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DIAGNOSIS OF USE AND DESIGN OF PEDESTRIAN SPACE[1]

CONTRIBUTIONS FROM THE LANDSCAPE FOR THE CITY OF LA PLATA, ARGENTINA

DIAGNÓSTICO DE DISEÑO Y USO DEL ESPACIO VIAL PEATONAL
APORTES DESDE EL PAISAJE PARA LA CIUDAD DE LA PLATA, ARGENTINA

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1 Este trabajo se desarrolló en el marco de una beca postdoctoral denominada " Los espacios de la movilidad como elementos estratégicos para un crecimiento urbano más sustentable. El caso de la ciudad de La Plata, Argentina" desarrollada en el Centro Nacional de Investigaciones Científicas y Técnicas (CONICET).

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En el marco de escenarios urbanos de creciente complejidad, la infraestructura de los espacios viales de las ciudades se encuentra todavía casi exclusivamente dedicada a los autos. La ciudad de La Plata no es la excepción, presentando además un interesante contraste entre sus áreas urbanas planificadas y aquellas que han crecido por expansión del tejido residencial. El concepto de espacio peatonal es entendido a partir de las distintas funciones que cumple no sólo en cuanto infraestructura de transporte sino también en cuanto espacios públicos y estratégicos para la conformación del paisaje urbano. Así, el trabajo se propone, por un lado, la generación de información primaria y, por otro, la construcción de un diagnóstico sobre el diseño y uso del espacio peatonal. Para esto, se realiza un relevamiento del estado actual del espacio peatonal, sus dimensiones, características morfológicas y elementos paisajísticos. Si bien existe una cantidad adecuada de espacio reservado al uso peatonal, se verifica que en muchos sectores aún no resulta accesible ni agradable para los ciudadanos debido a su mal estado o nulo tratamiento.

Palabras clave: Vialidad urbana, paisaje urbano, espacio público, ciudad, relevamientos.

In the context of increasingly more complex urban scenarios, the infrastructure of the city's road spaces is still almost exclusively dedicated to cars. The city of La Plata is no exception, also presenting an interesting contrast between its planned urban areas and those that have grown due to urban sprawl. The concept of pedestrian space is understood starting from the different functions it fulfills, not only insofar as a transport infrastructure, but also as public and strategic spaces that shape the urban landscape. Thus, this article proposes, on one hand, the generation of primary information and, on the other, the construction of a diagnosis about the design and use of the pedestrian space. For this, a survey of the current state of the pedestrian space, its dimensions, morphological characteristics, and landscape elements, is carried out. Although there is an adequate amount of space reserved for pedestrian use, it is confirmed that in many sectors it is still not accessible or pleasant for citizens, due to its poor condition or complete lack of upkeep.

Keywords: Urban roads, urban landscape, public space, city, surveys.

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I. INTRODUCTION

This article starts from the understanding the importance of the design of the pedestrian space, to collaborate in resolving issues inherent to the city's public space, including lack of safety, accessibility, traffic accidents, and also the environmental and landscape quality of the urban space: "Think about a city, and what comes to mind? Its streets. If the streets of a city look interesting, so does the city; if they are boring, then the city looks boring" (Jacobs, 1961, p. 107). Starting from this premise, this research proposes integrating the social and aesthetic views, typical of the landscape approach, to the classical functionalist view of these spaces. The purpose of this work is based, on one hand, on the generation of primary information to provide new concrete data, that can be used to contribute to future studies on the quality of the street and landscape space; and, on the other, in the construction of a diagnosis about the design and use of the pedestrian space in the city of La Plata.

The history of cities had a turning point at the beginning of the 20th century, with the start of the widespread production of cars. The international style in architecture and urbanism of the start of the century often turned to the creation of large spaces (for the car) with a functionalist design, leaving aside the small scale and humanization of the spaces. This, added to the exponential increase of the number of cars circulating alongside deficient planning, led to a series of strong mainly qualitative critiques around the world in the 1960s. These critiques were captured in the contributions of the books of Gordon Cullen (1959), Sylvia Crowe (1960), Kevin Lynch (1960), and Jane Jacobs (1961).

