

Conflict and oppositions in the development of peri-urban agriculture: The case of the Greater São Paulo region

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Abstract

One of the main factors preventing food production in urban and peri-urban areas is territorial opposition between different land uses. The aim of this article is to address the question of conflicts close to large urban centres, taking the example of the São Paulo Metropolitan Region (SPMR), a representative urban area, which includes both food issues of the cities: the still important presence of subsistence agriculture that serves to feed the local people and the development of much-gentrified urban agriculture. Our study is based on expert interviews, an analysis of the regional daily press and a study of local information sites and blogs. First, we briefly depict peri-urban agriculture and its main characteristics, and we stress the importance of land-use occupation faced with competing uses. Then, we present our method of analysis and the main agricultural characteristics of the SPMR. The third part is devoted to a study of the local conflicts, their location, their link to agriculture and the consumption of agricultural soils and the typology of the opponents and supporters of this activity. Finally, we conclude with some lessons on the place of peri-urban agriculture drawn from this experiment.

KEYWORDS

conflict, land use, opposition, peri-urban agriculture, urban sprawl

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INTRODUCTION

The issue of agriculture in and around cities has taken on renewed importance in recent years in response to the growing demands of populations for healthy and local food. The Coronavirus disease (COVID-19) crisis has only exacerbated an already strong tendency toward the identification, traceability and quality of food (Bakalis et al., 2020; MAPA, 2020). At the same time, the pandemic raised a desire for urban dwellers to consume more local products, to be informed about the identity of their producers and not to live too far away from them. Eventually, environmental concerns have led to some preferences for the shortening of transport distances, for example, in terms of food miles, and to the willingness to consume seasonal products, corresponding to the climatic and soil conditions of the region.

Peri-urban agriculture is seen as an important source of local food production in urban dynamics, and consumers located in urban areas increasingly ask for local production. Indeed, different arrangements are possible to build proximity relationships that can allow necessary infrastructure to link production to the final consumption areas. The reduction of the number of intermediaries can build a social relationship of trust between producers and consumers, whether it is through the creation of short marketing channels, alternative food production networks or numerous initiatives from civil society. Peri-urban agriculture, therefore, takes its place in all the questions on local food systems from the perspective of optimising this geographical and organised proximity with urban centres (Kebir & Torre, 2012). Alongside a reduction of costs in the products at the end of the chain, the environmental aspect appears crucial in these exchanges, whose carbon footprint must be lower, compared to other more conventional models.

Nowadays, the question of supply and food security in large urban centres (so-called food sovereignty; FAO, 2013) becomes an essential dimension for more resilient urban governance. Values-Based Territorial Food Networks (Nemes et al. 2023) provide food solutions for local populations, but they also raise questions in terms of territorial governance and economic and land-use issues. Regarding the constant increase in the world population (United Nations Organization (UNO), 2019) and its dominant urban character (FAO, 2009), proximity agriculture is considered a solution for several problems (De Zeeuw et al., 2000; FAO, 2007; Opitz et al., 2016). However, its inscription on the agenda of strategic urban planning and the management of urban or peri-urban agricultural areas and landscapes have always been laborious, whether through obtaining licences and carrying out best agricultural practices (Ackerman et al., 2014) or promoting its benefits for inhabitants (van Veenhuizen, 2006). The implementation and the development of public policies of financial and technical support to urban and peri-urban farmers allow that agricultural activities can be maintained, contributing to their diverse benefits to the population and the urban landscape (Madaleno, 2002), but they still confront several existing pressures from the urban environment.

This article focuses on the issues and the problems raised by the presence of agriculture on the fringes of urban agglomerations and sometimes even within the city. It is well documented that one of the main limits of the development or maintenance of food production in urban and peri-urban areas is linked to the existence of land-use conflicts (Darly & Torre, 2013; FAO, 2011; Fonseca & Torre, 2022) due to the competition between various uses of soils. This research aims to understand the importance of territorial conflicts related to the permanence of food production near and inside large urban areas. Our study is based on the example of agriculture in the suburbs and the hinterland in the region of the Greater São Paulo (Brazil).

The choice of this case study is based on the fact that this urban area is representative of the issues facing urban and peri-urban agriculture. In fact, it includes both the food issues of the cities, with the still important presence of subsistence agriculture that serves to feed the people who work there, and the development of a much-gentrified urban agriculture that meets the demand of the affluent population. Despite its large number of inhabitants of 12.4 million and its urban extension of 1.5 thousand km² (IBGE, 2021), it may be hard to imagine that the city of São Paulo has 445 km², so approximately one-third of its territory, classified as a rural area (São Paulo, 2016b), and that agriculture is still present, sometimes being the only source of employment and income for several local families.

