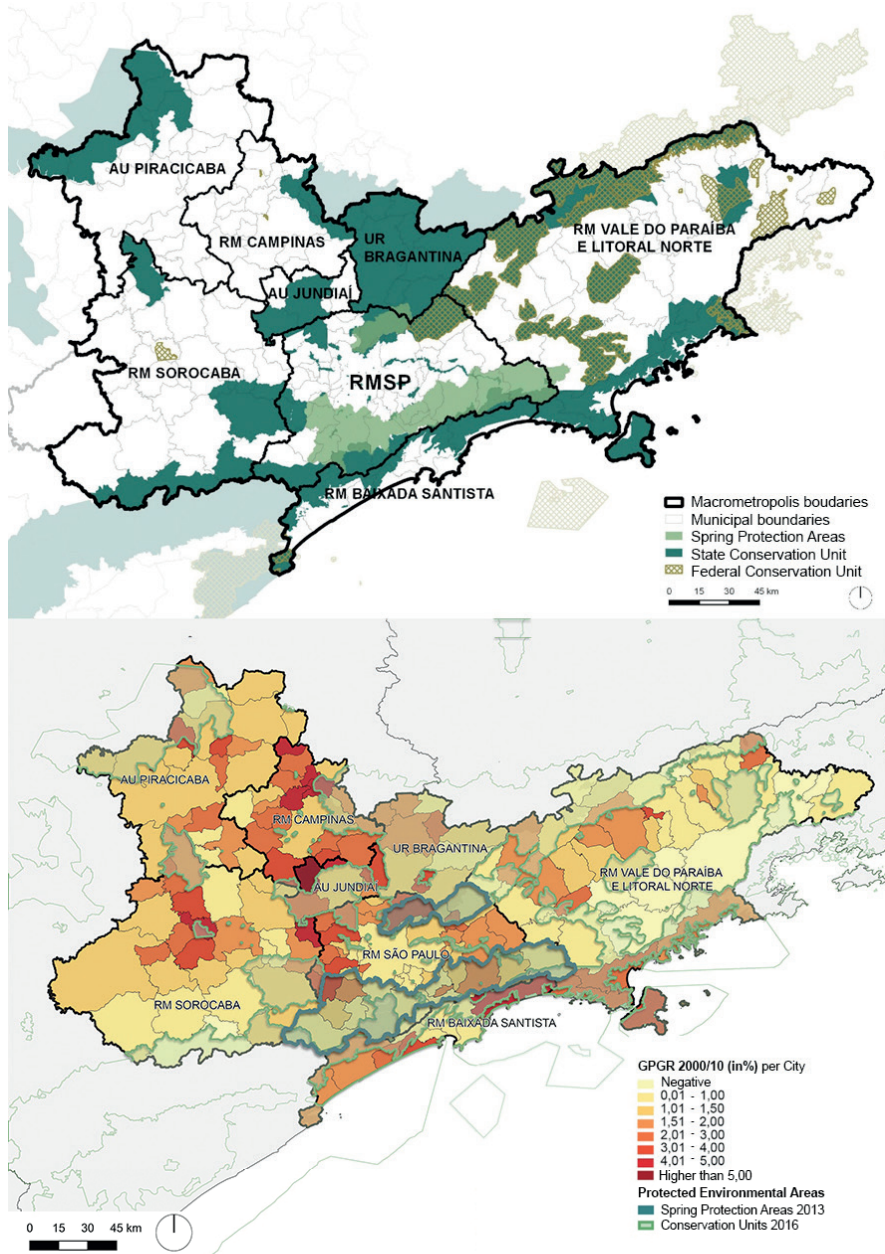
Regions comprising the MMP present significant urbanization level (89.6% and 98.9% in URB and RMSP, respectively). Despite the high urbanization level, the MMP presents low demographic density. According to the 2010 IBGE Census, counties such as Osasco, Carapicuíba and Guarulhos (RMSP); Praia Grande and São Vicente (RMBS); Hortolândia and Sumaré (RMC) recorded the highest demographic densities (more than 5,000 inhabitants per km²). The lowest demographic densities (less than 50 inhabitants per km²) were recorded for the following counties: Tapiraí, Piedade and Pilar do Sul (RMS); and Bananal, Arapeí, São José do Barreiro, Cunha, Campos do Jordão and Joanópolis (RMVPLN). Although demographic density is a relative indicator - since it is directly associated with territory size -, it is necessary taking into consideration that, somehow, it expresses urban occupation dispersion, i.e., few dense urban centers and a large area mostly presenting low population density.

The demographic growth informed by the geometric population growth rate (GPGR) is directly linked to the occupation of peripheral areas and of areas presenting greater environmental fragility. The main metropolitan regions have shown lower demographic growth rates in the last three decades than in previous decades, mainly in the 1960s/1970s/1980s. The explanation for such low demographic growth rate lies on decreased fertility, mortality and migration rates mainly recorded for the RMSP. However, the MMP presents great diversity when it comes to the GPGR of its counties, evidencing the previous statement. From 2000 to 2010 the host counties in metropolitan regions, such as São Paulo, Campinas, Sorocaba and São José dos Campos, presented GPGRs lower than 1% per year. Some small-sized counties presented high GPGR: Itupeva (AUJ) recorded the highest GPGR in the period (higher than 5% per year), whereas counties such as Bertioga (RMBS); Holambra, Jaguariúna and Paulínia (RMC); Louveira (AUJ); Iperó and Araçariguama (RMS); and Canas and Queluz (RMVPLN) recorded from 4.01% to 5% GPGR per year. Counties located in water source protection areas in the RMSP stood out with high GPGRs, namely: Mairiporã (which hosts Paiva Castro reservoir, the main reservoir in Cantareira system) and Cotia counties recorded GPGR between 3.01% and 4% per year; whereas Itapeverica da Serra, Rio Grande da Serra and Suzano counties recorded GPGR between 2.01% and 3% per year.

