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DISCUSSION PAPER

# Between urban and rural: towards an understanding of metropolitan edge

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## Abstract

The need to act on urban expansion has been a common concern throughout the history of urbanism. Different authors have shown how in industrialized countries the old distinctions between urban and rural become blurred. The location and conformation of new leisure, commercial and tertiary objects have become triggers for new looks at the urbanization edges of industrial cities. Although they have been less explored in non-industrial cities or cities with a lower degree of industrialization, different studies show that these characteristics seem to be combined there with other factors such as social housing, progressive expansion of the urban fabric and degraded areas. Nevertheless, could there be a theory that enlightens the conditions and transformations of the metropolitan edge and guides their research? The aim of this work is to compare four key approaches: spaces in socio-spatial transformation, multi-actor project, multiple, dynamic and heterogeneous uses, and non-universal spatial delimitation, focusing on three categories: concept, attribute, and methodology. This research is grounded in the selection of relevant publications based on their substantive scope, significant impact factor index, and/or number of citations, as well as the international recognition of researchers. These findings underscore the importance of theorizing the metropolitan edge as a process that transforms inherited spaces according to their socio-economic, historical, and environmental contexts. The results reflect the need for denominations and classifications that help us to differentiate analytically and cartographically the multiple landscapes of the metropolitan edge and question us about the specificity of this territory that extends between urban nuclei and rural space, the processes that have overlapped over time, and their logics.

**Highlights for public administration, management and planning:**

- The metropolitan edge must be theorized as a process that transforms inherited spaces according to their socio-economic, historical, and environmental contexts.
- The different processes, territories and scales must be the protagonists of the epistemological framework seeking to cohere the urban order and the socio-environmental form.
- The study of the processes through which the metropolitan edge transforms in relation to the typological classification of static units allows for a better understanding of it.
- Results reflect the need for denominations and classifications that help us to analytically and cartographically differentiate the multiple landscapes of the metropolitan edge.
- Fine-grained studies of different geographies and scales would allow us to get to know its conformation patterns. From these patterns of distribution and evolution, contexts with common characteristics can be identified to elaborate new concepts and methods to decipher this territory.

**Keywords**

Metropolitan border,
Urban planning,
Urbanization process,
Plan,
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## 1 Introduction

The trend towards ”planetary urbanization” seems irreversible, and the territories on the metropolitan edge emerge as stages of this process (Brenner & Schmid 2014). To explain it, three proposals are put forward. The first refers to Brenner and Schmidt's (2015) notion of promoting debate on the epistemological foundations of current ”planetary urbanization”. The second refers to the notion of territories extending between urban cores and rural spaces as independent areas with their own characteristics and dynamics (López-Goyburu & García-Montero 2018). The third proposal addresses how, despite the development of various studies, knowledge about these territories does not permeate institutional, professional, and governmental practices. In his framework, this paper aims to provide a starting point to encourage and promote further debate on the theory of knowledge of the metropolitan edge territories.

The need to act on urbanization processes has been a common concern throughout the history of urbanism. As has been discussed elsewhere (López-Goyburu 2010; López-Goyburu & García-Montero 2018), in the first cities, the rural-urban boundary was established to generate an enclosed structure capable of bringing together in a single space the functions that were scattered over a territory with villages. In pre-industrial European cities, the rural-urban boundary was materialized by a wall that clearly divided the urban system from the rural one; in industrial cities, the edge was determined by the control of voids, as Howard established with his proposal of the garden city, or by expansion plans with which administrations sought to control expansion, as Cerda established in his proposal for the expansion of Barcelona. On the other hand, in Latin American cities, during the colonial period, the edge was established through the clear delimitation of urban land; Aliata (2006) showed that with the advent of the Enlightenment, the extension of the grid intensified the dissolution of the structuring terms of the colonial period through the regularization of periphery; Favelukes (2011) pointed out that subsequently the enlightened regular ideology was abandoned and Monge geometry was adopted as an instrument to order territory without resorting to symbolic values of the past.

In recent decades, the territory metropolizing effect and the increase in private mobility, among other factors, have facilitated the access and subsequent transformation of the metropolitan edge. Several authors (Borja & Castells 1997; Secchi 2000; cap 2003; Woods 2009) have shown that the increasing mobility of goods and people has created a heterogeneous territory without a clear formal boundary that distinguishes between urban and rural systems.

