THE INFLUENCE OF GREEN AREAS ON THE USE OF PUBLIC SPACES: A CASE STUDY OF PRAÇA SANTOS DUMONT IN FLORIANÓPOLIS (SC), BRAZIL

A INFLUÊNCIA DAS ÁREAS VERDES NO USO DOS ESPAÇOS PÚBLICOS: UM ESTUDO DE CASO DA PRAÇA SANTOS DUMONT EM FLORIANÓPOLIS (SC), BRASIL

LA INFLUENCIA DE LAS ÁREAS VERDES EN EL USO DE LOS ESPACIOS PÚBLICOS: UN ESTUDIO DE CASO DE LA PLAZA SANTOS DUMONT EN FLORIANÓPOLIS (SC), BRASIL

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ABSTRACT
Tree cover in urban spaces plays an essential role in enhancing both their environmental and aesthetic value, while also making streets, squares, and parks more appealing. This study focuses on the distribution of trees in Praça Santos Dumont, Florianópolis (SC), Brazil, from the users' perspective, aiming to assess whether the current layout meets their needs. The research methodology involves on-site observation, mapping of the trees, and surveys conducted with regular visitors. The findings reveal concerns about the design of the space, particularly the lack of tree cover in large areas, which results in excessive sun exposure and reduces people's desire to use the space.

KEYWORDS
Urban Landscape. Environmental Psychology. Public Leisure Spaces.

RESUMO
A cobertura arbórea em espaços urbanos desempenha um papel essencial tanto no aumento do valor ambiental quanto estético, além de tornar ruas, praças e parques mais atrativos. Este estudo foca na distribuição das árvores na Praça Santos Dumont, em Florianópolis (SC), Brasil, a partir da perspectiva dos usuários, com o objetivo de avaliar se o layout atual atende às suas necessidades. A metodologia de pesquisa envolve observação in loco, mapeamento das árvores e questionários aplicados a visitantes regulares. Os resultados revelam preocupações com o design do espaço, especialmente a falta de cobertura arbórea em grandes áreas, o que resulta em exposição excessiva ao sol e reduz o desejo das pessoas de utilizar o espaço.

PALAVRAS-CHAVE
Paisagem Urbana. Psicologia Ambiental. Espaços Públicos de Lazer.

RESUMEN
El objetivo del artículo es analizar la viabilidad técnica de implementar una planta de reciclaje de residuos de construcción en Juazeiro do Norte, para ello se estudia inicialmente la viabilidad en términos de demanda de la planta, mediante el levantamiento del volumen anual de residuos de materiales reciclables de clase A civil. construcción en el municipio de Juazeiro do Norte, que albergaría esta hipotética planta. En un segundo paso, se estudió el camino que seguirán los residuos desde su generación hasta su destino final bajo la perspectiva legislativa local. También se realizaron estudios

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sobre el escenario nacional de las plantas de reciclaje de residuos de la construcción para señalar posibles características que debería tener la planta local para satisfacer las necesidades intrínsecas de Juazeiro. De esta manera, se pudo observar que el municipio brinda suficiente demanda para una planta de reciclaje de residuos, además de que aún falta en la legislación local una mayor regulación para el sector, pero con un escenario más alentador con el proceso de estudio y la implementación. de un consorcio intermunicipal para abordar los residuos sólidos urbanos.

PALABRAS CLAVE
Paisagem Urbana. Psicologia Ambiental. Espaços Públicos de Lazer.

1. INTRODUCTION

The continuous urban expansion in Brazilian cities has caused significant impacts, including the reduction of green areas. At the same time, the demand for these spaces in the urban environment has been increasing. This issue has gained more prominence in recent times due to the negative effects of the reduction of green areas on the population's quality of life, such as climate change and increased pollution (Oliveira; Mascaró, 2007).

Public leisure spaces are important components of the urban fabric and play a fundamental role in social relations and interactions among different users of urban space (Jacobs, 2011; Tenório, 2012). Therefore, it becomes essential to study the appropriation of these spaces and the aspects that directly influence this process. Appropriation is defined as a psychosocial process in which an individual uses a space and assigns it meaning (Cavalcante; Elias, 2011). Various urban elements influence this process, with vegetation being one of them. The location of trees in space, their ability to provide shade on urban furniture, and their influence on visibility can both attract and repel people.