Moreover, it is also obvious that the maintenance or development of agricultural activity is subject to increased urbanisation, as well as to the development of infrastructure serving urban agglomeration. Cities around the world have been proposing several actions to encourage territorial agricultural development. One of the most important in the case of São Paulo is the enactment of Law no. 16.140/15 on the progressive inclusion of organic or agroecologically based food in school meals from the city and its surroundings (São Paulo, 2016a). The city has been a signatory of the Milan Urban Food Policy Pact since 2015, which discusses the real engagement of local authorities in the setting of public agricultural policies for the urban environment and food security, aiming at articulations between different society actors, allowing guaranteed access to land, adequate school meals and stimulating short production circuits (MUFPP, 2020).

Our goal is to explore the questions posed by the maintenance and development of peri-urban agriculture in a situation of strong urban sprawl and to analyse the strategies followed by local stakeholders responsible for opposed land-use intentions. In particular, we analyse the types of conflicts between these local actors and the actions of public bodies in favour of the persistence or rise of peri-urban agriculture. In the first part, we briefly present the situation of peri-urban agriculture, describing its main characteristics and stressing the importance of land-use occupation faced with competing uses. In the second part, we present the method of analysis, as well as the main agricultural characteristics of the São Paulo Metropolitan Region (SPMR). The third part is devoted to an analysis of the local conflicts, their location, their link to agriculture and the consumption of agricultural soils and the typology of the opponents and supporters of this activity. Finally, we conclude with some lessons on the place of peri-urban agriculture drawn from this experiment.

THE IRRESISTIBLE RISE OF PERI-URBAN AGRICULTURE?

Urban or peri-urban agriculture, which designates agricultural activities located in the city or on its periphery, also encompasses agriculture whose products are mainly intended for the city and is located on soils or land for which there is an alternative between agricultural and nonagricultural use of resources (Moustier & Fall, 2004). Its definition thus covers two main issues, which concern (1) the supply of cities through local agriculture and (2) urban and peri-urban land use. These soils, their use and ownership, are subject to competition, complementarities and possible conflicts with other activities in the service of the city such as the construction of housings or office buildings, transport or waste treatment infrastructure, industrial production or the construction and maintenance of leisure and nature areas.

A few notions

For the Resource centre on Urban Agriculture and Food security (RUAF¹), urban and peri-urban agriculture is defined as the growth of trees, food and other agricultural products (herbs, pot plants, fuel, fodder) and the raising of livestock (and fisheries) within the built-up area or on the fringe of cities. It includes production systems such as horticulture, livestock, (agro) forestry and aquaculture and input supply, processing and marketing activities. However, it appears useful to make a separation between agriculture in proximity and within the city. Although this peri-urban agriculture, also called 'urban fringe agriculture' (Bryant, 1997) or 'metropolitan agriculture' (Heimlich, 1989), is under the threat of various urban pressures, it takes advantage of the proximity to urban activities, such as culture and markets, and it can be considered a sociocultural transformation from the rural to the urban way of life (Antrop, 2000; Piorr et al., 2011).

Located on the fringes or near the city, in areas sometimes used for agricultural purposes decades ago (Opitz et al., 2016), this agriculture aims to help feed urban dwellers. It is maintained in many emerging economies, related to the strong demand of urban inhabitants to consume cheap local foods or even to organise their own garden production. In this way, its maintenance prevents increases in food insecurity, unemployment and poverty (Dubbeling et al., 2010; FAO, 2007). Agricultural activity in these urbanised areas is not an option, but it is usually one of the only possibilities to survive and to access food and housing (Hamilton et al., 2014; Smit & Nasr, 1992).

Both in developing and developed countries, these agricultural activities are taking place to respond to the demands of urban populations, contributing to increasing people's food and nutrition security and being effective actions to achieve UN Sustainable Development Goals (Lal, 2020). These new demands have shown great diversity (Galli & Brunori, 2013) and a strong capacity for innovation in recent years, particularly with the establishment of short food supply chains for the city. These models, through which minimal intermediaries are established between the producer and the final consumer and the traceability of food products, present themselves in diverse organisational forms but share the same central base of support and appreciation of social relationships (Kneafsey et al., 2013). These products are often sold in open-air markets but may correspond to direct farm sales, picking, baskets made available to consumers or even Internet sales and are increasingly available in large- and medium-sized stores or collective catering. Beyond this marketing diversity, one aspect that is widespread is the fortification of territorial and community identity (Vittersø et al., 2019) made through the collaborations between producers and consumers and the communication made around these relationships.

The short food supply chains can be linked to two main characteristics: a short distance from the city (the chain is short because the product travels a few kilometres to be sent to consumers) and a low number of intermediaries (the chain of production and supply to consumers is short because it has few or no intermediaries; Kebir & Torre, 2012). They appear in part as the continuation of old forms of relationship between the city and peripheral agriculture, which took the form of market gardening or fruit belts, and food market places in the weekly open-air markets of most towns and villages. However, they are also set apart from this tradition by the motivations of their creators and their strong social and organisational innovations (Harrison & Vezin, 2006), like support for populations and links with the social economy, reference to the traceability of products and the origin of the farmer, methods of delivery and routing of products or reduction of food miles (Mundler & Laughrea, 2016). The Values-Based Territorial Food Networks (Nemes et al. 2023) emphasise the dimensions of production and exchanges with consumers but also the governance of the whole local complex network and their acceptability by local populations.

