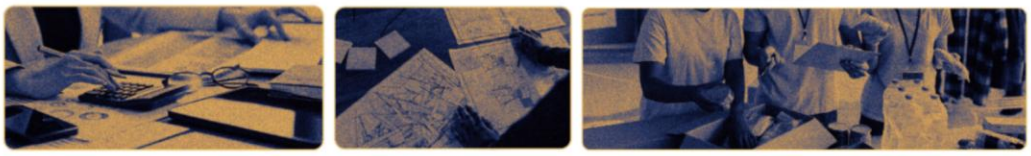

IMPACTO CIENTÍFICO
EDITORA

MUNICIPAL STRUCTURING PROJECTS WITH REGIONAL SCOPE: THE CASE OF THE GREEN LINE IN CURITIBA, PARANÁ

PROJETOS ESTRUTURANTES MUNICIPAIS DE ALCANCE REGIONAL: O CASO DA LINHA VERDE EM CURITIBA, PARANÁ

PROYECTOS ESTRUCTURANTES MUNICIPALES DE ALCANCE REGIONAL: EL CASO DE LA LÍNEA VERDE EN CURITIBA, PARANÁ

https://doi.org/10.56238/edimpacto2025.084-015

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ABSTRACT

After a period of “public enthusiasm” in the past century, marked by significant transitions in the urban structure of Curitiba, Paraná, there has been a kind of “innovative lethargy” in recent years, with an emphasis on government actions based on the review and expansion of older solutions. Considering this central issue, the research is justified by the relevance of studies on the development of a Major Urban Project (MUP), dating back to the late 1990s, with construction beginning in the early 21st century, aimed at transforming a federal highway into an urban avenue. The main objective of the article is to evaluate the landscape transformations associated with the real estate dynamics of the area covered by the Green Line Urban Consortium Operation (OUC-LV). To achieve this, the methodological procedures — structured as multi-method, exploratory in nature, with a qualitative and applied approach — are based on the analysis of qualitative aspects of the landscape in the most consolidated sector of the Green Line (South). In response to the research question regarding which sections of this metropolitan axis show the most significant landscape changes due to land use alterations, the main results indicate the transformation of certain land uses into others more compatible with the new conception of the operation. In addition to significant delays caused by interferences related both to the lack of financial feasibility of local works and to national economic downturns, it is concluded that there are interferences in the pace of real estate growth along the Green Line.

Keywords: Major Urban Project. Real Estate Dynamics. Landscape Transformations.

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RESUMO
Após um período de “entusiasmo público” no século passado, marcado por importantes transições na estrutura urbana de Curitiba, Paraná, observou-se uma espécie de “letargia inovadora” nos últimos anos, com ênfase em ações governamentais baseadas na revisão e expansão de soluções mais antigas. Considerando esse problema central, a pesquisa se justifica pela pertinência de estudos sobre o desenvolvimento de um Grande Projeto Urbano (GPU), datado do final da década de 1990, cujas obras se iniciaram no começo do século atual, voltadas à transformação de uma rodovia federal em uma avenida urbana. O objetivo geral do artigo é avaliar as transformações paisagísticas associadas à dinâmica imobiliária da área abrangida pela Operação Urbana Consorciada Linha Verde (OUC-LV). Para tanto, os procedimentos metodológicos — de estrutura multimétodo, caráter exploratório, abordagem qualitativa e natureza aplicada — baseiam-se na análise de aspectos qualitativos da paisagem do setor mais consolidado da Linha Verde (Sul). Como resposta à questão investigativa sobre quais trechos desse eixo metropolitano revelam as mudanças mais significativas em sua paisagem, decorrentes de alterações na ocupação do solo, os principais resultados indicam a transformação de certos usos para outros mais compatíveis com a nova concepção da operação. Além da existência de importantes atrasos causados tanto por interferências relacionadas à falta de viabilidade financeira das obras em nível local quanto por retrações da economia nacional, conclui-se que há interferências no ritmo de crescimento imobiliário da Linha Verde.

Palavras-chave: Grande Projeto Urbano. Dinâmica Imobiliária. Transformações da Paisagem.