Although the goal of this revolutionary wave against modern urbanism was reclaiming humanism in the city, today the street space is almost exclusively dedicated to cars, and it is difficult for other means of mobility to connect to the system. This aspect, referring to the accessibility of street spaces, is stated in different research projects (Arroyo, 1992; Pozueta Echavarri, 2014; National Association of City Transportation Officials [NACTO], 2016, Herce, 2008), while others return specifically to the aspects of road safety (Merchán, González & Noreña, 2011; Pérez-Stefanov, 2019). Some studies, like that presented by López and Ravella (2019), point out, from a more comprehensive viewpoint, the functionalist conception of spaces of mobility and the lack of integrated design platforms. Following this line, this document looks further into the spatialization and cartographic elaboration of key variables to design the pedestrian space, in order to contribute to their visualization. The case study was chosen on representing the issues that countless Latin American cities face (phenomena of diffusion and dispersion). It is well known that diffusion phenomena favor the increase of motorization rates and contamination. Although local governments have incorporated measures like infrastructure for bicycles, these interventions have mainly taken place in central areas, leaving the large peripheral sectors, which urgently need improvements in the quality of their environment, aside. This situation has been defined by Delgadillo (2014) as "a la carte urbanism", which are similar to other public policies, urban programs, and urbanistic "recipes" that seek to build a good image for the city, by improving areas that are most visually exposed to the population and its visitors.

II. THEORETICAL FRAMEWORK

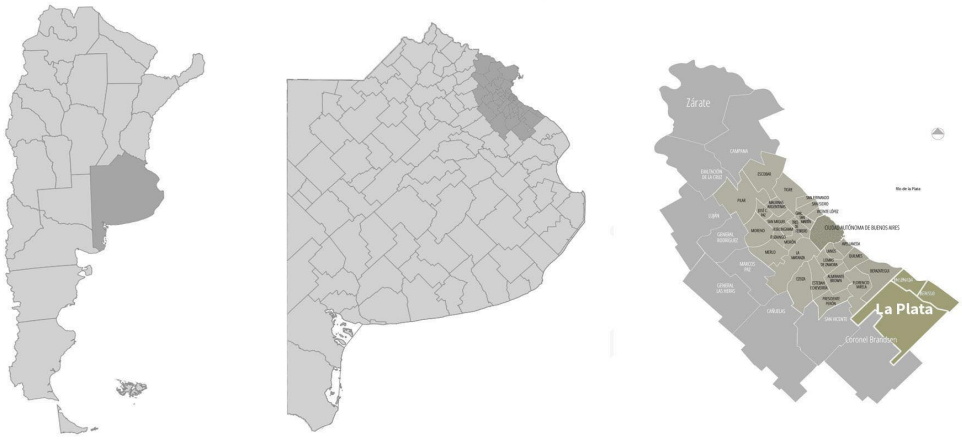
Pedestrian space design, key for 21st-century cities

Delgado (2011) conceives the public space as a political category and states that this needs to be urgently ratified as a place, becoming the "flesh between us" (p. 28). Thus, this public space (in a theoretical principle) becomes a real and sensitive space.

Within the category of public spaces, the street space is considered as the public connection space, understanding that, if the city is a meeting place par excellence, more than anything else, the city is its pedestrian public space (Gehl, 2006).

In this sense, a higher quality pedestrian space, introduced through a larger amount of urban vegetation, would lead to improvements in safety -as there would be more people on the street – (Kuo & Sullivan, 2001, p. 359), and in the environmental and landscape quality (Säumel, Weber & Kowarik, 2016, p.25). On the other hand, the creation of safer pedestrian spaces could be done through virtual walls with trees and defined boundaries for drivers, with the resulting reduction in car speed (Eisenman, Coleman & Labombard, 2021, p.2). Likewise, it is vitally important to consider suitable dimensions for the pedestrian space (NACTO, 2016), the creation of sidewalks in those urban areas that do not have them yet (Birche, 2020), and the placing of elements that guarantee universal access, like ramps and tactile paving.