Land-use issue and local solutions

Urban fringes, or the immediate outskirts of cities, are subject to intense competition for land use and land prices. Agriculture is just one of the possibilities for land use, confronted with many other uses in terms of infrastructure or housing, for example. The valuation of agricultural land is not comparable with that of alternative uses and results in oppositions, tensions, conflicts and pressure for urbanisation and artificialisation (Castillo et al., 2013; Duvernoy et al., 2018). This leads to the decline of agricultural soils near urban areas for which agricultural land constitutes a land reserve and therefore presents real difficulties in sustaining agriculture on the outskirts of cities due to the ever-halted progress of the built environment. For farmers, the land is subject to pressure from the housing market, as is the progressive increase in land prices (Cavailles & Wavresky, 2003). In addition, they do not always own the land and often have precarious short-term contracts (Munton, 2009). In this way, the financing capacity and the chances of maintaining these areas over time are impaired (Péron & Geoffriau, 2007; Piorr et al., 2011).

Recent experience shows that plans for maintaining agriculture near cities call for complex land strategies, whether they are carried out by the agricultural profession, the inhabitants of urban areas or local and regional authorities (Mok et al., 2014). It is necessary to both extend the possible legal restrictions existing to its implementation, legitimise it as real land use and integrate it into urban development planning. In the past urban planners from global north and south have typically considered agriculture exclusively as a rural activity (De Zeeuw et al., 2000; Pothukuchi & Kaufman, 1999), but things are changing. This is evidenced by the place accorded nowadays to agriculture in urban planning documents, especially those drawn up at the local, municipal or inter-municipal level. In the Brazilian case, the demarcations of areas reserved for agricultural activities are established in the strategic master plans or in the integrated urban development plans (*Plano de Desenvolvimento Urbano Integrado* or PDUi). The location of the different types of areas, the destination of their uses (industrial, natural, agricultural, etc.) incorporate more indicators of the fragility or interest of soils for agricultural use and are fiercely debated by urban planners and members of civil society engaged in these discussions during the drafting stages of these plans.

With increasing awareness of these issues, local authorities are no longer hesitant to experiment with land intervention measures: the setting up of experiments with land plots and land charters (charters about the rules of using and sharing soils) is becoming widespread. The multiplication of agri-urban projects, often carried out by local residents, is an example of the desire to maintain an agricultural activity or even to limit the extension of an urban front. At the local level, one observes the rise of a set of initiatives stemming from local associations or inhabitants of urban and peri-urban communities. This is the case for some initiatives that are supported by the PURPLE network² in Europe, which aims to promote concerted management of agriculture and peri-urban agricultural areas.

Constraints and opportunities for agriculture in proximity

The progress of the urban front at the expense of agricultural land and the process of artificialisation at the borders of cities raises questions regarding the future of urban and peri-urban agriculture. Is it still advantageous to maintain agricultural activity in peri-urban areas when the profitability of converting agricultural land into building land is much higher? And, on a political level,

what support can be provided in this context for the establishment or maintenance of local agriculture? All of these points now find renewed interest with the COVID-19 crisis and its impact on urban populations and their food supply (Lal, 2020; Pulighe & Lupia, 2020). Indeed, the pandemic has highlighted three major trends that will not fail to have a strong influence on the decisions made on the development of urban farming: (1) a demand from city dwellers for products from short supply chains and responsible agriculture, (2) an increased demand from urban dwellers for houses surrounded by green or agricultural areas and (3) a logistic fragility of global value chains, which could jeopardise the food supply of large cities.

Here appears all the ambiguity of the situation of agriculture near the cities. This results in oppositions, tensions and conflicts of various kinds, which reflect the opposing visions of the different stakeholders in peripheral areas. The concern of farmers to preserve their production zone or to enhance it responds to the concern of local residents to natural or landscape interest areas, who seek to preserve them from increasing urbanisation. However, agricultural lands are opposed to the ever-increasing demand for new housing, office buildings, and infrastructure to serve the city, such as expressways, shopping malls, waste treatment facilities or power plants.

This question of contradictory interests is found in the challenges of building permits, which are very important in peri-urban areas, due to the very tension in the processes of occupation and reconversion of agricultural land. It also raises the question of the management of landscape dimensions and living conditions through agricultural activity. Substituting natural landscapes or green spaces to contribute to a pleasant living environment, its virtues of protecting the environment or fighting against urban concentration are increasingly reassessed and weighed.