RESUMEN
Después de un período de "entusiasmo público" en el siglo pasado, marcado por importantes transiciones en la estructura urbana de Curitiba, Paraná, ha habido una especie de "letargo innovador" en los últimos años, con énfasis en acciones gubernamentales basadas en la revisión y expansión de soluciones más antiguas. Considerando este problema central, la investigación se justifica por la pertinencia de estudios sobre el desarrollo de un Grande Projeto Urbano (GPU- Gran Proyecto Urbano), que data de finales de la década de 1990 y con el inicio de las obras a principios del siglo actual, destinadas a la transformación de una carretera federal en una avenida urbana. Por lo tanto, el objetivo general del artículo es evaluar las transformaciones paisajísticas asociadas a la dinámica inmobiliaria del área cubierta por la Operação Urbana Consorciada Linha Verde (OUC-LV- Operación Urbana Consorciada Línea Verde). Para lograrlo, los procedimientos metodológicos, con estructura multimétodo, carácter exploratorio, enfoque cualitativo y naturaleza aplicada, se basan en el análisis de aspectos cualitativos del paisaje del sector más consolidado de la LV (Sur). Como respuestas a la pregunta investigativa sobre qué tramos de este eje metropolitano revelan los cambios más significativos en su paisaje debido a alteraciones en la ocupación del suelo, los principales resultados indican la transformación de ciertos usos hacia otros más compatibles con la nueva concepción de la operación. Además de la existencia de importantes retrasos causados tanto por interferencias derivadas de la falta de viabilidad financiera de las obras a nivel local como por retracciones de la economía nacional, se concluye que existen algunas interferencias en el ritmo de crecimiento inmobiliario de LV.

Palabras clave: Gran Proyecto Urbano. Dinámica Inmobiliaria. Transformaciones del Paisaje.

1 INTRODUCTION

With the implementation of Curitiba's first master plan in the mid-1960s, its provincial appearance was gradually transformed into a more contemporary appearance, based on the delineation of guidelines oriented to circulation, infrastructure, and land use (IPPUC, 2025a). The period of "public enthusiasm" between the 1960s and 1990s, marked by major transformations in the city's structure, including the involvement of the transport system through the exclusive *bus rapid transit* (BRT), was followed by a kind of "innovative lethargy", in which government actions were mainly concentrated on the revision of older solutions. as in the case of the metro, subjected to a turbulent process between the versions of its proposal and the unfeasibility of its implementation, especially due to technical-financial problems, coming to be considered an "urban legend" (Saraiva; Abdalla, 2019).

This **problem** of relative stagnation of urban ideas for the capital of Paraná during an interstice of almost five decades motivates the presentation of **justifications** for the realization of this research, given the relevance of studies on the development of a Great Urban Project (GPU- Great Urban Project), which dates back to the 2010s. transformation of a federal highway into an urban avenue, called Linha Verde (LV- Green Line).

Founded in 1693, Curitiba was elevated to the position of capital of the province in 1853. During the early years of the twentieth century, it underwent important transformations for the development of the regional economy, attracting immigrants from Central Europe and implementing public transport lines on rails. In 1943, the so-called "Agache Plan" defined structuring concepts and recommendations for the city, including radial and perimeter avenues, functional areas, and the building code (IPPUC, 2025a).

Curitiba's Urbanization Master Plan was based on this plan, following its "radial" growth model. Until the 1950s, Curitiba's population growth was compatible with the limits set by the Agache Plan, but then there was a more intense population increase. which leads to the need to readjust planning guidelines (Carmo, 2018).

A new 1965 plan, known as the "Serete Plan," established new occupancy guidelines and structured the linear growth of the center for the North and South structural axes. In this context, he proposed urban decentralization, with the creation of regional centers to reduce pressure on the central area; road hierarchy, to improve circulation and connection of different regions; functional zoning, with the definition of specific areas for differentiated uses; the conservation of the environment, with the improvement of green areas and the protection of natural resources; and integrated planning, through the articulation between transport,

housing, infrastructure and urban services (Carmo, 2018).

However, the expansion of urban occupation in the city along the margins of the BR-116 highway required, in the 1990s, the development of projects and actions to mitigate the negative effects of the highway on the urbanized network, with the aim of improving infrastructure in areas of urban conflict. improve the road structure and integrate the opposite marginal sides of the road axis. Initially called the "Metropolitan Axis", the Green Line received its current designation in 2005, and its works began in 2007 (PMC, 2019).

Subsequently, the Operação Urbana Consorciada Linha Verde (OUC-LV- Operación Urbana Consorciada Línea Verde) was approved by Municipal Law No. 13,909/2011. This instrument involves a set of municipal interventions, with the participation of representative entities of civil society, with the aim of improving and transforming the area of urban, environmental and social influence in the area of influence of the program (Curitiba, 2011).

The latest revisions of the municipal master plan incorporate the LV as the structuring axis of mobility and urban development, consolidating it as a strategic component of the sustainable growth of the city (Municipal Laws Nos. 14.771/2015 and 15.859/2021) (Curitiba, 2015; 2021). Of note is the ongoing planning update process for Curitiba, which began in 2025 and is expected to be completed by mid-2026 (IPPUC, 2025b).

In this brief history, the justifications for the elaboration of this research are reiterated, which seeks to analyze the improvements related to the old BR-116 -for decades considered an exclusive urban space- for the current OUC-LV, which has the character of a metropolitan axis of development, with emphasis on mobility. Thus, it has generated relevant impacts on the road system, public transport and, especially for this study, on land use and real estate and landscape dynamics.