In some places, before others, it can be seen how cities slowly began to give more spaces to pedestrians, phenomena that have seen a renewed momentum since the beginning of the 21st century, when city center pedestrianization works were inaugurated in La Plata and the micro-center of Buenos Aires. By 2010, Mexico City



Argentina
41,22 M hab.

Provincia de Buenos Aires
16,66 M hab.

Gran Buenos Aires
13,58 M hab.

Gran Plata
0,8 M hab.

Figure 1. Location of the city of La Plata. Source: Preparation by the Author (2019).

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saw its first conversion to pedestrian-only streets. In the same way, two of Broadway's most crowded sections were pedestrianized, as a pilot that was for less than a year, but that has continued up until today.

Interventions like these have been made to improve the urban landscape, and to improve public street spaces, encouraging people to use them rather than cars. Both on the theoretical and practical plane, it can be said that there is an evolution of the concept of landscape from an aesthetic and/or conservationist view, towards new perspectives that link it to territorial development (Birche, 2020). This would entail reinforcing economic and social aspects of landscapes, conceived as spaces for people to enjoy, and as assets for development. New practices and numerous theoretical contributions have emerged along this line, especially in the 1990s (Silvestri & Aliata, 2001; Santos, 2000; Nogué, 2007; Roger, 2007), including regulatory issues like the first Exclusive Law for Landscape in France (1993), and the Florence/European Landscape Convention (2000). Phenomena like pedestrianization, re-functionalization, and the renewal of large urban city centers show that the concept of landscape is capable of revitalizing street public spaces.

The pedestrian space in the city of la Plata

The city of La Plata is 60 km to the southeast of the Autonomous City of Buenos Aires (Figure 1). Upon its foundation, conceived to be a provincial capital, it was presented to the world as a modern city, capable of both satisfying the new pressing needs of hygiene and aesthetics taken onboard in Europe.

The city of La Plata is a clear example of how the road network is the true structure of the territory. As Herce (2008) shows, in principle, the network only acts as a nexus between strategic nodes which are then ranked and absorbed by the occupation of scattered buildings. The sprawl of the system built in the diffuse city brings with it the need to transport people, materials, and energy increasing distances, which increases motorized transportation. According to Rueda (1997), the diffuse model causes an increase in 1) mobility difficulties: congestion; 2) travel times due to distance: congestion; 3) occupation of the public space; 4) inaccessibility; 5) emission of gases into the atmosphere; 6) noise levels above admissible thresholds; 7) insecurity and amount of accidents; 8) naturalization of circulation conditions and their effects; 9) fragmentation of the natural systems; and, 10) degradation of the public space. All these aspects can be seen in the case of La Plata, which adopted a diffuse growth model early on.

Within the hub, four particular morphological elements can be seen: the system of streets, avenues, and diagonal streets; the system of squares and green spaces; the block system; and the distribution system of the public buildings (Birche & Jensen, 2018).