Figure 2 presents maps of the main environmental protection areas at state and federal levels, as well as demographic growth rates per MMP county. It is possible seeing

significant population growth rate in counties close to, or overlapping, protected areas, including spring protection and recovery areas located in the RMSP.

Figure 2 – São Paulo Macrometropolis: Protected Areas (2015); Geometric Annual Population Growth Rate (2000 - 2010) per county and Protected Areas.



Sources: Protected Areas: SMA / CPLA, 2019 and EMLASA, 2016. GPRG: IBGE census, 2000 and 2010. Prepared by Gisete Reis and Karina Dominici Alves.

These data indicate that São Paulo Macrometropolis presents different population growth paces and compositions, a fact that reinforces its complexity as macro-region. It is clear that the main road and transportation systems articulate centers and sub-centers, services, as well as industrial and residential areas of high and medium income. Populations living under unfavorable socioeconomic conditions occupy highly environmental fragile and disconnected from the mobility system. It is possible seeing intense concentration and spatial overlap of social vulnerability and environmental risk.

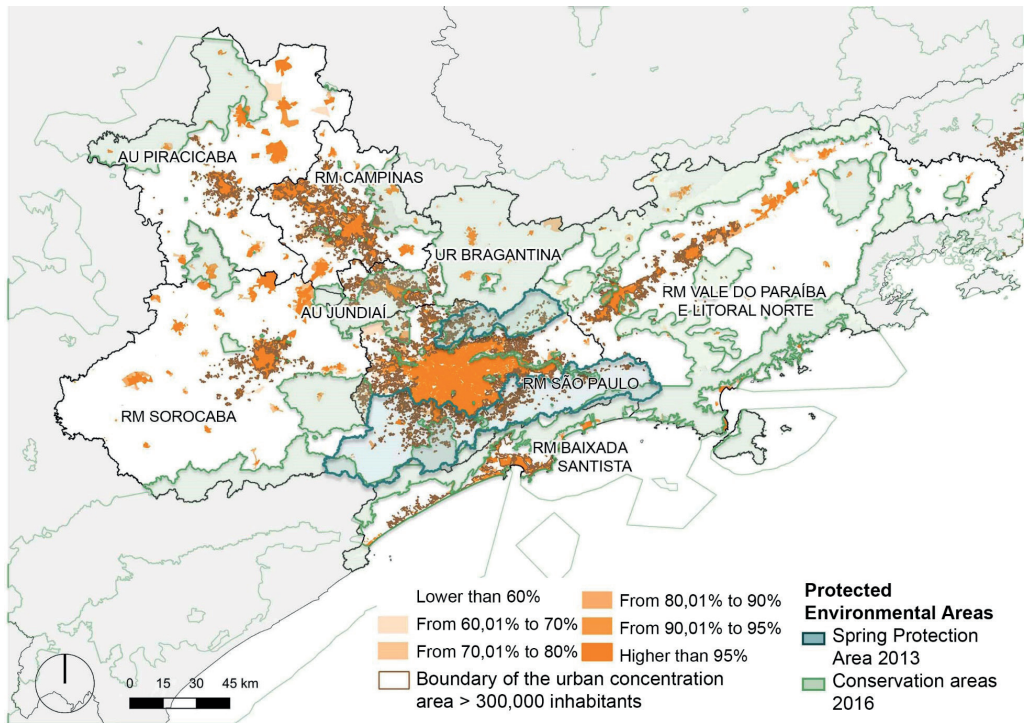
According to IBGE (2010), basic sanitation indicators mapped per census sector have corroborated this analysis and indicated specificities in some areas.

Overall, data have shown that water supply and garbage collection are virtually universal services in São Paulo Macrometropolis. More than 80% of households in most counties and census sectors had access to the general water supply and garbage collection network in 2010. However, the intra-urban reality is quite different, as well as that the overall data recorded by research agencies and institutes do not express such reality. It is clear that the population, mainly the one living in peripheral areas, is subjected to intermittent water supply. Garbage collection does not reach part of the neighborhoods in large cities, since the road geometry of many *favelas* and irregular allotments hinders vehicle traffic. These areas often lack public lighting, street paving and afforestation; besides, they often present open sewage and inadequate solid waste disposal.

Figure 3 presents sewage coverage data from the last Demographic Census (IBGE, 2010); these data were mapped per census sector and they indicate the association between low service levels and socio-environmental vulnerability in protected areas, as opposed to better located areas. Sectors highlighted in orange shades represent places where the centers of the main counties are located in, as well as the ones served by the structural road system of MMP - some of these sectors host 95%, or more, households connected to the sewage network (dark orange). However, the service is more critical on the opposite side. Less than 60% of households located in the most distant sectors, including sectors sheltering environmentally protected areas, have access to this service (blank areas, or areas overlapped by green areas).