Therefore, the **general objective** of the research is to evaluate the landscape transformations associated with the real estate dynamics of the area covered by the OUC-LV. To achieve this, the following **research question** is posed: which sections of this metropolitan axis reveal the most significant changes in its landscape due to alterations in land occupation? Based on this question, theories and concepts pertinent to the topic are used to guide its analysis.

2 THEORETICAL FOUNDATIONS

For Licnerski and Marchesan (2025), contemporary urbanization generates challenges for the understanding of multiple thoughts on the production of new places from

capitalist and neoliberal circuits. For the same authors, this process tends to reveal globally and simultaneously homogeneous and heterogeneous characteristics in the spatial construction of metropolises and in community coexistence in cities.

In this situation, GPUs are urban instruments intended to transform large fragments of urbanized space, made possible thanks to the institutional arrangements of public-private partnerships in urban regeneration processes. In Brazil, Licnerski and Marchesan (2025) link them to the OUC instrument, provided for in the Estatuto da Cidade (Estatuto de la Ciudad-Ley Federal Nº 10.257/2001) (Brazil, 2001).

These interventions in large urbanized fragments to allow for densification, verticalization and urban requalification aim to form new centralities for the diversification of economic and social development. In this context, Harvey (2019) differentiates space and place, attributing abstract and functional dimensions to the former, while conferring characteristics of resistance and identity on the latter.

From this perspective, Lefèbvre (2000 [1974]) frames the spatial configuration in the following triad: physical (perceived), mental (conceived), and experienced (representative), while Santos (2022 [1996]) organizes it into systems of objects ("fixed") and actions ("flows"). Acknowledging a promising approach, Slingerland and Hanse (2025) state that space is transformed into place in processes of "*place-making*", which allows feelings of belonging to be developed in appropriate territories.

On the other hand, the urban landscape is interpreted by Hardt (2020) as a combination of natural and anthropic components, with specific dynamics of interactions and interdependencies in a certain temporal, spatial and social section. In this context, these elements are inseparable and are in permanent evolution, generating mental perceptions and aesthetic sensations, derived from the ecosystem visualization of space.

In addition to the aforementioned City Statute, it is essential to mention the main legal provision that guides the management of metropolitan affairs, instituted by Federal Law No. 13,089/2015, which establishes guidelines for metropolitan planning and development (Estatuto da Metrópole- Statute of the Metropolis). This regulation also provides for the preparation of the Integrated Urban Development Plan (PDUI- Integrated Urban Development Plan) and other interfederative governance instruments (Brazil, 2015), currently under development for the Metropolitan Region of Curitiba (RMC- Metropolitan Region of Curitiba) (AMEP, 2025).

According to Hardt (2024), the lack of a regional-metropolitan instance in the Brazilian

federative system hinders the effectiveness of relations between the different municipalities in the physical, social, economic, and institutional spheres. One of the alternatives offered by OUC involves the transfer to landowners within the perimeter of the operation, construction rights above the usual zoning limits, through the purchase of the Certificado de Potencial Adicional de Construção (CEPAC- Certificado de Potencial Constructivo Adicional (PMC, 2025).

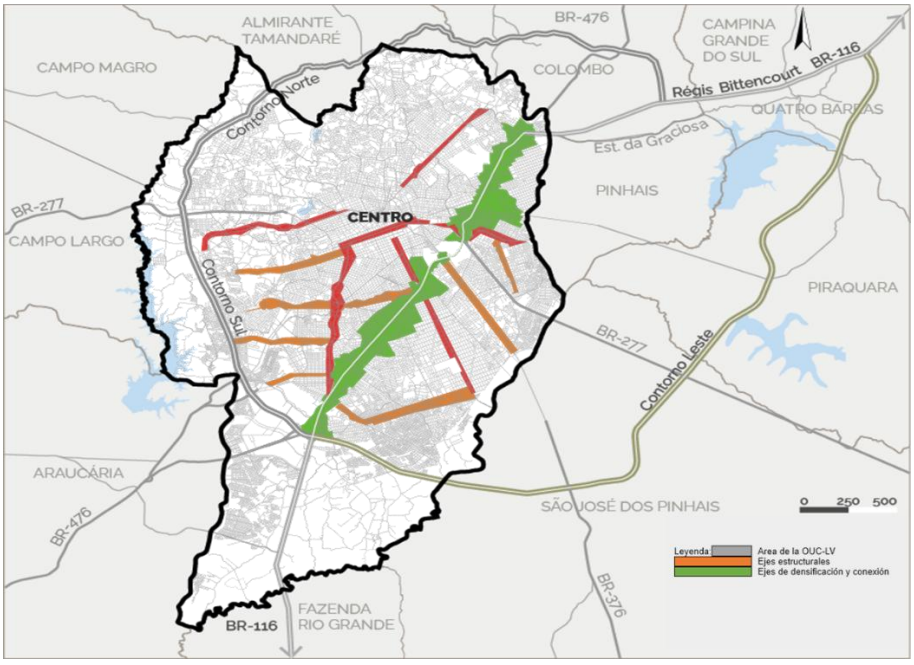
Given the limited experience of applying this alternative in the country, it is possible to say that the implementation of this financing mechanism still represents a learning experience, in which the existing discrepancies and contradictions must be understood, in order to correct them in the formulation of future urban operations. Given the complexity of the phenomenon under study, the techniques and methods adopted are systematized below.