Indeed, different authors have demonstrated how in industrialized countries the old distinctions between urban and rural have become blurred. After the Second World War, the dispersed relocation of residence to the suburbs began to be observed. Barnett (1995) stated how this residential dispersion made possible the subsequent decentralization of commerce and, later, of industries that adopted a dispersed structure in different productive clusters (Caravaca & Méndez 2003). Boeri et al. (1993) found that in Milan transnational industries began to concentrate management activities within a global city, but their productive facets were located within the metropolitan region. On the other hand, Font Arellano & Vecslir (2008) showed how new trade centers were located in the Barcelona region around the main road axes, generating synergies with leisure activities, and Boeri et al. (1993) reported how tertiary and commercial buildings were located along the main infrastructures in a relatively uniform way.

The location and conformation of these new leisure, commercial and tertiary objects have become triggers for new perspectives on the urbanization edges of industrial cities. In non-industrial or less industrialized cities, although they have been less studied, these characteristics seem to be combined with other factors such as social housing, progressive expansion of the urban fabric and degraded areas such as quarries, ditches or open-air dumps, among others (CONAMBA 1995; Toro Vasco et al. 2005; Lineamientos de Borde 2010).

The interest has shifted to the configurations of these territories with discontinuous urbanization processes. Sieverts (2003), in the study of the Frankfurt Rhine-Main region in his book “Cities without cities”, defined this territory as intercity (Zwischenstadt) and conceived it as fragmented, a product of the multiplicity of realities that take place in it. The term edge, conceptualized in relation to metropolitan basins by Potocko (2017) and to urban expansion by Favelukes et al. (2017), has the virtue of referring to an imprecise notion, which allows addressing the diverse processes that occur in the territories that extend between urban centers and rural space, new and old processes that overlap (López-Goyburu 2019) and not only happen in the urban-rural articulation but also in urban interstices (CONAMBA 1995).

Therefore, these territories that extend between urban centers and rural space, which in Micarelli &

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Pizzioli (2008) words constitute a new type of geography of urban expansion, prompt questions about their formation. The aim of this work is to compare four key approaches (spaces in socio-spatial transformation, multi-actor project, multiple, dynamic and heterogeneous uses, and non-universal spatial delimitation) focusing on the metropolitan edge in order to establish a comprehensive framework for future research on these territories. These four approaches are proposed as layers of interpretation of this complex territory through three categories: concept, attribute, and methodology.

These key approaches are defined through a literature review. The selection of relevant publications was based on their substantive scope, significant impact factor index, and/or number of citations, as well as the international recognition of researchers in this field of study. The articles were analyzed using the Snowball method (snow-balling technique).

The present paper consists of four parts. First, there is a brief introduction. Then, the four key approaches are addressed. Finally, these different approaches are compared based on the three mentioned categories and the paper concludes with a reflection that raises new questions.

## 2 Four approaches to metropolitan edge

### 2.1 Approach 1: Spaces in socio-spatial transformation

The metropolitan edge cannot be understood as a permanent form; it presents itself as a sum of temporary constructions in motion. Dayaratne & Samarawickrama (2003) considered the metropolitan edge as a space of constant transition and transformation that changes more rapidly than any urban or rural space.

In the 1960s, Gottmann (1961) began to envision a dispersion of pieces over the territory in the Northeastern United States, forming an irregular corridor of rural, urban and suburban areas of approximately 1,000 km in length and 30 million inhabitants, which he termed megalopolis. This concept refers to a blurring of the urban-rural distinction; the agricultural space is incorporated as part of extended urban conformations.

Authors such as Lefebvre (1974) argued that the complete urbanization of society could occur in the near future; decades later, Brenner & Schmid (2015) stated that ”urbanization has become planetary”. These authors argued that capitalist industrialization has been shaping increasingly extended regional units, in which urban forms are constantly being produced and re-elaborated to generate new patterns of socio-spatial organization and uneven development. Urban developments that, following Harvey (1989), involve the exploitation of particular advantages for the production of goods and services such as available resources (oil, drinking water, location) or those created through public and private investments in physical and social infrastructures.