Praça Santos Dumont (Figure 1), the empirical object of this study, functions as a central hub in the Trindade neighborhood of Florianópolis, Brazil. This space brings together a variety of daily activities and is valued by residents as a place for leisure, socialization, and holding fairs and events. In addition, the square attracts various commercial flows from the surrounding area, as well as students, professors, and staff from the Universidade Federal de Santa Catarina. The relevance of the square to the community, as well as its integration into the urban fabric, justifies the choice of this location as the object of study.

The objective of this article is to examine how Praça Santos Dumont, in Florianópolis (SC), Brazil, is appropriated by its visitors, with an emphasis on the influence of the distribution of vegetation in the space. For this purpose, a methodology was used that includes direct observations on-site, mapping of the design aspects of the space, with an emphasis on the distribution of trees, and questionnaires applied to users, aiming to identify their preferences regarding the landscape design aspects of the space.

Figure 1: Location of Praça Santos Dumont in Florianópolis.
Source: Prepared by the authors.

2. THE APPROPRIATION AND PRESENCE OF GREEN AREAS IN PUBLIC SPACES

Appropriation is a psychosocial process through which an individual establishes a personal connection with a specific place, assigning it personal meaning. It can be said that all human activities involve some degree of appropriation, manifested in different ways through perception, orientation, and action: the individual projects themselves into the space while assimilating it (Cavalcante; Elias, 2011). The individual dimension of appropriation can be subdivided into three main components: a sense of belonging, environmental appreciation, and affective investment, reflecting the emotional value attributed to the space (Kohlsdorf, 1996).

Among the aspects involving people's affective dimension with public spaces, those related to landscape and vegetation have been the focus of study by several researchers in urbanism and environmental psychology (Appleton, 1975; Nasar, 1992; Ulrich, 1986; Tuan, 2012; Kaplan and Kaplan, 2017). These studies indicate that people prefer to be in urban environments with vegetation and that greenery brings positive emotions related to tranquility and rest amidst the typical hustle and bustle of urban areas.

According to Mascaró and Mascaró (2002), the presence of trees plays a fundamental role in user comfort and in defining the different subspaces within a square. In addition to aesthetic benefits, trees provide practical aspects, especially regarding the shading of spaces, which alleviates climatic conditions, particularly in tropical climates.

Vegetation in urban spaces plays a significant role in advancing several Sustainable Development Goals (SDGs), notably emphasizing Goal 11 of "Sustainable Cities and Communities." This is reflected in specific target 11.7, which aims to ensure, by 2030, universal access to safe, inclusive, accessible, and green public spaces, with a special focus on women, children, the elderly, and persons with disabilities.

During the summer, vegetation plays an important role in providing shade and reducing direct sun exposure. This contributes to comfort by helping mitigate heat, resulting in a cooler climate. In winter, trees can be adapted to allow sunlight to enter spaces, contributing to natural warming (Mascaró; Mascaró, 2002).

Areas without vegetation receive significant solar incidence, which is particularly relevant in a climate like that of Florianópolis, the city where the study's object is located. This city is characterized by a subtropical climate classified as humid mesothermal. The annual average precipitation is 1506 mm, indicating a high value, and the annual average temperature is 20.8ºC. Precipitation levels are lower in August and higher in January. On average, the highest temperatures are recorded in February, reaching an average of 24.9ºC, while the lowest occur in July, with an average of 16.4ºC (Climate-Data, 2024).

3. PRAÇA SANTOS DUMONT

The Trindade neighborhood, located near the center of Florianópolis, Brazil, is home to Praça Santos Dumont and stands out as a strategic area, connecting the downton to neighboring districts, despite being separated from the center by the rugged topography of Morro da Cruz. The neighborhood is recognized for its importance, housing the campus of the Universidade Federal de Santa Catarina (UFSC), the University Hospital, and a variety of commercial and residential establishments that cater to both residents and the academic community.