3 METHODOLOGICAL PROCEDURES

To achieve the proposed objective, a multi-method research structure was adopted, with an exploratory character, a qualitative approach and an applied character. Figure 1 shows the location of the object of study in the city of Curitiba.

Figure 1

Schematic map of the location of the Operação Urbana Consorciada Linha Verde (OUC-LV-Operación Urbana Consorciada Línea Verde) in Curitiba



Source: Adapted from Cardoso (2021).

Apart from the review of the theoretical foundations of interest, the study was divided into four main phases: the selection of the most consolidated low-intensity sector, based on official information from the OUC-LV; the description of the main characteristics of the selected sector (South); the subdivision of the selected sector into other secondary sectors (seven subsectors plus a transition with the Central Sector) in order to evaluate the landscape results of the real estate dynamics between 2006 (before the start of the works) and 2024 (at the beginning of this research), by means of an indirect method of landscape evaluation, corresponding to the interpretation of technical attributes (Hardt, 2020); and the synthesis of the results achieved, through a matrix structure of relationships.

The image analysis and the chronological evolution of the space corresponding to the project in question were closely interconnected and were based on data from the Google Earth platform (2024) and thematic maps of the city (IPPUC, 2025c). These procedural steps guide the analysis of research findings.

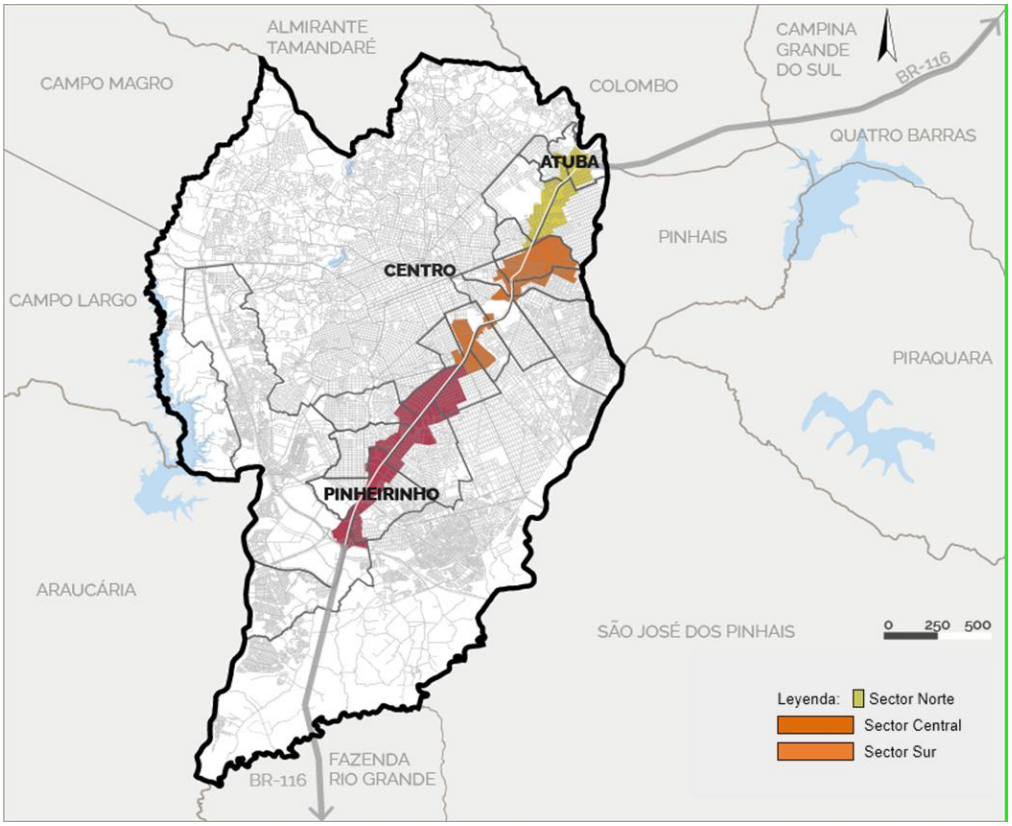
4 ANALYTICAL RESULTS

Despite its inception in the early 2000s, the implementation of the Green Line project is still far from reaching the idealized configuration, and two aspects must be considered for the evaluation of this context. The first, of a physical nature, is represented by civil works, especially the road system. The second is linked to a slow process and depends on factors exogenous to urban and metropolitan management, such as national economic conditions.