Therefore, the metropolitan edge is presented as a scenario of technological changes, production and reproduction of habitat, regulations and state investments (Massey 1984a). Friedmann & Wollf (1982), by mapping the spatial order determined by the interests of transnational capital, observed how something linear becomes a network of places of production and places of control and command, represented by the center cities. These tensions were also observed by the sociologists Sassen (1991) and Borja & Castells (1997). Massey (1999, 2012) highlighted space as an instrument of power, as a node of relations, exchanges and practices that intertwine and as the results of these interconnections with different social groups and individuals who are positioned in very different ways in relation to these interconnections and at different times, emphasizing that a place is not static. Massey (1984b) approached place as moments articulated in networks of social relations, as processes.

In industrialized cities, metropolitan edges appear as dispersed and disorganized spaces, without a clear center, but with networks and zones of specific functions associated with new facilities and closed urbanizations that displace agricultural uses. The study by Indovina et al. (1990) in Italy shows a dispersion of residences, services and productive uses, with low spatial densities and strong connectivity between different points to which he gave the name of diffuse city. Garreau (1991), after visiting several North American cities, observed how the need of large companies to expand their operating spaces leads to the appearance of large office and commercial spaces for rent on the metropolitan edges, which he called edge city.

In non-industrialized or partially industrialized cities, some different characteristics are perceived. Toro Vasco et al. (2005) showed that the Bogotá edges are occupied by settlements of low and high but not medium strata and that there are areas with water contamination from rivers and wetlands due to the lack of sewage systems. The diagnoses about Buenos Aires made by Bozzano and Cueva

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(CONAMBA 1995) in the documents "El Conurbano Bonaerense" and "Lineamientos de Borde" (2010) reported that in this territory there are extractive activities, precarious settlements and villas, settlements in flood-prone valleys, among others; they also highlighted the heterogeneity of this territory.
In this new geography, in Latin America, social differences and an increase in inequality occur (Pradilla 2014; Janoshka 2011), along with high deficiencies in infrastructure and services (Arteaga 2005). Studies depict a diverse housing situation and raise questions about changes in urbanization patterns. The logic of peripheral habitat location, driven by the market, is followed by public housing policies. Vio (2011) argues that while these plans help alleviate housing deficits, they also create a "location deficit".
Following the studies in historical perspective, the metropolitan edge is interpreted as a process of socio-spatial transformation. The work by Somekh & Eigenheer (2017) on the Anhanguera road, northwest of São Paulo, showed how the relevance that the area occupied in the territorial structure during the seventeenth century for facilitating the commercialization of goldwas lost with the railroad and recovered with its conformation as a highway, enabling the dispersion of residential and industrial uses. The cartographic restitution carried out by Rosas et al. (2017) highlighted some of the transformations of the Santiago de Chile periphery, whereas the study by Cordara et al. (2018), based on GIS reading, quantified the land uses of areas of the Buenos Aires metropolitan edge in 2006 and 2016.

### 2.2 Approach 2: Multi-actor project

The metropolitan edge is presented as a collective project that encompasses different jurisdictions in which tensions arise between urban and rural uses and where the state, following Jessop et al. (2008), discriminates certain actors and institutions over others. Novick & Vecslir (2015) showed that the evaluation and scope of alternatives for the territorialization of urban policies that emphasize the relative autonomy of the state and the functioning of actors operating at different levels of public administration is presented as an emerging issue. On the other hand, the increase in the value of land evidences the impossibility of sustaining traditional production methods and highlights the demand for land among different land uses.
Addressing the tensions between urban and agricultural uses, Sharp & Smith (2003) stated that the development of agricultural activities between neighbors and local industries and organizations generates social relations that reduce conflicts between agricultural and non-agricultural neighbors. In this sense, both the study by Lattuada & Renold (2004) on the challenges of agricultural cooperativism when facing globalization and the one by Lattuada (2006) on agricultural corporations in Argentina assigned a central place to the evolution of cooperativism.
Several authors have shown the network of immigrants behind the conformation of agricultural territories in metropolitan edges. Nemirovsky & González (2005) and Benencia & Quaranta (2005) illustrated the activity of Spanish, Portuguese and Italian land workers in the Buenos Aires metropolitan edge, whereas Benencia (2006), Barsky & Vio (2007), Pizarro (2007), Nieto (2011) and Feito (2013) described the socio-economic trajectories of Bolivian immigrants in this territory. Achón Rodríguez (2013) showed that in Barcelona different groups in a situation of social exclusion, as is the case of gypsies, find a labor niche in the fruit sector.
The metropolitan edge is not only co-produced and transformed through its users, who create new forms of experimentation of the territory (Lefebvre 1974), but also of the state. Dayaratne & Samarawickrama (2003) pointed out that the formation of community development councils linking community organizations with municipal and provincial authorities would make it possible to respond to the tensions that arise on the metropolitan edge. Skocpol (1989) and Jessop et al. (2008) highlighted the role of the state in the tensions that emerge in the shaping of a city; Elinbaum (2019) and Brenner & Schmid (2015) accounted for the struggles and interrelationships among the various actors involved in the processes of urbanization and the elaboration of urban planning regulations. Oszlak & O'Donell (1995) indicated that the state, through public policies, manifests by action or omission its position and the interest of other civil society actors.
In this perspective, although agricultural uses become a relevant issue for territorial planning, since they involve issues that affect not only current land use but also sustainability and food security, there is no comprehensive proposal for this territory. Among the specific works on this topic, the most outstanding ones are the "Charter of periurban agriculture. For the preservation, planning, development, and management of periurban agricultural spaces" (2010) from Barcelona and studies by different authors, such as Rivas (2010), dealing with the implementation of a project for organic food production