These data reveal significant lack of sewage network coverage for 40% of residents living in some sectors, mainly in sectors located in high environmental vulnerability areas.

Figure 3 – São Paulo Macrometropolis: permanent households connected to the sewage network (%).



Source: IBGE CENSUS, 2010. Prepared by Gisete Reis, 2019.

The County Sewage Collection and Treatability Indicator (ICTEM - Indicador de Coleta e Tratabilidade de Esgoto de Município) provided by CETESB helps partially understanding the complexity of such issue. In 2010, approximately 63% of counties in the Macrometropolis recorded ICTEM lower than 5 in the classification range from 1 to 10¹¹. According to EMLASA (2012), 17% of the counties recording low ICTEM were below index 1, namely: Campo Limpo Paulista and Várzea Paulista (AUJ), Lavrinhas and Queluz (RMVPLN), Tuiuti (MRB), Araçariguama and São Roque (RMS), Guarujá and Praia Grande (RMBS), as well as Barueri, Caieiras, Cajamar, Embu, Francisco Morato, Franco da Rocha, Itapeçerica da Serra, Itapeví, Jandira and Santana do Parnaíba (RMSP).

The National Water Resources Information System (SNIRH - Sistema Nacional de Informações Sobre Recursos Hídricos), which is controlled by the National Water Agency, presented sewage collection data from 2013 in Brazil, these data reinforced contradictions in this service in the MMP: counties such as Itapeçerica da Serra and Araçoiaba da Serra recorded significant lack of services – no sewage collection or treatment -, whereas counties such as Valinhos, Limeira, Jundiaí and Campinas brought this indicator down to zero. It is

11. This indicator was developed by CETESB to classify the urban sewage collection and treatment potential.

essential mentioning the incidence of *favelas*¹² in São Paulo Macrometropolis; according to PASTERNAK; D'OTTAVIANO; BARBON (2019), *favelas* are a macrometropolitan phenomenon, since 40 of the 60 São Paulo State counties presenting *favelas* in 2010 were located in the MMP. The RMSP has the largest number of counties with subnormal clusters. The metropolitan regions of Campinas and Baixada Santista have been presenting relevant data. Twenty (20) of the 39 counties located in the RMSP have *favelas*, as well as 6 of the 20 counties located in the Metropolitan Region of Campinas, and 4 of the 9 counties located in Baixada Santista.

According to the 2010 Census, 2,047 (98%) of the 2,087 subnormal clusters or *favelas* observed in São Paulo State were located in MMP units; they comprised 741,239 households (7.64% of the total households) and 2,691,127 people (8.95% of the total MMP population). The RMSP stood out for the absolute number of households and residents with 1,703 subnormal clusters, 596,479 households (9.80% of the total number of households) and 2,169,502 people living in *favelas* (11.15% of the total population). According to data of the 2010 Census, the largest part of the population living in *favelas*, in comparison to the total population, is found in the Metropolitan Region of Baixada Santista (17.97% of the total population), which is followed by the Metropolitan Regions of São Paulo and Campinas (5.88% of their total population). Based on PASTERNAK; D'OTTAVIANO; BARBON (2019), the number of individuals living in *favelas* in the AUJ reached approximately 3.5% of its total population. According to the aforementioned authors, households' conditions in subnormal clusters have been worsening, mainly in the Metropolitan Regions of São Paulo and Baixada Santista, whose total population increased from 9.46% (in 2000) to 11.15% (in 2010), as well as from 12.99% (in 2000) to 17.97% (in 2010), respectively.

The number of individuals living in subnormal clusters in the Metropolitan Region of Campinas decreased from 6.16% to 5.88% in comparison to its total population; however, the absolute number of individuals increased by 21 thousand (PASTERNAK; D'OTTAVIANO; BARBON, 2019).

Overall, the *favelas* are mainly located in the boundaries of, or in territories integrated to, areas of great environmental importance, such as the water source protection and recovery areas in the RMSP or next to Serra do Mar (Sea's Ridge). According to Taschner (2000), the concentration of individuals living in subnormal clusters is a variable that properly expresses the association between poverty and lack of urban infrastructure; moreover, it has strong link to individuals' exposure to environmental risks.