According to official data (PMC, 2025), with about 5 million square meters of total area, excluding lots and built areas, the OUC-LV covers 22 neighborhoods in an approximate extension of 22 km, subdivided into three main sectors (Figure 2). As mentioned above, for analytical purposes, the **selection of the most consolidated (** methodological phase 1) corresponded to the South segment, due to the beginning of implementation work in 2007.

Figure 2

Map of the structuring sectors of the Operação Urbana Consorciada Linha Verde (OUC-LV-Operación Urbana Consorciada Línea Verde)



Source: Adapted from Cardoso (2021).

The **description of the main characteristics of the South Sector** goes through its larger surface area compared to the others, with about 10.5 million square meters and almost 51% of the territorial extension of the metropolitan axis. Generally speaking, the main uses are commercial, service, and residential. There are 1.7 million square meters of vacant land in the South Sector, which corresponds to approximately 16% of the area of said compartment.

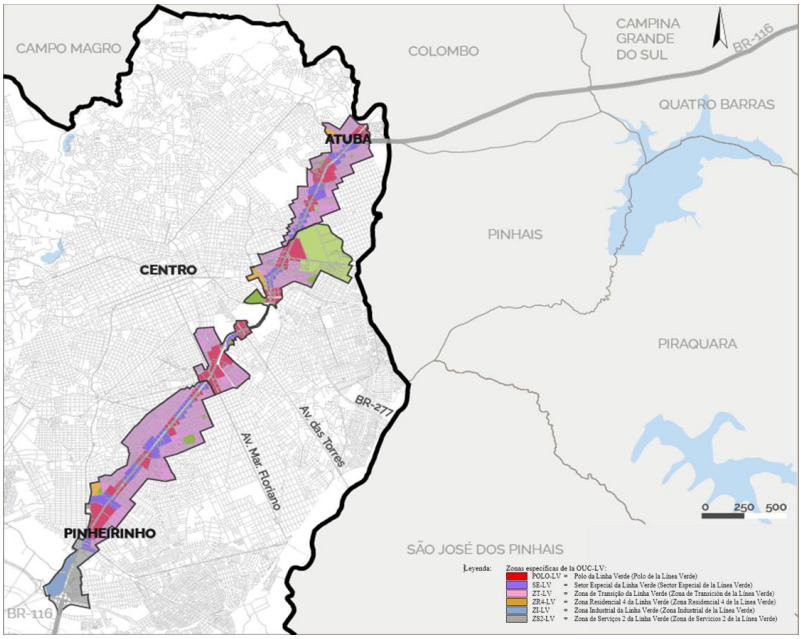
It is worth mentioning that LV occupancy is predominantly horizontal, with buildings generally of low to medium level. Commercial and service uses, and residential uses, occupy on average about 99% and 95% of its buildings horizontally, respectively, and approximately the other uses reach 80% of the same heights. Therefore, verticalization is uncommon and concentrated in specific locations.

The subdivision of the South Sector **into other secondary sectors was prioritized** to evaluate the landscape results of the real estate dynamics in a representative sample of

road transformations associated with real estate launches in the period studied, with results in volumetric changes and population density. Thus, the seven subsectors defined in the South Sector and one more in the Central Sector, composed of the urban areas identified in Figure 3 and Table 1, are presented in image and analytically in the years 2006 (before the start of the works) and 2024 (the beginning of this research) in geographical order – from south to north – justified by the chronology of execution of the works, pointing to the landscape analysis of these cuts.

Figure 3

Land use and occupation zoning map of the Operação Urbana del Consorciada Linha Verde (OUC-LV- Operación Urbana Consorciada Línea Verde) and subsectors of the analytical coverage area



Source: Based on Curitiba (2019).

Table 1

Occupancy parameters of urban areas in the analytical coverage area of the Operação Urbana Consorciada Linha Verde (OUC-LV- Operación Urbana Consorciada Línea Verde)