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in the Buenos Aires metropolitan edge to recover degraded areas, generate jobs, improve food quality and security and control urban expansion. Barsky et al. (2010) and Barsky (2018) showed that producers on urbanization edges pose the need to generate initiatives aimed at small producers and to manage these territories to protect the industrial-agricultural belt (agricultural uses and their associated industries).

On the other hand, the boundaries of the unit used to understand the territory have an impact on the institutions or organizations involved in its management and must represent their operating dynamics. Simon (2008) stated that metropolitan edges commonly extend over a considerable number of urban and rural spaces with different local authorities, and Hudalah et al. (2007) indicated that institutional fragmentation is perceived in the metropolitan edge. In this scenario, several cities have promoted intersectoral and interjurisdictional coordination agendas. For example, in 2011, Barcelona constituted the Metropolitan Area of Barcelona (AMB for its acronym in Spanish), the public administration of the Barcelona metropolitan territory that replaces the three entities in force until then (Union of Municipalities of the Metropolitan Area of Barcelona, Environmental Entity and Metropolitan Transport Entity), simplifying metropolitan governance by having a single administration that enables all urban issues related to the 36 municipalities it consists of to be analyzed in accordance with joint planning. In Rosario, the Metropolitan Coordination Entity (ECOM for its acronym in Spanish) was formed in 2016, a non-state public entity of horizontal articulation integrated by mayors and communal presidents (Provincial Law No. 13,532) that promotes the elaboration, development and execution of projects on a metropolitan scale.

### 2.3 Approach 3: Multiple, dynamic and heterogeneous uses

The metropolitan edge is presented as a space with heterogeneous uses, which demands to be understood. The accelerated process of spatial differentiation in metropolitan edges arouses the interest of different disciplines, and the discontinuous and heterogeneous urbanization processes that take place in them are rendering obsolete concepts in which the distinction between urban and rural is made according to the density of inhabitants, the continuity of the built space or the level of facilities and services (see Approach 1).

In this sense, López-Goyburu & García-Montero (2018) showed that metropolitan edges are territories with natural ecosystems and productive, agricultural and urban systems with their own characteristics and dynamics. Bravo Bello (2013), in his study of metropolitan edge land uses in eight European cities, accounted for their great heterogeneity and temporal dynamism. Bozzano and Cueva (CONAMBA 1995)) pointed out that the Buenos Aires metropolitan edge has heterogeneous uses, and López-Goyburu (2019) stated that the processes of commercial and leisure enterprises, industries and new generation residential spaces are superimposed on processes of progressive extension of the urban fabric and the consolidation and intensification of horticultural and floricultural uses.

Kelly (1999) indicated that understanding the social processes taking place at the metropolitan edge dissipates any sense of a stable landscape or balanced development. Jiang & Sands (1999) showed that neighbors' reaction to odors could limit future development of the animal production industry at the metropolitan edge, and Kelsey & Singletary (2013) showed that both the size of a farm and the number of nearby homes are the most influential factors in the likelihood of complaints from neighbors of such a farm.