The urban layout of the neighborhood follows a fishbone pattern, derived from its initial agricultural planning. Lauro Linhares street, which serves as the central axis of this pattern, is predominantly occupied by commercial establishments and mixed-use buildings (residential and commercial), connecting the perpendicular streets where residential use prevails. Figures 2 and 3 illustrate the central position of the Trindade neighborhood in Florianópolis, highlighting its role as a connecting point between the city center and adjacent neighborhoods, which is fundamental for urban integration.

Praça Santos Dumont faces intense urban flows, with heavy vehicular traffic on the three avenues that surround it and a considerable number of pedestrians on the surrounding streets, although the internal movement within the square is more moderate. This constant activity contributes to a bustling daily life, despite the reduced flows within the square itself.

These characteristics make the neighborhood and the square highly significant elements in analyzing the local urban dynamics. The neighborhood acts as a transition point between various adjacent neighborhoods and serves as a residential area for students, professors, and other professionals from UFSC, who are key users of the local facilities and the square.

Originally, the square was a gathering point for community events, such as the fruit and vegetable market

and the Festa do Divino Espírito Santo (or Orange Festival), which attracted large crowds with shows and sweet stalls. In the 1970s, "Bar do Pida" was established, making the square a popular spot for students and residents, giving it the nickname "Praça do Pida." However, after the bar's closure in 2010 due to legal issues, the square fell into decline, suffering from a lack of maintenance and an increase in the presence of homeless people, which led to feelings of insecurity.

In response, the Trindade Neighborhood Residents' Association initiated a revitalization project in 2012. Although the project presented to the city hall underwent changes, the revitalization completed in 2021 aimed to make the square more inclusive, with new rest areas, spaces for exercise and pets, a redesigned playground, and areas for temporary commerce. The furniture was renewed with new concrete benches, but the trees and the original structure, with minor modifications, were preserved.

Currently, Praça Santos Dumont remains an important venue for social and cultural events in the Trindade neighborhood, including the traditional Festa do Divino in June, as well as university pranks, student parties, rap battles, skateboarding competitions, and capoeira circles.

Figure 2: Location of Praça Santos Dumont in the Trindade Neighborhood..
Source: Adapted by the authors from Google Earth

Figure 3: Praça Santos Dumond in the context of the Trindade Neighborhood.
Source: Adapted by the authors from Google Earth

4. METHODS OF ANALYSIS

To analyze the tree coverage of Praça Santos Dumont and its relationship with the appropriation of the space, the study was divided into two distinct stages:

Survey of the design aspects of the square, highlighting activity areas, circulation spaces, and a photographic survey of the vegetation present in the square, with an emphasis on the distribution of trees. This survey was mapped to understand how vegetation was planned and arranged during the different interventions throughout the square's history.

Collecting users' perspectives on the space was conducted through online questionnaires using the Google Forms platform. This phase included questions related to users' preferences regarding the space and their opinions on possible modifications. The aim of the questionnaire was to understand how the distribution and specifications of the trees in the space affect how people use this environment. A total of 35 responses were received for 7 formulated questions, two of which were graded evaluations (scores from 0 to 5), while the others were open-ended responses. The questionnaires were distributed through social media channels of the Universidade Federal de Santa Catarina and in groups focused on residents of the Trindade neighborhood and surrounding areas. All responses were treated anonymously.

It is important to note that, for this stage, ethical aspects were observed in accordance with Resolution No. 466, of December 12, 2012, for research involving human subjects (Brasil, 2012), with approval from the Research Ethics Committee (CEP) of the educational institution.

Each phase contributed to a more comprehensive understanding of the relationship between the tree coverage of Praça Santos Dumont and its appropriation by users. Additionally, analyses were conducted on other aspects—such as furniture, coverings, etc.—that are also involved in this dynamic.

5. THE SPATIAL CONFIGURATION OF PRAÇA SANTOS DUMONT

Praça Santos Dumont is situated on a terrain characterized by rugged topography, marked by uneven levels that result in the distribution of activities across different levels. The space is traversed by a variety of ramps and stairs, as shown in Figure 4.