THE STUDY OF THE SPMR

The SPMR is the largest urban agglomeration in South America, with more than 21.5 million inhabitants (EMPLASA, 2019a), and the sixth-largest urban agglomeration in the world. It comprises 47.6% of the population of the State of São Paulo and is inhabited by one in 10 Brazilians. Its gross domestic product (GDP) corresponded in 2018 to R\$ 1.18 billion, which is equivalent to 53.45% of the GDP of the State of São Paulo (R\$ 2.21 billion) and 16.87% of the Brazilian GDP (São Paulo, 2021). It represents the largest industrial complex and the main financial centre in the country, with a highly qualified workforce and sophisticated telecommunications infrastructure and services. The city of São Paulo has a third of its territory classified as a rural area and includes different types of urban and peri-urban agriculture. The agricultural sector is responsible for 2.04% of the state GDP and 0.13% of the metropolitan GDP (SEADE, 2019).

Method of analysis

The analysis of the oppositions and the conflicts reported in the region is based on different sources. We follow the methodology defined by Torre et al. (2014) for identifying and categorising conflicts and their links with territorial governance processes. Concerning the case of São Paulo and the absence of reliable legal data, we apply to this issue the extended method used for the cases of developing countries by Magsi et al. (2017): We integrate social media to compensate for this lack of information.

More precisely, we made the following types of investigations.

–Expert surveys conducted, at the local level, among resource persons from different professional groups and public bodies (officials of Chambers of Agriculture, syndical officials, elected municipal officials, farmers and farmers' organisations, civil society activists, academic staff, agricultural consultants, local public institutions, local elected officials, environmental and nature user institutions, local associations for the defence of nature or linked to the environment, hunters/fishermen federations and their associations, forestry and agriculture spheres, agricultural unions, socio-professional representation like chamber of trades commerce and industry, entrepreneurs' club, local entrepreneurs, water agency, electrification and water syndicate, railway network, state services as subprefectures, economic services, journalists of the local press, notaries, judges). The complete list of local actors is listed in Appendix 1.

–Analysis of interactions between interviewees and other protagonists involved in territorial conflicts, based on meetings with them and their life stories (Thomson, 2012) to identify in their discourses the origins of disagreements and to understand what kinds of relationships they had and currently have between territorial actors. This means that through contacts with local actors or elected officials, through the interviews or meetings within working groups (such as members of a union, a regional natural parks committee, a board of elected officials, etc.), we identified and discussed the different forms of relationships between these actors in the past and present and with other local actor groups to determine different territorial development dynamics.

–Analysis of the articles published in the daily regional press, with an identification and a review of the articles related to land use and agricultural conflict. The articles were consulted in the metropolis section of the Newspaper *o Estado de São Paulo* between January 1, 2014, and December 31, 2021. Access was made electronically thanks to the collection available to subscribers on the newspaper's website at <https://acervo.estadao.com.br/>. The newspaper was chosen because it presents the metropolitan section, while other more or less local newspapers portray daily life through other sections that are not metropolitan (the method of coding is described in Appendix 2).

–Analysis of different websites, Facebook pages and blogs of local information related to local agriculture or spatial conflicts (list of the websites, Facebook, social network pages and blogs consulted in Appendix 3).

The role and place of agriculture in the region

Agricultural production is diversified in the SPMR, and different types of insertions co-exist. As presented in Figure 1, it is possible to find horticulture, flowers, fruits, eggs and poultry farming, beef cattle, pig farming productions and others, but nowadays, fresh vegetable products have more impact in the metropolitan agricultural production. Urban sprawl has developed at the expense of large agricultural areas, which used to contribute to the local food provision (Silva, 2013), and farmers who were far from the city become near and start to participate in the urban supply chain.

Mainly, these fresh productions but also fruits and poultry productions are found in the near east side, such as the municipalities of Mogi das Cruzes, Suzano and Biritiba Mirim and in the far-east side. In the southern zone, where the major part of the city's farmers are located, there are different practices and a recent increase in organic, agro-ecological or transition systems, most of which are based on horticulture products. On the southwest axis, as in the municipalities of Cotia and Itapeverica da Serra, traditional subsistence agriculture survives, with the largest scale production of potatoes and onions. For the northwest metropolitan sector, agriculture activities are based on pasture and beef cattle production. The northeast peri-urban area, whose good part is