From the environmental point of view, Allen (2003) interpreted the metropolitan edge as a territory in which the environmental balances and imbalances resulting from the exchanges that occur between urban and rural spaces are manifested. Maconachie et al. (2009) indicated that the growing number of people in the space of the metropolitan edge together with the increase in prices and accessibility of fuels cause greater pressure on forest resources due to the extraction of firewood. Yadav (2008) argued that population growth and resource use figures show that the metropolitan edge is a degraded space. Boren et al. (1997) stated that intensive agricultural areas negatively affect native grassland bird species, and Ragab (2009) reported in a study how the loss of agricultural land generates imbalances and distortion of urban-rural linkages.

Brenner & Schmid (2015), in their study of capitalist industrialized cities, postulated that territorial urbanization and market-oriented territorial regulation create a new regulatory framework that encourages speculative urban investment. The authors argued that spatial practices that intensify land use and increase infrastructure are established to facilitate the processes of capitalist industrialization and are mediated by specific forms of territorial regulation. In Buenos Aires, in a context of low-

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density expansion and heterogeneous uses resulting from developmental policies that conceive urban growth as unlimited, the Land Use Planning Code was enacted, which considers that the metropolitan edge consists of those zones where the city ends, sectors surrounding or adjacent to urban areas destined as reserves for their expansion and specific uses called complementary areas. In Bogotá, the Territorial Management Plan defined that the edge must contain the processes of conurbation of the city and fulfill an articulating function based on the diversification and specialization of functions.

Gallent & Shaw (2007) stated that there is a need to move from a policy of considering the metropolitan edge as an element to control population growth to a policy that considers the multi-functionality of this space. López-Goyburu & García-Montero (2018) posed that the metropolitan edge planning must include measures to limit the overlapping of residential and agricultural uses, must take into account the location of new urban nuclei to optimize water management, reduce social tensions and comply with landscape quality and economic development and must incorporate the economic, social and environmental situation of the metropolitan edge to prevent the rapid changes that occur there from overflowing the planners' capacity to meet the needs of its population.

### 2.4 Approach 4: Non-universal spatial delimitation

The metropolitan edge cannot be understood as a form that can be replicated in different cities, but rather as the result of spatial practices specific to each territory. Following Nel-lo (1999), one of the aspects on which most emphasis has been placed in the studies carried out so far is the delimitation of these spaces. In this sense, Sabugo (2017) pointed out that *"the great concern raised by metropolitan-size cities is that the absence or indefiniteness of their limits is equivalent to the absence of their form."*

Vejarano (2004) described the edge as a limit to urban construction. This idea is not new; at the end of the 19$^{th}$ century, Howard (1965) proposed a reserve of rural space around the city called green belt, which could act as a public device to limit the urban area growth and maintain the balance between urban and rural space. This proposition was considered by the County of London plan (1943) and the Greater London plan (1944), which indicated to limit urban growth by means of a green belt that acts as a tool for containment, order and provision of urban services. The Copenhagen Finger plan (1947) used this idea as a reference and re-adapted it to Copenhagen's public transport radial structure; thus, the open spaces between radial axes are maintained without buildings as green wedges that penetrate the city center.

Following this way of argumentation, an essential question must be asked "where does urban end?". There are different criteria to determine when a territory is urban. In several countries, the delimitation of urban space is defined according to the number of inhabitants. For example, in Argentina, localities with more than 2,000 inhabitants are considered urban; in Mexico, this figure rises to more than 2,500 inhabitants whereas in Spain or Malaysia it increases to more than 10,000 inhabitants. In other countries, urban space is defined by the availability of facilities and services. In Chile, for example, an urban locality is defined as one that has certain public and municipal services. In other countries, different criteria are combined. For example, to be considered urban, a locality in Israel must have more than 2,000 inhabitants or at least one third of households must earn their living from agriculture, a locality in Canada must have more than 1,000 inhabitants and a population density of more than 400 persons per square kilometer and a locality in the United States must have more than 2,500 inhabitants and a population density of more than 1,000 inhabitants per square mile (Ministerio del Interior 2016; ONU HABITAT 2018).

Therefore, in addition to the different reference values and criteria among the various countries, the socio-technological structure must be considered now (Castells 1971; Capel 1975). The mobility of people, goods and services between rural production centers and urban spaces blurs the boundaries; cities have been extending their radius of influence to include areas outside urban agglomerations (Badia-Perpinya & Pallares-Barbera 2006; Narain & Nischal 2007).