Zone	Basic	Additional potential			General			
	Maximum Utilization Coefficient (CA)	**Maximum height of the building** (number of floors)	**Maximum Utilization Coefficient** (CA)	**Maximum height of the building** (number of floors)	**Maximum Occupancy Rate** (TO)	**Minimum Front Withdrawal** (m)	**Minimum setback from boundaries** (m)	**Minimum lot.** (tested x area)
POLO-LV	1,0	Free	4,0	Free	50% of single-family homes 75% base 50% tower	5	≤ 2 pav: allowed >2 pav: H/6 attended min. from 2.5	20x1000
SE-LV	1,0	≤ 6	4,0	Free	50%	5	≤ 2 pav: allowed >2 pav: H/6 attended min. of 2.5.	20x1000
ZT-LV	1,0	≤ 4	2,5	8	50%	5	≤ 2 pav: allowed >2 pav: H/6 attended min. from 2.5	15x450
ZR4-LV	1.0 Single-family home 2.0 Other uses	6	2,5	8	50%	5	≤ 2 pav: allowed >2 pav: H/6 attended min. from 2.5	20x1000
ZI-LV	1.0 Industry 0.6 Trade and sectoral services	-	-	-	50%	15	Min.: 3 + 7 for batches with ≤ 50 tested Min.: 5 for batches with > 50 tested	20x600
ZS-2-LV	1,0	2	-	-	50%	10	-	15x450

Source: Based on Curitiba (2019).

Despite being the oldest, **Subsector 1** (Figure 4), composed of the ZE-LV, ZI-LV and ZS2-LV zones, does not present significant changes in the panorama of these compatibilities in the interstices studied. For the ZR2 (low density) itself, external to the established cut, no major transformations are noticeable.

Figure 4

Aerial images of Subsector 1 of the South Sector of the Operação Urbana Consorciada Linha Verde (OUC-LV- Operación Urbana Consorciada Línea Verde) – 2006 (left) and 2024 (right)

Source: Based on Curitiba (2019) and Google Earth (2006; 2024).

Legend: Specific areas of the OUC-LV represented in the images:

- SE-LV = Setor Especial da Linha Verde (Special Sector of the Green Line)
- ZI-LV = Zona Industrial da Linha Verde (Green Line Industrial Zone)
- ZS2-LV = Zona de Serviços 2 da Linha Verde (Service Zone 2 of the Green Line)

Another non-specific area of the OUC-LV represented in the images:

- ZR2 = Residential Zone 2 (Residential Zone 2)

On the other hand, **Subsector 2** (Figure 5) is especially represented by POLO-LV and secondarily by ZT-LV. With the enactment of Municipal Law No. 15,511/2019, it was defined that the former should encourage medium and high-density occupation areas, aiming at densification, verticalization, and predominance of commercial and service uses, in addition to establishing the free height of buildings (Curitiba, 2019). However, only occasional changes are perceived in the region, more evident in the ZT-LV, contrary to what is observed in the ZR2 and ZR4, which are predominantly residential, with the possibility of intensification of commercial uses and local services in the latter.

Figure 5

Aerial images of Subsector 2 of the South Sector of the Operação Urbana Consorciada Linha Verde (OUC-LV- Operación Urbana Consorciada Línea Verde) – 2006 (left) and 2024 (right)

Source: Based on Curitiba (2019) and Google Earth (2006; 2024).

Legend: Specific areas of the OUC-LV represented in the images:

- POLO-LV = Polo da Linha Verde (Green Line Pole)
- ZT-LV = Zona de Transição da Linha Verde (Green Line Transition Zone)

Other non-specific areas of the OUC-LV represented in the images:

- ZR2 = Residential Zone 2 (Residential Zone 2)
- ZR4 = Residential Zone 4 (Residential Zone 4)

In the third compartment (**Subsector 3**) (Figure 6), landscape changes in different areas are highlighted: POLO-LV, SE-LV, ZR4-LV and ZT-LV. Apart from the first, focused on commerce and services, the others are categorized by the predominance of housing uses. This fact is verified due to the launch of large real estate projects in the region, in addition to the construction of large commercial warehouses. Again, ZR2 outside the boundaries of OUC-LV does not demonstrate significant urban dynamics.

Figure 6

Aerial images of Subsector 3 of the South Sector of the Operação Urbana Consorciada Linha Verde (OUC-LV- Operación Urbana Consorciada Línea Verde) – 2006 (left) and 2024 (right)

Source: Based on Curitiba (2019) and Google Earth (2006; 2024).

Legend: Specific areas of the OUC-LV represented in the images:

- POLO-LV = Polo da Linha Verde (Green Line Pole)
- SE-LV = Setor Especial da Linha Verde (Special Sector of the Green Line)
- ZT-LV = Zona de Transição da Linha Verde (Green Line Transition Zone)
- ZR4-LV = Zona Residencial 4 da Linha Verde (Residential Zone 4 of the Green Line)

Another non-specific area of the OUC-LV represented in the images:

- ZR2 = Residential Zone 2 (Residential Zone 2)

Figure 7, related to **Subsector 4**, shows changes in land use and occupation that are not restricted to the lots near the LV, but extend throughout their coverage area, with extension to the neighborhoods, with a greater concentration in the ZT-LV. In the two compartments of the POLO-LV zone, in addition to the concentration of transport stations, there are important road crossings that connect with the neighborhoods or structural axes. Again, the ZR2 external to the OUC-LV does not support special landscape transformation dynamics.