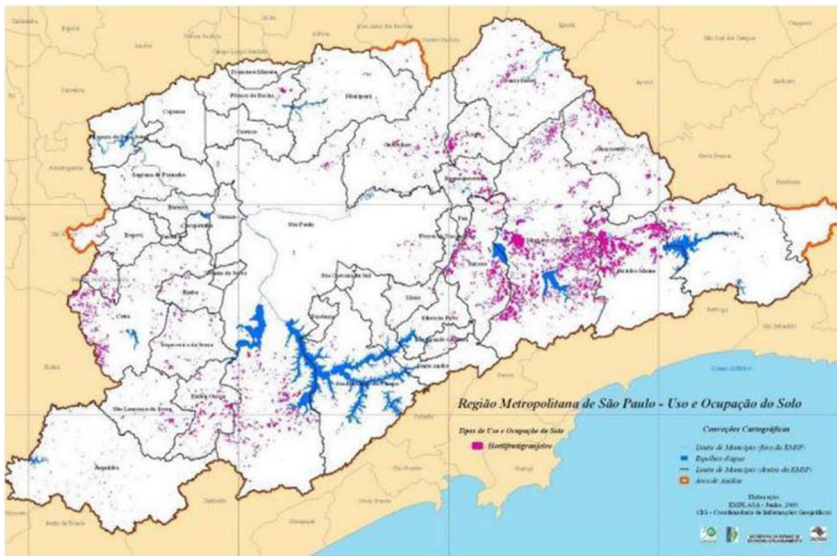


FIGURE 1 Land occupations with horticulture, fruits, poultry and egg production in the São Paulo Metropolitan Region. EMPLASA, 2005

under environmental protection laws, especially of water supply resources, produces vegetables. The centre-west area, given its strong urbanisation, has few remnants of agricultural production, most of them located in parks, public squares and community gardens.

Since the 1960s, urban sprawl has been developed at the expense of large surfaces, and many agricultural areas, which used to contribute to local food provision, have been converted to various other land uses (Silva, 2013). Traditional agricultural spots in surrounding cities are suffering from housing market pressure and have difficulties to resist, but some peripheral areas in the extreme south and in the east remain with some agricultural practices. The expulsion of the agricultural function away from the urban centre encouraged new former distant farmers to contribute to the supply chain of the green food belt, which tends to expand. Southern neighborhoods, which are the most environmentally preserved and where agricultural practices could be developed, have been suffering in a more intense proportion from clandestine invasions controlled by criminal organisations like the *Primeiro Comando da Capital* (First Capital Command).

The economic crisis that has intensified since 2014 is one of the main causes of the lack of investments destined for production, commercialisation and local agricultural development. In the meantime, community gardens, rooftop farming, community support agriculture (CSA), solidarity local agricultural stores and others have developed in the city or on its border. In the east side areas of the city of São Paulo, where the electricity distribution networks are installed, several insertions of agriculture are noticed under the lines. Seeming to be abandoned, they would probably be occupied with illegal housing at the expense of the lives of their occupants. Since the owners of the land are legally responsible, an alternative to avoid these occupations was to allow the installation of urban gardens. In this way, the electricity utility avoids conflicts with illegal occupation and at the same time contributes to urban food production.

Greater São Paulo lacks conducting public policies for the maintenance and development of its agricultural areas. Programmes and projects are subject to discontinuity and changes in public management; communication between different spheres of public power (municipal, state

and federal) is deficient or nonexistent and even more difficult when municipal, state and federal administrations with divergent political orientations do not converge regarding territorial development guidelines. Thus, it becomes a difficult challenge to support urban and peri-urban agriculture productions over time. Despite a few government policies to strengthen local agriculture, every new government staff member who arrives with local elections (one every 4 years) dismantles projects and laws from the previous one. The articulated metropolitan governance of agricultural land is practically nonexistent, although there are some agricultural management projects and programmes in the city, that appear punctually, like the Urban and Peri-Urban Agriculture Programme (PROAURP), school vegetable garden projects and even social vegetable gardens.

One of the results of this fragility is the dismantlement of several public institutions related to agriculture. The implementation of the PDUi elaborated in 2018 was an opportunity to centralise the management and outline the governance of the SPMR agricultural areas. However, with the arrival of the last federal administration (in January 2019), the institution responsible for São Paulo's metropolitan planning, the Empresa Paulista de Planejamento Metropolitano, was dismantled, as were several other councils and institutions, in particular, the National Council for Food and Nutrition Security, with the premise of reducing national public spending. In this scenario of the absence of government leadership for the metropolitan agricultural issue, several territorial actors, with emphasis on real estate speculation, take advantage of advancing their urban expansion fronts, generating competition with various other functions of the soil but mainly agriculture.

AGRICULTURAL CONFLICTS IN THE CASE OF THE SPMR

Agriculture has never been a priority in São Paulo's urbanisation model and has often been considered an antagonist. Then, urban planning always gave a place to all other land-use functions, and the agricultural production areas were pushed further away. Despite the existence of cooperatives, organisations in regional food supply centres and various types of agricultural production, there was an intense growth of population in the suburbs from 1940 onwards (Taschner & Bogus, 2001). In the 1980s, with increasing concerns about addressing the population's hunger, a programme of community gardens in schools and under electric power distribution lines was created, and a food supply secretariat was established (Biazoti, 2020). From the 2000s onwards, agriculture was incorporated into territorial planning, the creation of a greenhouse programme in schools and horticultural courses, the launching of an PROAURP and the creation of ecological agriculture houses (Valdiones, 2013). Since 2010, farmers' associations and cooperatives have emerged, as well as activist community gardens (Biazoti, 2020).