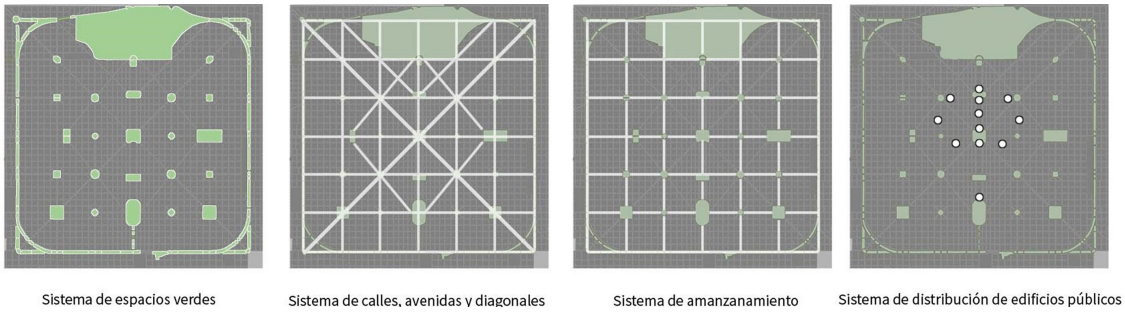

Figure 2. Particular morphological elements within the foundational hub. Source: Preparation by the Author (2019)

Figure 3. Reduction of the central esplanade on Diagonal 79. Source: Mitos platenses.

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These elements respond to criteria of order, organization, and balance between the built and the public space, seeking a balanced distribution of activities and circulation. This plan reserves 58% of its surface for construction, 35% for circulation spaces, and 9% for squares and parks.

As of 1930, the period of car dominance begins. In this way, the road system of the city is transformed to give more space to private motorized transport, just as in most Argentinean cities. The preeminence of the bus and the train, typical of the 1980s, was lost almost simultaneously from the mid-90s **3**. In line with this, diagonal streets and avenues were modified, starting with the elimination or reduction of the central esplanades and/or their forestation, generating a loss of hierarchization and a conflictive reading of the city landscape.

Currently, the public street space in the city represents, by 2019, 18.2% of the surface assigned as an urban area which, added to the 3.7% corresponding to green public

3 While in 1990, the motorization rate was 1 car every 7 people (Ravella & Giacobbe, 2001), in the 1990s, a significant increase in said rate occurred, rising to 5.4 inhab./car in 1991, and 4.5 inhab./car in 2001. Today, the motorization rate is estimated at 2.3 inhabitants per car in a city of approximately 700,000 inhabitants (Aón, López & Cortizo, 2014).

Figure 4. Street spaces by categories in La Plata. Source: Preparation by the Author (2019).

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spaces, results in a total of 21.8% of the urban surface dedicated to public space (Birche, 2020). As a reference, it can be mentioned that 50% of the public space is common in successful cities. Manhattan, Barcelona, and Brussels dedicate up to 35% of the city to street space, and an additional 15% for other public uses (UN-Habitat, 2018). In this sense, this study focuses on evidencing the uses and design characteristics of the street space, particularly showing the relevance and characteristics of the pedestrian space. Its quantification allows uncovering the importance it has as an urban public space for the city, especially considering the lack of green public spaces which are well below that recommended (Jensen, 2018). In addition, it can be stated that there is a lack of both official information and research projects that quantify and spatialize, in an updated way, the street spaces at a municipal level, which may (in part) be due to the magnitude of a survey of this size.

IV. METHODOLOGY

As has already been mentioned, this work proposes, on one hand, to generate primary information and, on the other, to build a diagnosis on the design and use of the pedestrian street space. As a starting point to outline the purpose of the study, said spaces are conceived as those "destined to intra and inter-urban connection for the movement of vehicles and pedestrians. These are the basic functional support of urban mobility" (CEP, 2004).

Although this definition does not reflect the complexity of the street space concept, nor all the nuances that can appear on working with it, here it is used on being considered suitable and effective for this research project, as it integrates both functional questions related to the movement of people and aesthetic issues linked to the urban landscape, on mentioning "the enjoyment of pedestrians".

Because of matters related to the practicality of the research, the decision was made to cut the sample of streets being surveyed (Figure 4), starting from a selection of main roads, like the typically transited roads of La Plata, chosen using Google Transit. The choice is also based on the Valencia Green Plan (2011), where it states that "the especially relevant transport infrastructures become landscape routes due to their high frequency of observation".