Figure 7

Aerial images of Subsector 4 of the South Sector of the Operação Urbana Consorciada Linha Verde (OUC-LV- Operación Urbana Consorciada Línea Verde) – 2006 (left) and 2024 (right)

Source: Based on Curitiba (2019) and Google Earth (2006; 2024).

Legend: Specific areas of the OUC-LV represented in the images:

- POLO-LV = Polo da Linha Verde (Green Line Pole)
- SE-LV = Setor Especial da Linha Verde (Special Sector of the Green Line)
- ZT-LV = Zona de Transição da Linha Verde (Green Line Transition Zone)

Another non-specific area of the OUC-LV represented in the images:

- ZR2 = Residential Zone 2 (Residential Zone 2)

The images corresponding to **Subsector 5** (Figure 8) show significant changes in the urban landscape of the metropolitan axis, which demonstrates the effectiveness of the zoning proposals applied, which influence the issuance of permits for commerce and services for POLO-LV, and for housing in SE-LV and ZT-LV. The highlight is the launch of a large shopping mall in the region. On this occasion, the ZR2 area, located outside the perimeter of the OUC-LV, also presents a greater landscape dynamism.

Figure 8

Aerial images of Subsector 5 of the South Sector of the Operação Urbana Consorciada Linha Verde (OUC-LV- Operación Urbana Consorciada Línea Verde) – 2006 (left) and 2024 (right)

Source: Based on Curitiba (2019) and Google Earth (2006; 2024).

Legend: Specific areas of the OUC-LV represented in the images:

- POLO-LV = Polo da Linha Verde (Green Line Pole)
- SE-LV = Setor Especial da Linha Verde (Special Sector of the Green Line)
- ZT-LV = Zona de Transição da Linha Verde (Green Line Transition Zone)

Another non-specific area of the OUC-LV represented in the images:

- ZR2 = Residential Zone 2 (Residential Zone 2)

In **Subsector 6** (Figure 9), there are also changes in the panorama of the POLO-LV, SE-LV and ZT-LV areas, but with more expressiveness This condition is possibly due to the pre-existing degree of urbanization.

Figure 9

Aerial images of Subsector 6 of the South Sector of the Operação Urbana Consorciada Linha Verde (OUC-LV- Operación Urbana Consorciada Línea Verde) – 2006 (left) and 2024 (right)

Source: Based on Curitiba (2019) and Google Earth (2006; 2024).
Legend: Specific areas of the OUC-LV represented in the images:

- POLO-LV = Polo da Linha Verde (Green Line Pole)
- SE-LV = Setor Especial da Linha Verde (Special Sector of the Green Line)
- ZT-LV = Zona de Transição da Linha Verde (Green Line Transition Zone)

The same precondition of a more consolidated level of urbanization affects the dynamics of the local landscape, with no major changes recorded in the specific areas of the OUC-LV (POLE-LV, SE-LV and ZT-LV). This characteristic is also diagnosed for external ones (ZR2 and ZR3 – medium density).

Figure 10

Aerial images of Subsector 7 of the South Sector of the Operação Urbana Consorciada Linha Verde (OUC-LV- Operación Urbana Consorciada Línea Verde) – 2006 (left) and 2024 (right)

Source: Based on Curitiba (2019) and Google Earth (2006; 2024).

Legend: Specific areas of the OUC-LV represented in the images:

- POLO-LV = Polo da Linha Verde (Green Line Pole)
- SE-LV = Setor Especial da Linha Verde (Special Sector of the Green Line)
- ZT-LV = Zona de Transição da Linha Verde (Green Line Transition Zone)

Other non-specific areas of OUC-LV represented in the images:

- ZR2 = Residential Zone 2 (Residential Zone 2)
- ZR3 = Residential Zone 3 (Residential Zone3)

The last compartment analyzed (**Subsector 8**) is located near Marechal Floriano Peixoto Avenue, which composes with the LV two axes of alteration of the basic design of the city, representing the transition between the northern limit of the section (South Sector) and the beginning of the Central Sector, where the works were concluded longer. Even so, the images, which mainly contain the POLO-LV, SE-LV and ZT-LV zones, do not show relevant changes (Figure 11), despite changes in land use, with structures with industrial characteristics and general services that give way to other uses, such as university teaching and research and large-scale commerce. At first, the external ZR2 did not undergo significant changes in the analysis period.

Figure 11

Aerial images of Subsector 8 of the South Sector of the Operação Urbana Consorciada Linha Verde (OUC-LV- Operación Urbana Consorciada Línea Verde) – 2006 (left) and 2024 (right)

Source: Based on Curitiba (2019) and Google Earth (2006; 2024).