The square can be accessed from various points along the three streets that surround it, totaling fifteen access points marked in white, six of which are via ramps and stairs. These entrances provide access to the interior of the square, establishing the predominant flows that move through it. It is important to note that the square is not accessible along its entire perimeter. This is due to the design of the space and the uneven levels, which create elevated flowerbeds and barriers that restrict direct access around the entire perimeter.

The internal paths of the square are determined by the main access points, characterizing the primary flows of users and the distribution of amenities. Some of these paths are delineated by ramps and stairs, reflecting the unevenness of the terrain. The definition of these routes allows for identifying the predominant passage within the space and establishing the main pedestrian flows, revealing patterns such as the concentration of passage in areas without ramps or stairs.

The term "Activity places" in this study refers to spaces that provide conditions for performing activities of permanence. These locations are defined differently: areas where people do not enter, functioning as flowerbeds, wooded spaces, and so on; and areas where specific activities occur. These are delimited by various types of barriers: topographical barriers, flowerbeds, walls, ramps, steps, and low walls. These features are identified in Figure 5.

Among the activity places, 14 environments are identified for various functions in the square: outdoor gym (exercise area), pet place, parking lot, playground, seating areas, large areas designated for events such as craft and farmers' markets, small skateboarding competitions, rap battles, etc., commercial space, taxi stand and bus stop.

Identifying these places is essential to understand the process of appropriation, as it is in these spaces where the predominance of activities is likely to manifest. It is worth noting that not only these locations have equipment that can be appropriated; some paths also include benches, tables, and bike racks. Moreover, certain behaviors are observed in places not explicitly designated for activities, such as the use of low walls, flowerbeds, and lawns as seating by some people.

These design aspects are illustrated in Figure 6.

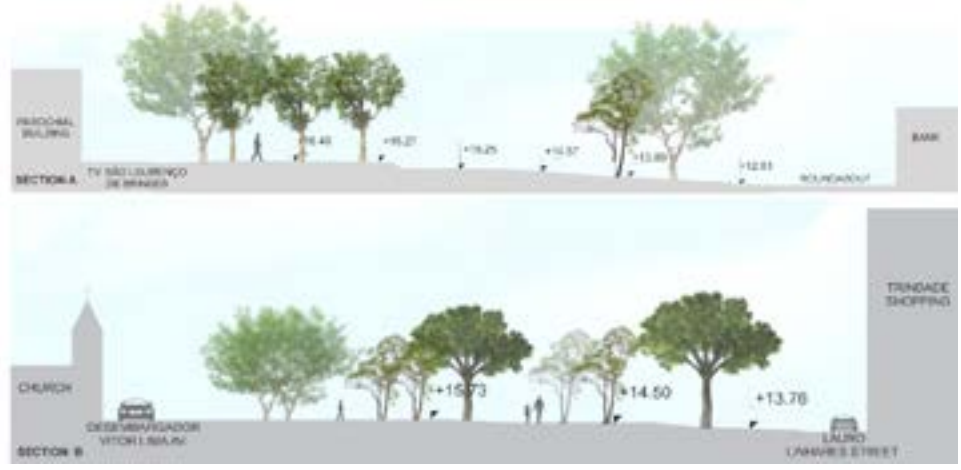

Figure 4: Schematic Section of Praça Santos Dumont.
Source: Prepared by the authors.

Figure 5: Equipment at Praça Santos Dumont.
Source: Prepared by the authors.