The subsequent emerging question is "how wide is the metropolitan edge?" There are various types of studies that approach the metropolitan edge qualitatively from different areas of knowledge (urbanism, ecology, sociology, health, etc.), as presented in Approaches 1, 2 and 3. From the functional point of view, this territory is conceived as a space in transformation (Qviström & Saltzman 2006) that lacks properly urban or rural attributes, where its effects are reduced or less evident (CONAMBA 1995), or as areas where the city must grow (Decree-Law No. 8912). From the social point of view, the metropolitan edge is interpreted as a space in a process of transforma-

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tion based on the performance and interaction between a multiplicity of actors and logics (Brenner & Schmid 2015). From the environmental point of view, the metropolitan edge is understood as the space where the flow of goods and services between production centers and urban centers takes place and the environmental balances and imbalances produced in these centers are reflected (Allen 2003).

Quantitatively, the work by Bravo Bello (2013) refers us to the European context based exclusively on spatial criteria and makes an approximation to this delimitation through the application of statistical analysis to the distribution and evolution of land uses. In this way, the author stated that it is very difficult to delimit the width of the metropolitan edge, estimating -as an approximation based on the choice of land uses- a spatial reference of 500m. On the other hand, Article 91 of Bogota's Land Use Plan (Decree No 469/2003) defines the edge ecological corridor as a 50-100m wide strip in rural land, contiguous and parallel to the urban perimeter.

## 3 Discussion and conclusions

In this section, the four key approaches described above are related. The intersection between these approaches is structured into three categories: concept, attribute, methodology (Table 1). In conceptual terms, attempts to define this territory that extends between urbanized centers and rural space have been mediated by particular historical, social, economic, and environmental contexts. This territory has been conceived from a space to accommodate urban growth, as proposed in Decree-Law No. 8912, to a space to contain urban growth, as proposed by Howard (1965) with his concept of garden city. This conception of the territory as land reserve areas or green spaces to contain urban expansion does not seem to reflect its different characteristics and dynamics, from the investment of the state, in technological issues and the multiple uses, actors and interests.

The various studies that analyze the articulation between forms of urbanization and social structures show that these territories present a changing reality that has been modified over time (Approach 1), making it difficult to define them. We should probably stop trying to use a single concept to represent the different territorial conformations that extend between urbanized nuclei and rural space (Approach 2) that varies over time and space (Approach 3). The identification of different situations within what is generically designated as metropolitan edges (Approach 4) constitutes an opportunity to re-think and investigate these territories.

Regarding attributes, and in line with the conceptual approach, it is observed that metropolitan edges require specific descriptions and explanations before planning (Secchi 1992) and the need to know their processes (López-Goyburu 2019). The description and explanation of the physical structure of the systems of the metropolitan edge, both as a formal expression of the ways of life and the work that is developed in these territories, may provide an indication of which culture may be proper to it (Approaches 1, 2 and 4). Some criteria to take into account are: to recover the theoretical foundations considering its inhabitants' forms of perception of the territory (Sieverts 2003); to question the sensation of indifference in the position of things and the logics of discontinuous forms (De Solá Morales 2008); and to inquire about the positive interest of the diffuse city (Vigano 1999).

The metropolitan edge can also be analyzed from an environmental and systemic approach. Sorace (2001) studied how urban-agricultural parks are a good option for wildlife in the metropolitan edge due to less intensive agricultural procedures, absence of hunting pressure and less human disturbance. Hara et al. (2008) stated that understanding the transformation processes of the metropolitan edge is relevant for landscape planning because it is a mixture of land uses. Another possible entry is the actors. The metropolitan edge is the result of the social relationships among the different actors that intervene in it, conditioned by the social structure that constitutes it (Approach 3). The analysis of the articulation between spatial form and social structure requires multidisciplinary work.

Finally, from the methodological perspective, the metropolitan edge is a multi-dimensional space that demands to be understood and leads to the deconstruction of mono-dimensional epistemologies. It requires an understanding of the territory that can enlighten its specific historical patterns through which its different conformations are articulated. The framework of epistemological operations of research and theories on the metropolitan edge should not understand this territory as a universal form that develops within fixed and stable limits but should contemplate the study of specific forms or units at different spatial scales (Approach 4). In Brenner and Schmid's (2015) words, the distinction between urban and rural is being diluted, and its demarcation as a field of study is a process of theoretical abstraction that changes in relation to the context.