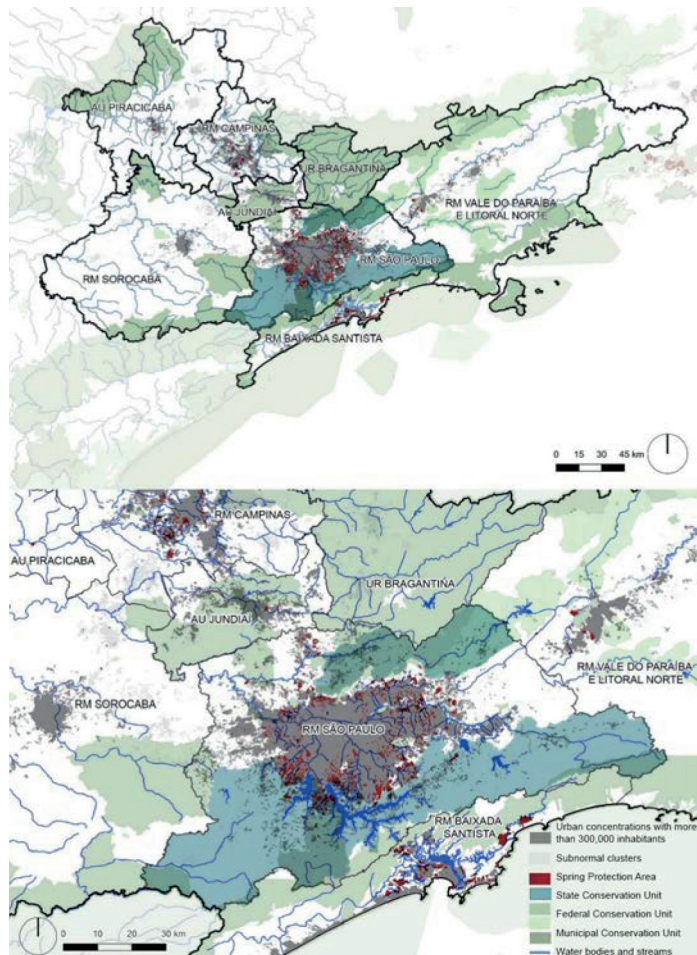
Based on territorial information released by the 2010 Census, it is possible seeing the alarming situation associated with the occupation of water courses and environmental protection and preservation areas by subnormal clusters. In 2010, the RMSP recorded the largest number of households in subnormal clusters. According to IBGE (2011), they were mainly built on the banks of streams, rivers or lakes/ponds (148,600 households), in landfills, dumps and other contaminated areas (1,984 households), in areas located close to gas/oil pipelines (2,282 households) and transmission lines (10,816 households), as well as in environmental preservation areas (10,213 households). Such information

12. Pasternak; D'Ottaviano (2010) consider that the data on subnormal agglomerations recorded by the Census in 2010 deal specifically with precarious occupation of the favela type.

corroborates the analysis carried out by Alves (2006)¹³, who pointed out that, according to 2000 Census, 62.8% of the population living in favelas in the RMSP were found in high socio-environmental vulnerability areas, a fact that evidenced high exposure to environmental risks and severe poverty experienced by this population.

Figure 4 shows the conflict among urban areas, subnormal clusters and protected areas in the MMP; its enlarged image highlights the occupation of preservation areas in the RMSP and RMBS by subnormal clusters.

Figure 4 – São Paulo Macrometropolis: urban areas, urban clusters versus environmentally Protected Areas.



[Source: IBGE, 2010; EMLASA, 2013; Instituto Florestal (Forestry Institute), 2018. Prepared by Gisete Reis, 2019.

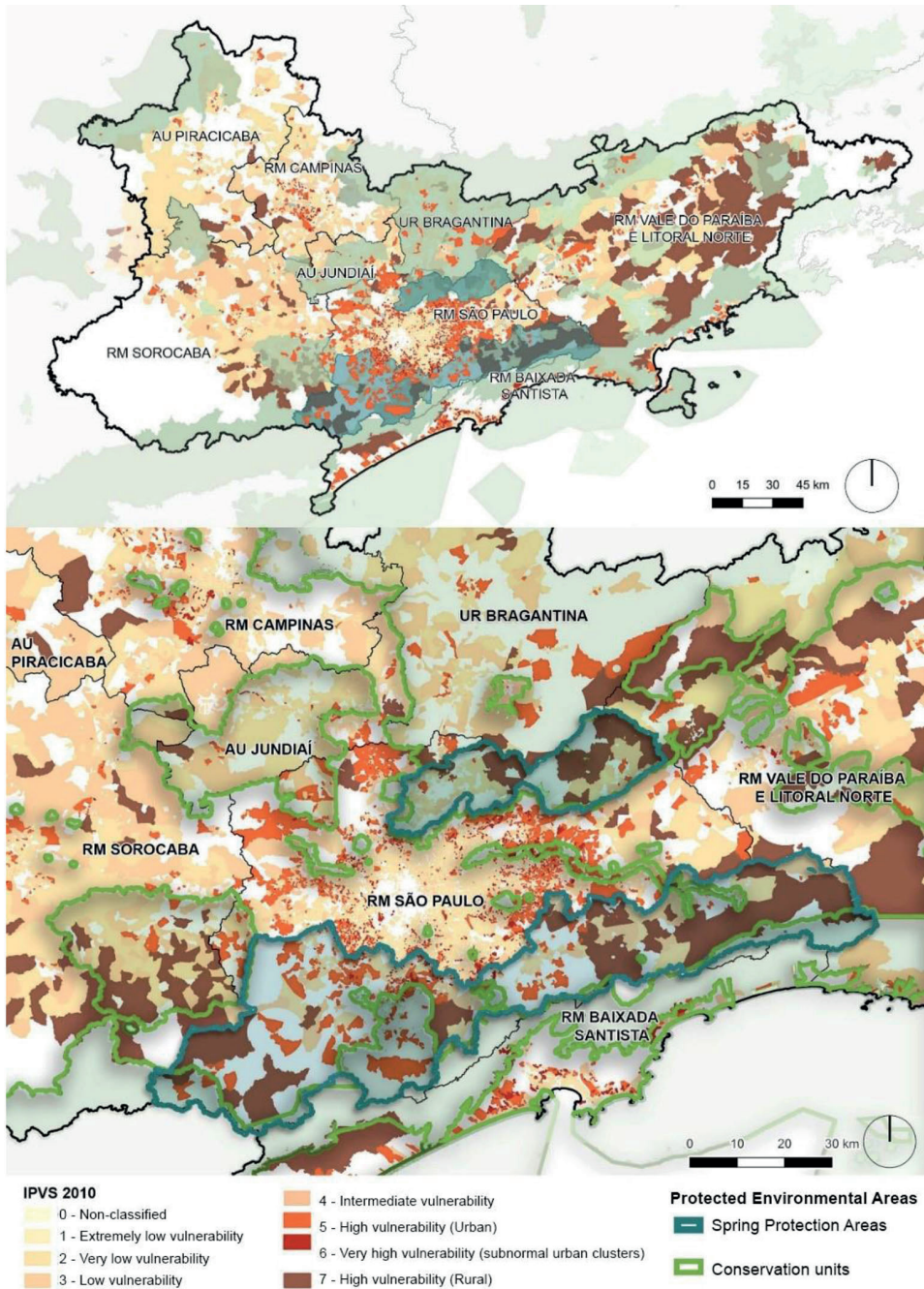
13. ALVES et al (2010) and ALVES (2017) operationalize the concept of socio-environmental vulnerability based on the construction of socio-environmental indicators at intra-urban scale (by crossing IBGE Census and environmental data that represent environmental risk areas).