Regarding this cross-section, the street segments outside the urban area are excluded, and the streets are segmented into 100-meter sections. Then, the georeferenced survey is made using the Google Street View tool, which has images updated between 2014 and 2018. This survey includes:

Figure 5. Left: Sidewalk that verifies the walkable width. Center: Sidewalk that does not verify the walkable width. Right: Pedestrian space without a sidewalk. Source: Google Street View (2019).

i) quantitative aspects: dimensions; surfaces occupied for each use; the number of street trees; urban furniture (trash cans, lighting, benches).

For the dimensions of streets, the width and length of each one are taken. Regarding the uses, these are divided into pedestrian use, vehicle use, and the separator use of sidewalks. As for the number of street trees, although a suitable distance for planning urban tree lines will depend on different factors such as the width of the street, of the sidewalk, the height, the space from building facades, and fundamentally, the species being planted; 10 trees every 100 meters is adopted as the verification average **4**. This number is not intended to be understood as a determining factor, but rather a standardized visualization instrument for a rarely viewed problem in the region, namely landscape elements on street spaces.

ii) qualitative aspects: morphological characteristics of the profile, state of the sidewalks, presence of ornamental water features.

A classification is adopted for the morphological characteristics, based on four street types: those with an esplanade (central platforms with urban furniture and equipment); those with a large separator (central platform of more than 1.2 meters without equipment); those with a small separator (central platform of less than 1.2 meters); and ones without a separator. Meanwhile, the state of the sidewalk is classified into three categories (Figure 5), taking the walkable width established in the Global Street Design Guide (NACTO, 2016)

V. RESULTS

The surveying and systematization of the aforementioned data allow making a diagnostic analysis of the uses and design of pedestrian spaces integrating, apart from the traditional dimensions of use and design, the landscape perspective through variables like tree-cover and the presence of water. Initially, it is seen that the street space adopts the following distribution of uses: vehicle, 42.2%; pedestrian, 54.3%; street separator, 3.5%; bike lane, 0.1%. Although the percentage dedicated to pedestrian space is high **5**, in practice it is seen that the state of the sidewalks is often bad or non-existent (leaving only dirt for pedestrians to walk on). This leads to a deficient, inaccessible, and hazardous **6** urban space, especially for the periphery.

More broadly speaking, it was determined that from a total of 591,552 linear meters analyzed, 247,172 meters (41.8%) had no sidewalk, 154,229 (26.1%) did not have the minimum

4 Regarding the recommended amount of trees in the urban environment, an average is taken as reference between the maximum distances suggested by Beytia, Hernández, Musalém, Prieto and Saldías (2012, p.12), who recommend that small trees (under 6m high and species of vertical growth) are distanced between 4 and 6 m from one another; that medium-sized trees (6 to 15 m high), 6 to 8 m from one another; and that large trees, more than 15 m tall, are placed with a separation of between 8 and 12 m.

5 Cities like Amsterdam have a pedestrian use of 40% of their surface, while Berlin and Freiburg have 33% (Gössling, 2016).

6 In recent months, at least 3 people died on important avenues in the Platense periphery (at 7 and 617 in November, at 38 and 25 in September, and at 530 and 173, on July 27th, 2021 as the El Día Newspaper reported), after being struck by hit-and-run drivers. The victims were walking on the street due to the lack of sidewalks.

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Figure 6. Verification of sidewalks by walkable width for La Plata. Source: Preparation by the Author (2019).

TIPOS DE ESPACIO VIAL Y PEATONAL		
Con paseo	Avenida con árboles y una plataforma central donde los asientos y el mobiliario de la calle brindan oportunidades frecuentes para que la gente se detenga, contemple y descanse.	
Con separador grande	Avenida con árboles y una plataforma central de más de 1,20 m	
Con separador	Avenida con una zona central de plantación (separador de menos de 1,20 m).	
Sin separador	Calle sin una plataforma central.	

Figure 7. Types of Street Space by profile. Source: Preparation by the Author (2019).