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**Table 1** Synthesis of the categories concepts, attribute, and methodology of the four key approaches.

| Approaches | Concepts | Attributes | Typical methods |
|---|---|---|---|
| **Spaces in socio-spatial transformation** | Sum of temporary constructions in motion. | New patterns of socio-spatial organization and uneven development. | Processual, studies in historical perspective |
| | Entrelazamientos de relations, exchanges and practices. | Networks and zones of specific functions associated with new facilities and closed urbanizations that displace agricultural uses. | Geo-historical understanding of metropolitan space |
| | Dispersion of pieces over the territory. | Settlements of low and high but not medium strata. | Satellite image analysis. |
| | Heterogeneous territory. | Extractive activities. | Statistical analysis. |
| | Networks of social relations. | Areas with water contamination from rivers and wetlands. | |
| **Multi-actor project** | Collective project that encompasses different jurisdictions. | Agricultural activities between neighbours and local industries and social organizations. | Interviews with key actors. |
| | Tensions between urban and rural uses. | Conflicts between agricultural and non-agricultural neighbours. | Socioeconomic trajectories. |
| | Network of immigrants. | Immigrants land workers. | Operational dynamics. |
| | Co-produced and transformed through the state. | Social exclusion. | Case studies. |
| | Sustainability and food security. | Cooperativism. | Conflicts among different actors. |
| | | Organic food production. | |
| | | Protect the industrial-agricultural belt | |
| **Multiple, dynamic and heterogeneous uses** | Space with heterogeneous uses. | Processes of commercial and leisure enterprises, industries and new generation residential spaces | Satellite image interpretation. |
| | Discontinuous and heterogeneous urbanization processes. | Horticultural and floricultural uses. | Statistical analysis. |
| | Productive, agricultural and urban systems with their own characteristics and dynamics. | Environmental balances and imbalances resulting from the exchanges that occur between urban and rural spaces are manifested. | Geographic Information Technologies. |
| | Heterogeneity and temporal dynamism. | Neighbors' reaction to odors de las granjas | Regulatory frameworks. |
| | | Pressure on forest resources. | Case studies. |
| | | Loss of agricultural land. | |
| | | Speculative urban investment. | |
| | | Low-density expansion. | |
| **Non-universal spatial delimitation** | Cannot be understood as a form that can be replicated in different cities. | Limit to urban construction. | Movement of people, goods, and services. |
| | Delimit the width of the metropolitan edge. | Metropolitan edge wide. | Population density. |
| | | Socio-technological structure. | Regulatory framework - Urbanizable land. |

Results show that there is not a morphology of the metropolitan edge but different transformation processes that crystallize in different territories and spatial scales. The metropolitan edge is a project mediated through institutions, strategies, and socio-spatial struggles that combine and articulate, thus requiring reflective connection among the different actors influencing its formation (Approach 2). Additionally, it is a territory with uneven socio-spatial and environmental development that prompts an exploration of interconnections between its uses and with the territory itself (Approach 3). Moreover, the metropolitan edge appears as a historically dynamic and evolving process, where the quest for concepts to designate it must demonstrate its diversity (Approach 1).

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In conclusion, the metropolitan edge must be theorized as a process that transforms inherited spaces according to their socio-economic, historical, and environmental contexts. The conformation of the metropolitan edge is a reflection of its historical processes and its socio-spatial and environmental frameworks. The different processes, territories and scales must be the protagonists of the epistemological framework seeking to cohere the urban order and the socio-environmental form. The study of the processes through which these territories are transformed with respect to the typological classification of static units of the metropolitan edge allows a better understanding of it. Policies and programs specifically designed are required to intervene in this intermediate and evolving space that extends between the consolidated city and rural areas. Results reflect the need for denominations and classifications that help us to analytically and cartographically differentiate the multiple landscapes of the metropolitan edge and question us about the specificity of this territory that extends between urban nuclei and rural space, the processes that have been overlapping over time and their logics. It seems difficult to find a protocol that gives an answer to its delimitation, but fine-grained studies of different geographies and scales would allow us to get to know its conformation patterns. From these patterns of distribution and evolution, contexts with common characteristics can be identified to elaborate new concepts and methods to decipher this volatile and, to a great extent, unknown territory.

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