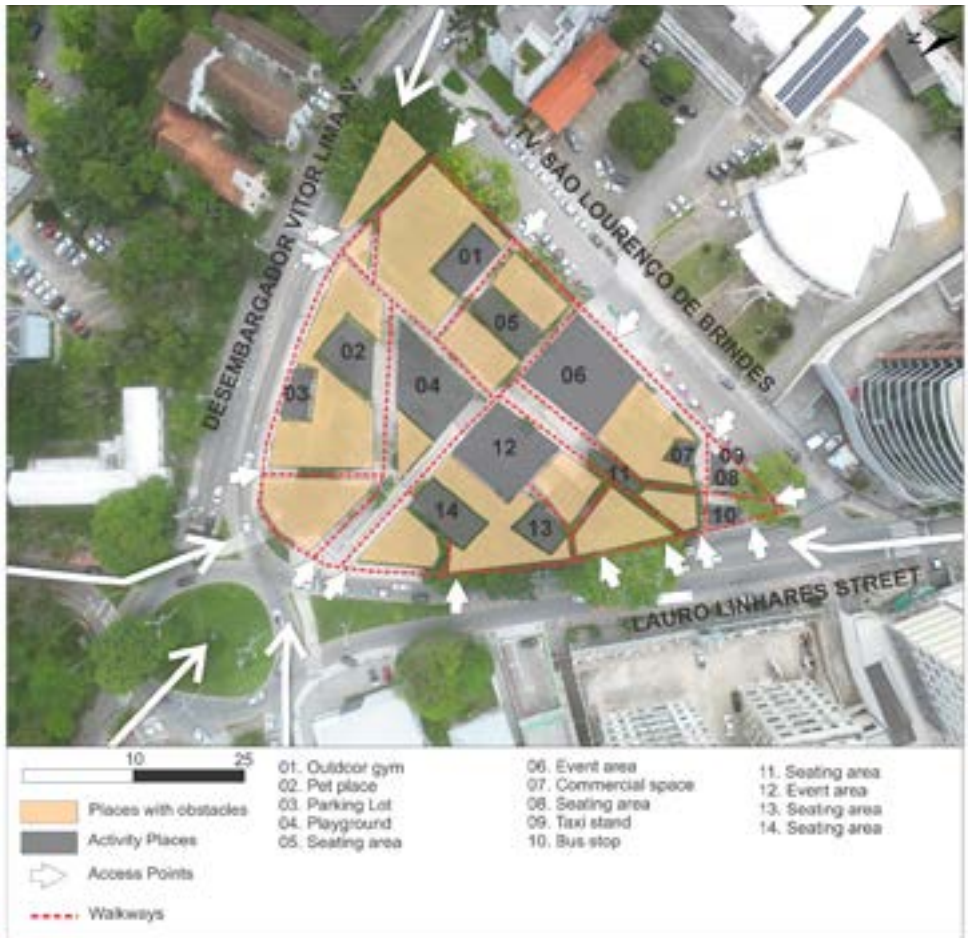

Figure 6: Design Aspects of Praça Santos Dumont.
Source: Prepared by the authors.

6. THE TREE DISTRIBUTION IN PRAÇA SANTOS DUMONT

The analysis of the tree distribution in Praça Santos Dumont is illustrated in Figure 7. In this figure, in addition to the location of the trees, the access points to the square are identified, which occur due to significant elevation changes along its perimeter, making it inaccessible at certain points. The internal paths and vegetation distribution are also highlighted. Areas designated for activities and flowerbeds are distinguished separately, as the spaces with lawns and flowerbeds, where trees are predominantly found, are also subject to physical barriers such as low walls and curbs.

Praça Santos Dumont features a substantial amount of shaded areas created by vegetation, resulting from interventions at different historical moments. It incorporates a mix of native and exotic tree species, shaped by various landscaping projects from the early days when the square served as the center of the Freguesia da Trindade (18th century) to more recent years, during which the neighborhood underwent significant transformations, and the square became the subject of several redesign projects.

Today, there is an efficient distribution of trees in the lateral spaces designated for activities, strategically positioned near seating areas, particularly in the locations shown in photos 01, 04, and 05 (Figure 7), which benefit from more effective shading. However, there are gaps in tree presence in areas such as the two large spaces for events, where some equipment is installed, and various events are held, making them more exposed to sunlight due to the lack of tree coverage.

The absence of trees in these spaces may be intentional, allowing for a large central area in the square for outdoor events with direct sun exposure. Additionally, although trees are distributed along the sidewalks near seating areas, they often act as visual barriers to the space, causing a sense of insecurity and hesitation for those entering the square.