Land-use conflicts in metropolitan and rural areas

The urban area of the greater São Paulo tends to expand, and urban sprawl creates new housing and urban spaces in areas previously considered rural. The price of agricultural land remains very low, compared to other urban land uses (approximately 1 to 5 €/m² in the most distant rural south zone vs 1110 €/m² in urban areas of Parelheiros, according to personal interviews and Estadão, 2020), which makes it succumb to the strong pressures of real estate speculation processes. Irregular occupations and invasions have increased dramatically, associated with the weakening of

TABLE 1 List of main keywords frequently found during the identification of pertinent articles from the newspaper *Estadão*

List of the main keywords found in the selected articles from daily regional press				
Agriculture	Local	Highway	Duplication	Ring road
Budget	Sustainability	Organised crime	Invasions	Dams
Billings	Guarapiranga	Rural	São Paulo's border	Danger
Prevent invasions	Clandestine allotments	Environmental legislation	Urban area proximity	Irregular garbage disposal

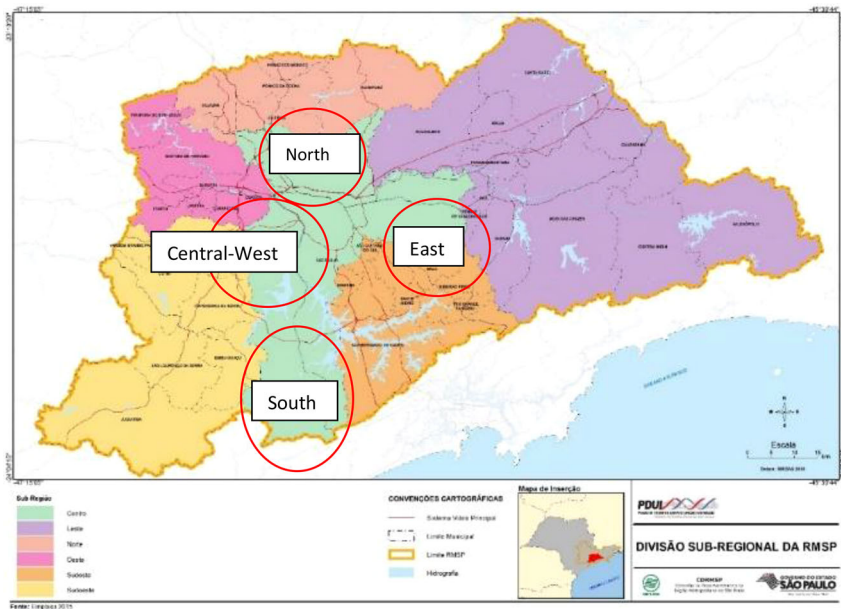


FIGURE 2 Conflict zones in São Paulo municipality

state and municipal public inspection with regard to compliance with sectoral laws. In addition, the fact that many public urban lands still lack land tenure regularisation further contributes to real estate speculation. As revealed by our research, this movement gives birth to a series of urban oppositions and conflicts, which can be asserted related to the main areas of the SPMR. These tensions were identified during the analysis of the regional daily press *Estadão*. The frequent keywords found in the analysis of the articles that addressed these themes in SPMR are shown in Table 1.

A visualisation of the zones in the municipality of São Paulo and the main types of existing conflicts over agricultural areas is presented in Figure 2 and Table 2.

In the south zone, the main conflicts are related to urban infrastructure projects, such as the Parelheiros airport, the creation of a local logistics centre and part of the Rodoanel Ring Road. The expansion of the real estate market is strong, associated with increasing irregular land occupations in areas of environmental conservation due to water resources and the local ecotourism pole with predominantly rural characteristics. The conflicts with the Tupi-Guarani ethnic villages, identi-

TABLE 2 Main types of conflicts in the areas of São Paulo municipality

Main types of conflicts over agricultural lands	South	North	Central-West	East
Urban market	X	X	X	X
Infrastructure ring road	X	X		
Infrastructure logistic centre	X			
Urban violence due socioeconomic contrasts, drug traffic and others	X		X	X
Ecotourism pole	X			
Environmental conservation areas (water and forests)	X	X		
Indigenous villages	X	X		
Irregular land occupations	X			
Unstable land-use contracts				X

fied as environmental protected areas, are mainly due to the installation of urban infrastructure or the expansion of the urban fabric.

In the northern part, the presence of the mountainous area of Serra da Cantareira hampers the pressure of urban expansion. A conflict is linked with the project of an urban road infrastructure on the northern stretch of the Ring Road. If carried out, it may impact the environmental conservation units, the local agricultural production and areas of demarcation and territorial protection with indigenous villages.