If one correlates the protected areas to São Paulo Vulnerability Index (IPVS - Índice Paulista de Vulnerabilidade)¹⁴ per MMP census sector, it is possible seeing that the more peripheral and closer to protected areas the urban occupation is, the higher the IPVS. Census sectors located in central urban centers and in consolidated neighborhoods present IPVS ranging from 1 to 3 (Extremely Low, Very Low and Low Vulnerability), whereas peripheral sectors - mainly the one located near protected areas - present IPVS ranging from 4 to 7 (Medium, High, Very High Vulnerability - urban subnormal clusters; High Vulnerability - rural subnormal clusters). Figure 5 presents the IPVS of the MMP per census sector, as well as the enlarged image of the RMSP and its neighboring regions. There is significant concentration of census sectors presenting IPVS indices 5 and 6 in the Campinas-São Paulo and Santos axes, mainly in sectors adjacent to, or overlapping, environmental and spring protection areas.

Data about the nominal monthly income (per capita) of the population corroborate the current analysis by pointing out significant income variation between people living in peripheral areas and the ones living in central areas. Based on the 2010 Census, such income ranged from R\$ 363.00 (0.7 minimum wages) to R\$ 1,288.00 (2.5 minimum wages). Data about the population earning up to half the minimum wage were mapped per census sector (Figure 6) to help better understanding the complexity of the situation. According to the 2010 Census, the census sectors in the central areas of counties located along the main circulation axes accounted for 10% (or less) of the population earning up to half the minimum wage, whereas a significant number of individuals with per capita income lower than half the minimum wage lived in the census sectors of urban peripheries, in areas presenting significant fragility or in preservation areas. The largest part of the population earning per capita nominal monthly income lower than half the minimum wage is found in the farthest regions from the MRSP, close to environmental preservation areas (mainly in Serra da Cantareira), and next to the Metropolitan Regions of Campinas, Sorocaba, Paraíba Valley and Northern Coast. The edges of these regions present 30% of the population living with per capita monthly income lower than half the minimum wage.