Regarding tree species, there is a predominance of deciduous trees, which lose some of their leaves in winter to allow sunlight in and grow fuller in summer to provide shading. The space is characterized by a mix of native and exotic trees of small, medium, and large sizes. The main species include:

Fig Trees (Ficus Carica), distributed in different parts of the space. Guarapuvu (Schizolobium parahyba), considered the symbol of Florianópolis, a large tree that can reach up to 30 meters in height. Jatobá (Hymenaea courbaril). Indian Almond Tree (Terminalia catappa). Loquat (Eriobotrya japonica). Chinese Banyan (Ficus microcarpa), among others. These elements collectively define the square's character and influence user appropriation and the overall dynamics of the space.

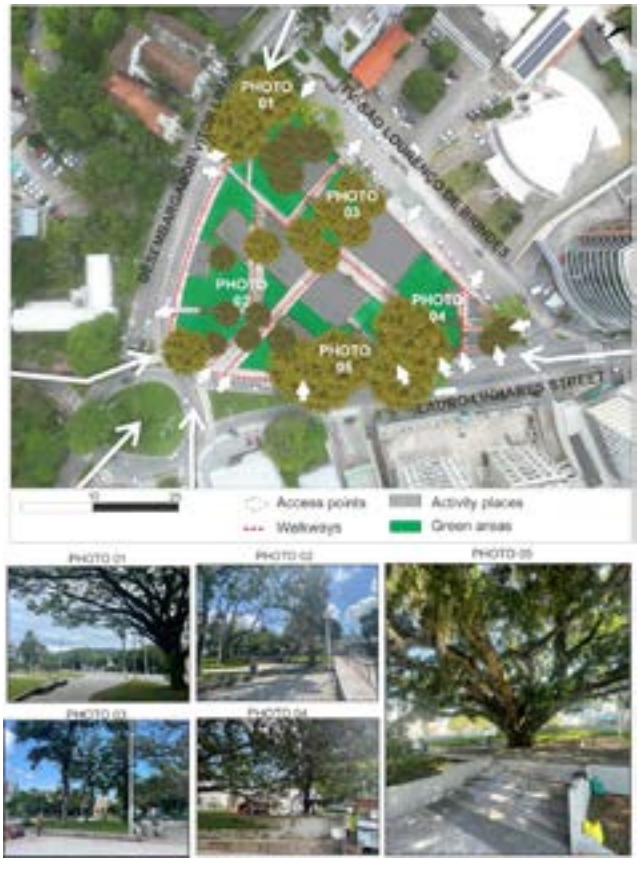

Figure 7: Distribution of Trees in Praça Santos Dumont.
Source: Prepared by the authors.

7. USER PERCEPTION OF THE ARBORIZATION IN PRAÇA SANTOS DUMONT

The questionnaires revealed that the presence of trees in Praça Santos Dumont was perceived both positively and negatively by respondents. While participants expressed satisfaction with the existing trees, they also pointed out dissatisfaction due to the lack of trees in certain areas, especially near some seating spaces. The online questionnaires, conducted via Google Forms and shared with groups from the Trindade neighborhood and the Universidade Federal de Santa Catarina (UFSC), gathered a total of 35 responses. Seven questions were formulated, combining open-ended questions and graded evaluations (on a scale of 0 to 5). The responses were compiled and are presented below:

01. Do you often visit Praça Santos Dumont? How frequently and during what times of the day?

Out of the 35 responses, only two participants indicated they "do not" visit the square or do so "rarely." The majority reported regular visits, with most passing through the square on weekdays during business hours. Only nine participants mentioned occasional visits. Notably, many participants revealed from the first question that they mainly use the square as a passageway on their way to work, university, or the market. This highlights that the square serves primarily as a thoroughfare, with its appropriation mostly by people moving towards other destinations.

02. How satisfied are you with the presence of trees in Praça Santos Dumont?

50% of participants rated their satisfaction as "2" on the scale, indicating low satisfaction with the tree distribution. The reasons for this dissatisfaction were further explored in subsequent responses.

03. What positive aspects do you observe in the distribution of trees in this square?

The predominant responses highlighted the importance of shade and the ability to stay in the area during hot days due to the presence of trees. For example, one response noted: "The few remaining trees provide shade and allow for longer stays on hot days." Participants also pointed out the presence of furniture in shaded areas as a positive aspect.