The smaller central-west area is characterised by a high population density, absence of natural barriers and a continuous urban spread. Several land-use conflicts are the result of the impacts of extensive urbanisation. The presence of important universities and high standard business centres, great economic dynamism, a hub of cultural activities, and luxury housing condominiums is contrasted with the presence of countless favelas where poverty coupled with the lack of basic infrastructure and adequate power assistance result in major problems of urban violence.

For the eastern zone, one of the most urbanised areas, the conflicts are closely linked to the expansion of the urban network. The remaining areas of agricultural use are scarce, like production under the electric energy distribution lines. The areas are quite exposed to urban violence, with theft and robbery.

Oppositions and conflicts linked to the existence and persistence of peri-urban agriculture

Disputes of divergent interests are increasing in relation to decisions on different land uses and, in particular, on areas of agricultural production such as their vocations and importance in the face of metropolitan development. Another common feature is exposure to violence, theft and drug trafficking, which negatively interfere with the permanence of local agriculture. It is possible to identify a plurality of different cases of disputes related to the agricultural function of the soil, grouped in geographical areas.

Most of the farmers are concentrated in the south zone, and the urban developments in this region lead to great opposition in terms of land use. Farmers have been pressured both by the advance of classic urban expansion and by criminal urbanisation; land is often occupied illegally,

which generates deforestation, harms areas of water production for urban supply and expels local agriculture. Agricultural production areas have also been impacted or expelled with the development of urban infrastructure projects such as the *Rodoanel*, Parelheiros airport and a logistics centre. Farmers and environmental activists turn against the government to prevent the progress of these works. The presence of indigenous villages is also affected by urban expansion and infrastructure projects. Their subsistence agriculture is essential for the maintenance of the villages, so Indigenous peoples and organisations in defence of indigenous rights mobilised against public power.

In the northwest sector, a particular axis of expansion of the urban fabric is linked to the construction of middle- or upper-middle-class residential condominiums with an attractive quality of life, seeking to avoid the urban centre and with close quick access routes. An important activity of the production of beef cattle has been expelled by the real estate market and the extent of urban sprawl. The vocation for environmental protection of these areas is of great importance, mainly because they contain water dams that supply the entire metropolitan population. Agricultural activities are not necessarily conflicting but require different management of the oppositions of land occupations so that they can coexist with the already consolidated uses of environmental protection and water production.

The centre-west area, with its strong urbanisation, has few remnants of agricultural production in parks and public squares, with conflicts related to urban housing pressure and urban violence. In the western peri-urban area, the urban sprawl of small local towns and the development of urban road infrastructure in the São Paulo–Sorocaba axis appear to be the largest contributors to the expulsion of local agriculture. Despite the activity of farmers' associations to maintain local agriculture, the expansion of the urban area, together with the proposals for financial gain from the sale of agricultural land, seems to gain more and more space in this disputed peri-urban territory.

In the eastern zone, the largest conflicts are related to the expansion of the real estate market and the vulnerability of the fragile urban agriculture found under the power distribution lines. Thus, it is subject to precarious lending contracts governed by private companies that have the power to change the conditions. Several municipalities, such as Mogi das Cruzes and Suzano, traditionally having subsistence agriculture or poultry and fruit production, are now the main suppliers of fresh vegetables from the SPMR. Agricultural activities have been increasingly threatened by the expansion of the urban network, related to the geographical proximity to the municipalities, and the development of rail and road network infrastructures, aiming to develop relations on the São Paulo–Rio de Janeiro axis. Another fragile aspect was a series of unsuccessful experiences of organising farming actors in associations and cooperatives, which today represents a break on organisational initiatives for various purposes, such as rural extension and commercialisation of production.

Supporters and opponents of agricultural activities

Table 3 shows the main proponents and opponents of agricultural activities in the region. Most of the local actors fall either into the promotion or the threat to local agriculture. Among those who drive agricultural activities in the territory, the actors from civil society initiatives, local associations, and private initiatives to support agricultural production generally present innovative profiles seeking to meet different niches of demand from the population. Cooperatives and

TABLE 3 Territorial actors classified between supporters and opponents of São Paulo Metropolitan Region agricultural activities

Profile of territorial actors	Agriculture supporters	Main opponents
Local public authorities	X	X
Local associations	X	
Urban market–housing		X
Urban infrastructure (warehouse centres, ring road, airport)		X
Actors of urban violence		X
Irregular land occupation		X
Criminal organisations		X
Agricultural land of power distribution companies	X	X
Cooperatives and farmer associations	X	
Actors from civil society initiatives	X	
Private initiatives to support agricultural production	X	
Public management responsible for environmental conservation areas	X	X

farmers' associations tend to focus on supporting the productive and organisational aspects on the producers' side without excluding marketing and consumer relations issues.