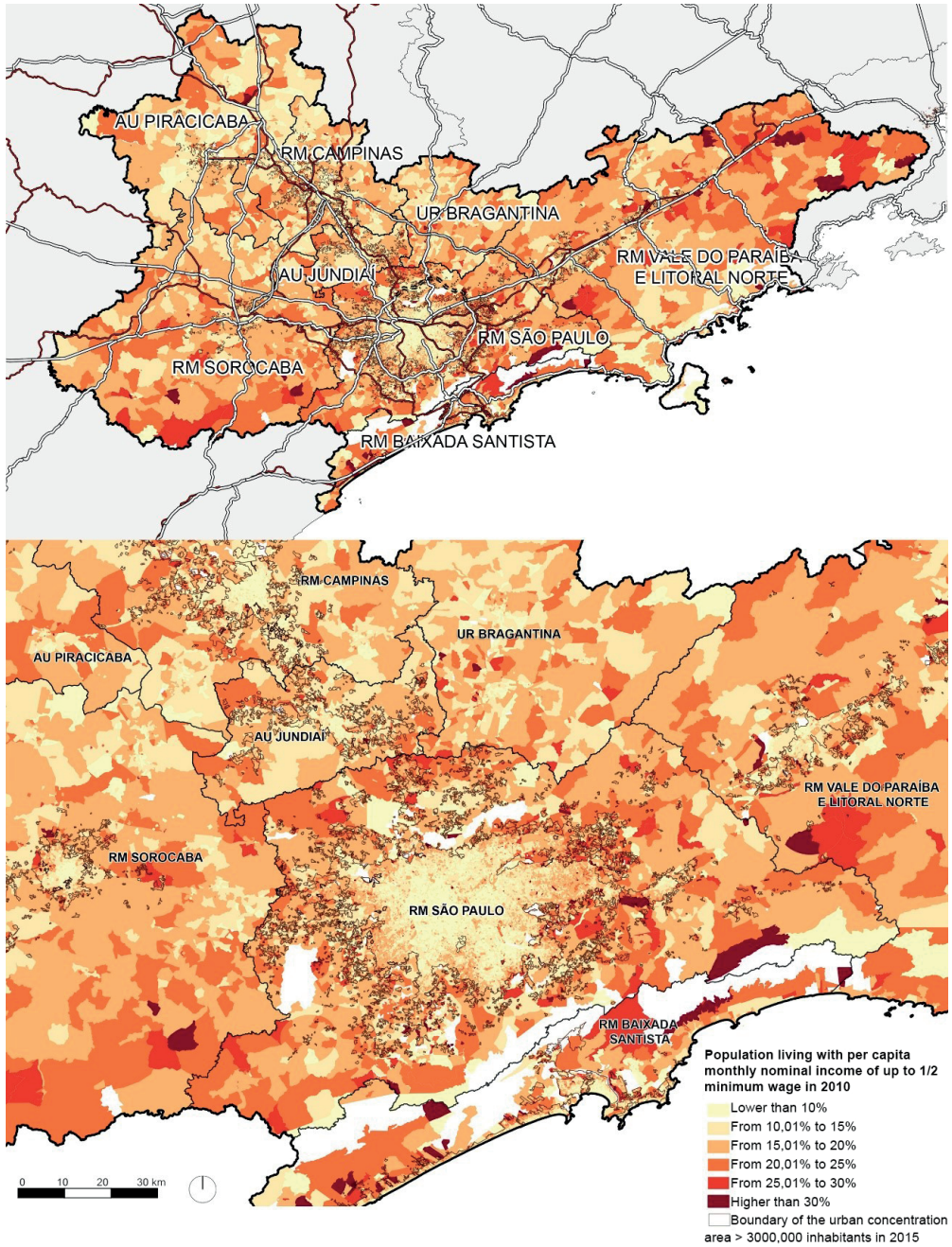
14. The IPVS, indicator created by Seade Foundation, classifies the counties of the state of São Paulo and their census sectors into socially vulnerable groups, based on the combination of demographic and socioeconomic dimensions (SEADE, 2013).

Figure 5 – São Paulo Macrometropolis: São Paulo Social Vulnerability Index (IPVS - Índice Paulista de Vulnerabilidade Social); environmental protection areas (2010).



Source: SEADE Foundation, 2013; EMLASA, 2013; Instituto Florestal (Forestry Institute), 2018. Prepared by Gisete Reis, 2019.

Figure 6 – São Paulo Macrometropolis: population living with mean per capita income of up to 1/2 minimum wage per census sector (%).



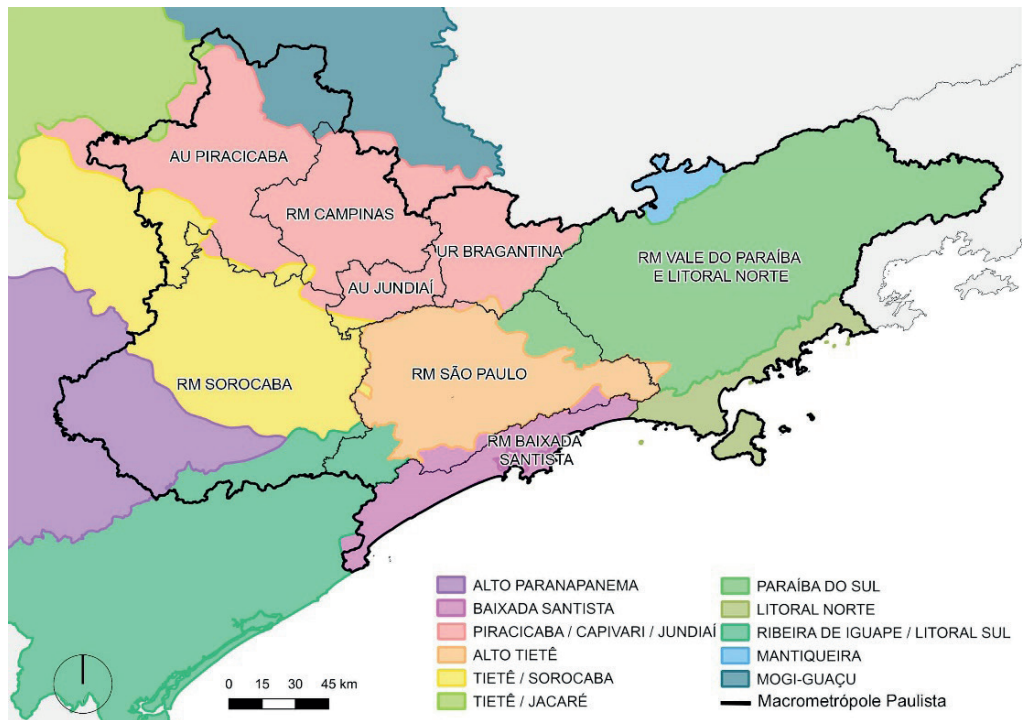
Source: IBGE Census, 2010. Minimum Wage in São Paulo State in 2010: R\$ 510.00. Prepared by Gisete Reis, 2019.