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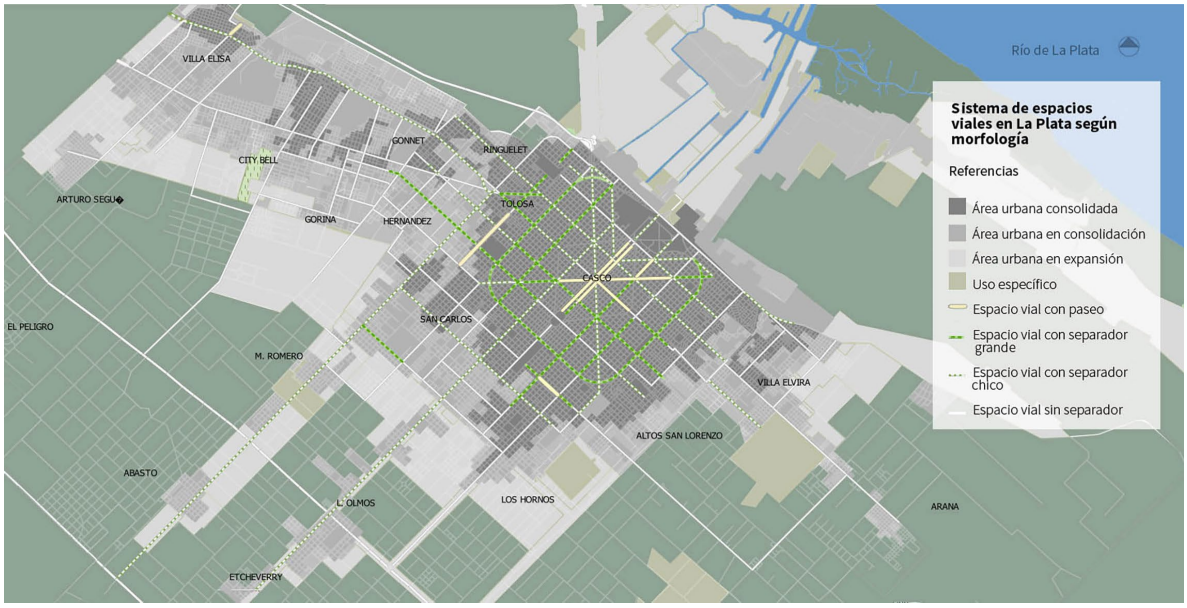

Figure 8. Types of street space by profile in La Plata. Source: Preparation by the Author (2019).

Figure 9. Public street trees in the street space of La Plata. Source: Preparation by the Author (2019).

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width, and 190,151 meters (32.1%) had the minimum width of 1.8 meters. Thus, it can be confirmed that consolidated areas mostly have sidewalks with a walkable width, while areas undergoing consolidation and expansion have sidewalks that do not have the width or simply do not have sidewalks (Figure 6).

Regarding the morphology of street spaces, four types can be seen (Figure 7):

If the distribution of these types is laid out on a map, it is possible to see that there is a higher number of linear meters of streets with vegetation in the foundational hub, compared to the periphery (Figure 8). Outside the hub, there are only 3 sections that correspond to profile 1 (with esplanades) and these are in Los Hornos, Tolosa, and Villa Elisa. The streets of type 2 (with large separator), are found in the periphery, with roads that continue their profile from the foundational hub, like those of Camino Centenario, Avenida 25, 19, and also a sector of 155. With the streets of type 3 (with separator), something similar happens, and many of these continue with a profile consistent with that of the foundational hub. This is the case of the following five: Avenida 7, Avenida 44, 520, Avenida 1, and 143. The remaining streets follow profile type 4 (without separator).

This last surveyed aspect is susceptible to being planned and optimized, alongside a suitable provision of urban tree cover, which would allow setting up the so-called ecological corridors **7**, which would also allow maintaining biodiversity.