The urban market–housing stands out as one of the main actors in conflict with the maintenance of agricultural spaces, especially on the edges of the city. Urban infrastructures (storage centres, ring roads, airports) are projects of great occupation of the territory and are sometimes identified with a character of public interest. Actors of urban violence and criminal organisations tend to repel productive areas in proximity to the urban environment due to the lack of security and possibilities of illegal occupations in agricultural areas. Within an urban context, irregular land occupation often presents itself as a condition for agricultural production spaces, historically identified as spaces of land reserves and urban expansion, a fact that weakens the permanence of agriculture when confronted with the organisational or mobilising force of any other uses of these territories.

A few actors are more balanced, like the local public authorities, who finance agricultural programmes but do not perpetuate them or their financial support and assistance. The electricity supply companies provide space for the development of agriculture under the distribution lines but also present precarious contracts causing instability in land use, employment and income of land workers. The environmental conservation areas authorise and encourage agricultural activities within their spaces, as long as they meet specific environmental protection requirements. Production in agro-ecological transitions, agro-forestry production and permaculture are supported. Agricultural practices that do not fit these environmental preservation axes, such as large monoculture farms, abusive use of pesticides and disrespect for local biodiversity are discouraged.

CONCLUSIONS AND RECOMMENDATIONS

The objective of this article was to take stock of the oppositions met by peri-urban agriculture in the proximity of large urban areas and the conflicts it can generate, taking the example of

the urban sprawl and consumption of agricultural land in the Metropolitan Region of São Paulo. Through our research, it was possible to verify that the main conflicts in this area are based on divergent land uses, neighborhood pressures with environmental protection zones and the housing market. Considering these scenarios, the most important actors involved in these disputes are public authorities, the housing market, farmers, organised crime, public demand and energy companies.

Regarding these results, it is possible to identify some conflicting conjunctures related to the presence and the possible development of agriculture inside and near the city, which can be grouped into the following three subsections.

Urban sprawl and its consequences in terms of consumption of agricultural land

Growth dynamics of urban expansion are complex, but its pressure on agricultural areas is certain at this time. In São Paulo, there is a huge urbanisation movement transforming traditional agricultural lands close to the city into housing areas, with a few control and awareness of the importance of this kind of proximity to agricultural lands. At the same time, some state policies try to support family farmers and facilitate their production commercialisation near large centres. From a sustainable perspective, closer municipalities could be more supported to preserve their agricultural lands, supporting a closer consumer market.

The changing behaviours of local authorities

For a long time, local and national authorities were not aware of the issue of peri-urban agriculture. In the case of SPMR, governments are not giving full attention to this question and its interest to local populations; they do not seem able to prevent growing illegal occupations or to protect these areas. In the case of the Greater Paris Region (GPR) for example, the concern is growing, and regional public authorities are launching ambitious policies in favour of the preservation of agriculture. Recently, they have increased the importance of these policies because of the COVID-19 health crisis and several questions raised about food security and sovereignty and its local value.

The rise of local initiatives

Everywhere, there is a rise of local initiatives in favour of the development of peri-urban agriculture and the protection of agricultural lands. In the SPMR, new alternatives appear stemming from society. Led by citizens (community gardens, rooftop farming, CSA, etc.), they reveal the increasing demand of the population for agriculture and food systems and the support to these news models through its participation and consumption actions. For GPR, civil society wishes to encourage local agricultural activities. Several local initiatives in favour of food production and protection of agricultural soils are launched, with the support of local municipalities. This situation appears even more clearly related to the transformation caused by COVID-19 when citizens realise the importance of local agricultural resources and products to increase their food security and reduce their environmental impact.

These results allow us to draw a few policy recommendations concerning the case of the São Paulo region and urban agriculture more generally. Given the current enthusiasm of urban populations for this type of agriculture, it is important to help its development because it can help feed part of the population, but above all, because it helps to maintain green spaces and a certain level of biodiversity and is an example for younger people. For this reason, policies for the development and maintenance of agriculture must be encouraged, and credible plans must be developed that are accepted by the population. To achieve this goal, it is necessary to develop discussions with local dwellers, launch promotion campaigns and take into account local opinions to avoid opposition and conflicts that are too great. The level of governance corresponding to this type of activity is that of municipalities or agglomerations, that is, the territorial level and not national or federal, which are too far removed from the concerns of local populations.

Our approach could be performed and reproduced in other places. Its relevance could be improved if the following dimensions were taken into account: make a comparison between cities of comparable size in various countries; carry out more precise and detailed surveys on certain categories of population like farmers, neighbourhood associations or even promoters; organise participatory forums with contradictory speeches and hold debates between different categories of population and different opinions.

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CONFLICT OF INTEREST

All authors declare that they have no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data are available on request from the authors.

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ENDNOTES

¹ Resource centre on Urban Agriculture and Food security, which aims to provide assistance, technical support and policy recommendations in this field to local and national authorities and other local governments (<http://www.ruaf.org/>)

² The Peri-Urban Regions Platform Europe, which represents the interests of peri-urban European regions, was set up in 2004. It strives for greater recognition of these regions in European policy and regulation and to ensure their long-term sustainability.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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