Institutional political conflicts: obstacles and challenges

It is possible seeing important political-institutional conflicts and socio-spatial processes in the MMP. They boost sectorial policies and lead to lack of integrated urban and regional planning processes.

It is worth mentioning that different territory management forms coexist in the MMP, most of them are addressed in the 1988 Federal Constitution and in resulting state/municipal laws: counties - federative entities responsible for planning land use and occupation processes (articles 182 and 183 of the 1988 Federal Constitution; Federal Law 10.587 / 2001); metropolitan regions, urban clusters and micro-regions (article 225 of the 1988 Federal Constitution) - regional units planned to manage common issues (although with little progress, despite the Metropolis Statute, Federal Law 13.089/2015). Simultaneously, state bodies in charge of water and environmental management processes - such as DAEE, SMA, CETESB, among others - use the water resource system (State Law 7633/1991) as reference to define water resource management units (UGHRIS), which, in their turn, overlap and do not coincide with the municipal and regional political-administrative boundaries (Figure 7).

Figure 7 – São Paulo Macrometropolis: Water Resource Units versus Political-Administrative Units.



Source: Administrative boundaries: EMPLASA, 2019. UGHRI boundaires: São Paulo State Geographic and Cartographic Institute (IGC-SP), 2014. Prepared by Gisete Reis, 2019.

Although these management instances have different attributions, they end up determining the prevalence of sectorial policies, as well as evidencing the lack of integrated territory planning and management, and difficulties of articulation among State, counties and civil society instances; in short, they evidence lack of integrated perspective in their agendas, policies and actions.

It is worth emphasizing that the concept of Spring Protection and Recovery in São Paulo State - foreseen by State Law N. 9.866/1997 - indicates, on the one hand, a certain progress in the likelihood of articulation between urban and environmental policies focused on protected areas. On the other hand, it exemplifies the hard time to implement a process that has been dragged for more than 20 years.

This legislation, which is based on the principles of São Paulo State Water Resource Policy (State Law N. 7633 / 1991), defines hydrographic basins as planning and management units, whereas Basin Committees are described as the bodies responsible for decentralizing management spring areas, as well as for the tripartite and equal participation of State, Local and Civil Society representatives. Specific legislations, which are instruments required for its regulation, delimit intervention areas based on the land use and occupation features observed in the hydrographic basins about to be protected, preserved and/or recovered. In addition, these legislations are used to guide municipal master plans, which must be in compliance with parameters defined by them (ALVIM, 2019).

Specific laws within the scope of Alto Tietê Hydrographic Basin, which virtually coincides with the RMSP and presents significant water resource issues, have been implemented quite slowly: in 2006, State Law N. 12233 defined the APRM- G (Watershed Protection and Recovery Area of Guarapiranga sub-basin); in 2009, State Law N. 13579 defined the APRM-B (Billings sub-basin); and in 2015, State Laws N. 15790 and 15913 instituted the APRM-AJ (Alto Juquery, which corresponds to the spring area of Juquery-Cantareira sub-basin) and the APRM-ATC (Alto Tietê Cabeceiras sub-basin), respectively. The process to make the municipal master plan compatible to state laws has been time-consuming due to its complexity, to political-institutional conflicts among the state, counties and the civil society, and to the occupation dynamics of spring areas¹⁵.

This topic is of paramount importance, mainly because several hydrographic basins of the MMP, such as Alto Tietê and Piracicaba-Capivari, have been facing critical water availability issues since 2013 (JACOBI; LEÃO, 2015).

The adoption of different political-institutional logics to deal with severe socio-environmental issues can have significant negative effects on areas of great fragility and on environmental protection areas, a fact that puts the sustainability of São Paulo Macrometropolis at risk.

Final Considerations

There is clear intertwining among, and overlapping of, urban expansion processes and social and environmental issues in Brazilian cities, mainly in metropolitan areas with

15. For further information, see Alvim, 2019.

large population concentrations. Far from exhausting the therein investigated topic, the current article aimed at addressing how the MMP is a complex territory that host human, economic and environmental relationships often subjected to conflicts. The MMP is an urban-regional phenomenon that aggregates different scales, and whose articulation logic is based on economic flows, as well as on the circulation of people, goods and information that, together, privilege the macro scale to the detriment of intra-urban dynamics and its socioenvironmental specificities.

The territorial dimension of the MMP, as well as socioeconomic, demographic and environmental diversities, determine, and are determined by, relationships set between different economic scales and flows. These relationships overlap local daily-life activities, as well as environmental fragility and irregular territory occupation.

Areas counting on circulation, transportation and logistics infrastructure support the flows and the main economic activities linked to the dynamics of MMP's territory and to dynamics taking place at state, national or global scales, a fact that favors the concentration of high- and mid-income social groups living in it. On the other hand, there is overlap of social and environmental issues in areas that mostly house low income populations, who live under precarious housing conditions in a deficient urban infrastructure that lacks urban equipment - it reflects alarming social and environmental conditions.