Legend: Specific areas of the OUC-LV represented in the images:

- POLO-LV = Polo da Linha Verde (Green Line Pole)
- SE-LV = Setor Especial da Linha Verde (Special Sector of the Green Line)
- ZT-LV = Zona de Transição da Linha Verde (Green Line Transition Zone)

Another non-specific area of the OUC-LV represented in the images:

- ZR2 = Residential Zone 2 (Residential Zone 2)

The **synthesis of the results** obtained is presented from the matrix structure of relationships shown in Table 2. Paradoxically, for the initial subsectors of the works (1 and 2) and their surrounding areas, located further south, conditions of real estate dynamics and occupation are diagnosed that have not significantly modified the previous landscape. It should be remembered that, in addition to forming areas that can be classified as having relative urban expansion, the first compartment comprises industrial and service spaces that are partially consolidated and maintained by current legislation.

Table 2

Matrix of relationships of zones and subsectors analyzed in the area covered by the Operação Urbana Consorciada Linha Verde (OUC-LV- Operación Urbana Consorciada Línea Verde) according to classes of landscape transformation dynamics

	Acronym	Name	Subsector 1	Subsector 2	Subsector 3	Subsector 4	Subsector 5	Subsector 6	Subsector 7	Subsector 8
Specific areas of the OUC-LV	POLO-LV	Polo da Linha Verde (Green Line Pole)	-							
	SE-LV	Setor Especial da Linha Verde (Special Sector of the Green Line)		-						
	ZI-LV	Zona Industrial da Linha Verde (Green Line Industrial Zone)		-	-	-	-	-	-	-
	ZR4-LV	Zona Residencial 4 da Linha Verde (Residential Zone 4 of the Green Line)	-	-		-	-	-	-	-
	ZS2-LV	Zona de Serviços 2 da Linha Verde (Service Zone 2 of the Green Line)		-	-	-	-	-	-	-
	ZT-LV	Zona de Transição da Linha Verde (Green Line Transition Zone)	-							
Non-specific areas of the OUC-LV	ZR2	Residential Zone 2 (Residential Zone 2)						-		
	ZR3	Residential Zone 3 (Residential Zone 3)	-	-	-	-	-	-		-
	ZR4	Residential Zone 4 (Residential Zone 4)	-		-	-	-	-	-	-

Source: Based on Figures 4 to 11.

Legend: Upper class; Intermediate Class; Lower class

Guo, Hu, and Guo (2025) argue that the renovation of traditional areas predominantly focused on industries is essential for the sustainable development of contemporary cities. At the same time, they confirm that strategies that privilege local characteristics promote varied approaches, including advances in innovation and technologies to improve urbanized space, especially in the environmental field.

There is also a situation of some stagnation of the landscape for the penultimate to the north (Subsector 7). In this case, there is a certain degree of urbanization that limits the process of modifying urban scenarios. These same characteristics are observed in the adjacent subsectors (6 and 8), but in these, the rate of change is somewhat more expressive.

The main highlights of the results achieved are subsectors 3 and 5, with the most relevant transformations derived from a more significant number of commercial and housing projects installed in the period analyzed.

Awuah and Abdulai (2022) attest that the global landscape of the built environment is subject to rapid change, associated with serious implications for developing countries. In these circumstances, attention is paid to the fact that changes in the urban landscape do not necessarily mean improvements for the experience of citizens in urbanized contexts.

It is interesting to note that the landscapes of the non-specific areas of the OUC-LV are not, with rare exceptions, influenced by the patterns of the operation, which evidences

their ubiquity. This is another aspect to consider, because, as Cho, Kim, and Lee (2020) predict, urban regeneration processes, as in the OUC-LV, tend to influence the valuation of proximity. However, the phenomenon in Curitiba seems to be restricted to the limits of the operation itself, which provides the assumption of conclusions about the investigation.

5 FINAL THOUGHTS

The article achieves its general objective of evaluating the landscape transformations associated with the real estate dynamics of the area covered by the OUC-LV, providing answers to the research question about which sections of this metropolitan axis reveal the most significant changes in its landscape due to alterations in land occupation.

The theoretical foundations, briefly presented and with possibilities for further study, allowed the methodological procedures to be structured in four progressive phases. Even with the intention of simplifying them for easy appropriation by municipalities with similar goals to those of this study, in future studies it will be possible to overcome some procedural limitations, such as the extension of the area of analysis to the entire extension of the OUC-LV, as well as the incorporation of quantitative factors to the study of the landscape.

The results synthesize theoretical and practical contributions to the field of knowledge by exposing realities for the improvement of a process in development, whose phenomenon is not adequately known in all its complexity. The real estate dynamics and landscape transformations diagnosed promote scientific advances, which need to be perfected gradually.

ACKNOWLEDGMENTS

To the National Council for Scientific and Technological Development (CNPq) and the Pontificia Universidade Católica do Paraná (PUCPR) for their support of research.

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