Additionally, the distribution of trees was considered adequate for not interfering with pedestrian circulation. Positive comments also emerged regarding tree species, such as: "I'm glad there are large trees in the square."

04. What negative aspects do you observe in the distribution of trees in this square?

The most frequently mentioned issue, present in more than half of the responses, pertains to the center of the square, which was entirely covered in concrete following a 2021 revitalization, leaving a large area devoid of trees. Users highlighted the difficulty of staying in the area on hot summer days due to the lack of shade and the concrete flooring, as expressed in comments like: "There's little shade in a space with a lot of concrete. On hot days, the square is not usable," and "the 'core' of the square is huge, totally devoid of trees, and has a concrete floor. This needs to be reconsidered because it's unbearably hot." Additionally, some users pointed out other tree-deficient areas, such as the perimeter of the square near sidewalks, which are also concreted and lack trees. Other negative points mentioned include the dense presence of trees along the boundaries of the space, creating a visual barrier and discouraging entry into the square, a lack of lighting in some densely wooded areas, which can create a sense of insecurity, and the placement of seating furniture near areas without trees.

05. Do you think the tree distribution meets the needs of the space throughout all seasons?

Responses predominantly leaned toward lower ratings, between 1 and 3, highlighting dissatisfaction with the tree species and their distribution. This resulted in the space being considered uncomfortable for year-round use.

06. Does the presence of trees make you want to stay in the square?

For this question, 100% of the responses were "yes," indicating that the presence of trees is a significant factor that enhances the appropriation of the local space.

07. Do you have any suggestions for improving the arborization of the space? What are they?

Once again, the predominant responses to this question were related to the central area of the square, which is paved with concrete and lacks trees, as shown in Figure 8. While the design reasons for keeping this area "empty" to allow for events are understood, this creates significant discomfort for users, limiting its use on sunny days. One user expressed this concern, stating: "The seating areas without trees are good for sitting in winter. However, in summer, more shaded areas are needed. The paved area below the stairs and next to the playground (more central area) is underused, with little occupation. The vegetation generally needs more frequent care." Another comment suggests a review of the design, highlighting the need for specialists to consider alternatives to make the space more usable, taking into account both frequent events and the community's daily needs. Users also requested more flowers to soften the predominance of concrete, as well as more resting furniture near trees and better maintenance of the trees themselves.

These perceptions provide a comprehensive understanding of the public's perception of the square's arborization and its impact on user experience and space appropriation. The feedback suggests a demand for a balanced approach to maintaining areas for events while increasing shaded spaces to enhance comfort and usability throughout the year.

Figure 8: Tree Planting in the Central Area of the Square.
Source: Photo by the authors.

8. FINAL CONSIDERATIONS

The article aimed to analyze the opinions of visitors to Praça Santos Dumont regarding its tree coverage and how this influences their willingness to use or stay in the space. To achieve this, a questionnaire was administered to users to identify their preferences. It is important to note that the study has a limitation concerning the sample size, as only 35 people were interviewed, which may not fully represent all perspectives of the square's users.

The results reveal that tree coverage is a fundamental element for attracting people to public spaces, especially leisure spaces such as squares and parks. In the analysis of Praça Santos Dumont, it is observed that users frequent the space regularly in their daily routines, but they also point out some negative aspects related to the tree coverage, which sometimes demotivate them from using it.

There is a clear need for adjustments in design aspects, such as the excessive amount of concrete used in the paving of the space, which may lead to increased temperatures, along with the absence of trees in some areas, potentially making the space uncomfortable during the hotter seasons of the year. Users particularly report discomfort in the central area, which lacks trees to provide shade for events such as the weekly vegetable markets, handicraft fairs, and other occasional community events. Additionally, they request more furniture near the shaded areas and more trees around the high-traffic areas.

It is worth noting that, in addition to tree coverage, the appropriation of urban public spaces can be influenced by various other factors not addressed here, such as urban insertion and other morphological and social elements.

Despite being a specific case study, this research contributes to the understanding of how architects and urban planners can carefully consider the landscape aspects of public leisure spaces, promoting the creation of more humanized environments that meet the needs and comfort of users.

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