After analyzing the public street trees, it can be said that 51.9% of the streets analyzed do not have a minimum threshold of 10 trees every 100 meters and that the sections with less than 10 trees every 100 meters are exclusively in the periphery.
Regarding the presence of ornamental water features within street spaces, it has been possible to confirm that these are few and far between, like the water fountains on the access to the city located at 7 and 32, and 13 and 32. There is also a small fountain on Avenida 51 and 8. Now, in the outskirts of the city, it is possible to see the water of the open streams from the streets and avenues. However, this situation does not aesthetically represent an added value for the city as the works done there have been developed from an engineering point of view, disregarding impacts, landscapes, and the public pedestrian space.

Lighting on category one streets has been thought out for vehicles and, therefore, is located 5 to 9 meters above the ground, often leaving pedestrians with deficient lighting. For categories two and three, this problem is less serious, as on having a lower hierarchy, the lights are lower. Meanwhile, suitable urban furniture only appears in central areas, and subcenters of the city, leaving the rest of the street spaces without any.

VI. DISCUSSIONS

For non-motorized mobility, there is a particular shortage of both official information and studies regarding calculations of pedestrian and bicycle transit and, to a lesser extent, about suitable design conditions for their circulation. The pedestrian has a stand-out place in urban mobility, on both representing the most basic form of circulation that feeds other forms of transportation, and on maintaining a constant and direct relationship with the different activities (Valenzuela-Montes & Talavera-García, 2015). In this sense, the work outlined here makes a methodological contribution of analysis for urban pedestrian spaces and, contributes at the same time, to the generation of new information available for the case study, seeking to make contributions that allow designing pedestrian spaces, not just as spaces of movement, but as places in themselves (Birche, 2020; Nello-Deakin, 2019; Mehta, 2015; Gehl, 2006).

The diagnosis made, emphasizes a disconnected street space system that has been developed from its particular aspects, ignoring the concept of system and that of the landscape too. Interventions have been detected that hint at a preference for the urban area corresponding to the foundational hub over those of the periphery. These data are aligned with the term suggested by Delgadillo (2014), "a-la-carte urbanism". For the case study, from the political and regulatory sphere, no interest can be appreciated to fully solve these problems, as López and Ravella (2019) state, with no valid territorial organization plan or particular plans for public space or mobility. It is for this reason that looking further into the knowledge, surveying, and spatialization of the built environment factors that are most closely connected to the pedestrian is key, both to improve the quality of these environments and to see permanently transforming problems and characteristics associated with the pedestrian space system. In this way, this article contributes to developing new ways to analyze urban design, opening the door to project-based research.

7 The concepts of biological and ecological corridor, are new and evolving. They emerge from landscape ecology, one of the branches of biogeography. They describe ecological landscape structures that have the conditions for the displacement of a species.

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VII. CONCLUSIONS

In summary, the use and state of the pedestrian street spaces in La Plata were reviewed, seeing that their design is directed at motorized transport, coherent with the diffuse growth model. It was confirmed that 67.9% of the urban area does not have sidewalks that guarantee accessibility for people, a percentage that is exclusively outside the foundational hub.

On surveying the morphological of the street space, it was seen that the periphery has few streets with esplanades, separators, and green spaces, which complicates incorporating green corridors and infrastructure. Likewise, it was seen that 51.9% of the streets did not have a minimum threshold of 10 trees every 100 meters.

With variables like the presence of water and street furniture, it was possible to confirm that these cannot yet be connected with the landscape view, as they are erratically spread throughout the pedestrian space without contributing to a functional aesthetic of the city itself and, at the same time, allowing inhabitants to enjoy them.
In this context, it is felt that holistically addressing the problems of the territory is the only possible way to plan and build pedestrian spaces that express, in their design, the qualities and values of the city they represent. It is from this perspective that this study has emphasized the importance of pedestrian transit and its close ties with the landscape, aiming at generating updated information that contributes to generating new design guidelines for pedestrian street space, and diagnostic analyses that uncover the main variables to work on, in order to lead our cities towards a more inclusive, fairer, and more sustainable development, consolidating landscape as a new approach of 21st-century urban praxis.

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