Overall, public policies, plans, programs and projects are conflicting and sectorial; thus, they do not achieve satisfactory results due to vulnerability patterns observed in different Macrometropolis scales, mainly in fragile areas inhabited by the least favored populations.

The political-institutional conflicts taking place in water source protection and recovery areas belonging to Alto Tietê Hydrographic Basin (RMSP) exemplify the aforementioned issue. Advancements observed since the enactment of State Law N. 9866/1997 are opposed to the relationship between urban and environmental policies that, in most cases, are developed in a non-convergent and disjointed way, or that are founded on the instability of short and medium-term political agreements (ALVIM; KATO; BRUNA, 2015). These policies fail to address the effects of urban occupations on essential water resources used for human supply.

The use of hydrographic basins as intervention units may be a possible way to implement integrated urban and environmental planning and management models in São Paulo Macrometropolis. However, the integrated management of river basins requires the intersectoral, institutional and shared articulation of these territories (SILVA, 2000), which, in its turn, requires the implementation of a new governance form understood in a more comprehensive way, such as the one that incorporates state and non-state actors (JACOBI and SINISGALLI, 2012).

Finally, the effectiveness of urban and environmental public policies depends on the redefinition of a new integrated urban and environmental development model, on the expansion of population's participation basis and on the redefinition of the role played by the State as an agent capable of articulating different instances in favor of public interests.

Thus, sustainability emerges as a complex concept with multiple dimensions, in which the idea of a balanced relationship among economic growth, environmental

preservation, political-institutional integration, and social equity and justice stands out. It remains to be seen whether the effective achievement of sustainability and conflict overcoming are possible alternatives in Brazilian cities, mainly in complex regions such as São Paulo Macrometropolis.

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CONFLICTS, VULNERABLE AREAS AND SUSTAINABILITY IN SÃO PAULO MACROMETROPOLIS

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CONFLICTS, VULNERABLE AREAS AND SUSTAINABILITY IN SÃO PAULO MACROMETROPOLIS

Abstract: The aim of the current article is to address the relationship between urban dynamics and socio-environmental conflicts expressed in the territory of São Paulo Macrometropolis (MMP), which is a complex urban-regional phenomenon whose logic is mainly associated with economic and circulation flows based on different local dynamics. As the result of a research in progress, the current study is based on a methodology that associates socioeconomic and urban data analysis and the mapping of some indicators. Its main aim is to investigate conflicts associated with the dynamics of the Macrometropolis, with emphasis on relationships set among environmental vulnerability, socio-spatial inequalities and protected areas. Results have indicated that the urbanization process in the MMP, which is dispersed and lacks planning, has significant negative effects on environmental protection areas and jeopardizes their sustainability. It was possible concluding that it is necessary implementing an integrated and participatory planning process in the MMP.

Keywords: Urban-environmental conflicts, sustainability, São Paulo Macrometropolis.

CONFLITOS, ÁREAS VULNERÁVEIS E SUSTENTABILIDADE NA MACROMETRÓPOLE PAULISTA

Resumo: Este artigo aborda as relações entre as dinâmicas urbanas e os conflitos socioambientais que se expressam no território da Macrometrópole Paulista (MMP), fenômeno urbano-regional complexo e de lógicas predominantemente associadas a fluxos econômicos e de circulação, com dinâmicas locais diferentes entre si. Fruto de pesquisa em andamento, o artigo desenvolve-se a partir de metodologia que integra a análise de dados socioeconômicos e urbanos e técnicas de mapeamento. O principal objetivo é discutir os conflitos relacionados às dinâmicas da MMP com ênfase nas relações entre vulnerabilidade

ambiental, desigualdades socioespaciais e áreas protegidas. Os resultados indicam que o processo de urbanização da MMP, disperso e sem planejamento, tem efeitos perversos nas áreas de proteção ambiental, colocando em risco a sua sustentabilidade. Como parte das conclusões, defende-se a necessidade de implementação de um processo de planejamento integrado e participativo na MMP.

Palavras-Chave: Conflitos urbano-ambientais, sustentabilidade, Macrometrópole Paulista.

CONFLICTOS, ZONAS VULNERABLES Y SOSTENIBILIDAD EN EL MACROMETRÓPOLE PAULISTA

Resumen: Este artículo aborda las relaciones entre las dinámicas urbanas y los conflictos socioambientales que se expresan en la Macrometrópolis Paulista (MMP), Fenómeno urbano-regional complejo y de lógicas predominantemente asociadas a flujos económicos y de circulación, con dinámicas locales diferentes entre sí. Fruto de investigación en curso, el artículo se desarrolla a partir de una metodología que asocia el análisis de datos socioeconómicos y urbanos y el mapeo de algunos indicadores. El principal objetivo es discutir los conflictos relacionados con las dinámicas de la Macrometrópolis con énfasis en las relaciones entre vulnerabilidad ambiental, desigualdades socioespaciales y áreas protegidas. Los resultados indican que el proceso de urbanización de la MMP, disperso y sin planificación, tiene efectos perversos en las áreas de protección ambiental, poniendo en riesgo su sostenibilidad. Como parte de las conclusiones, se defiende la necesidad de implementación de un proceso de planificación integrado y participativo en la MMP.

Palabras Clave: Conflictos urbano-ambientales, sostenibilidad, Macrometrópole Paulista.
