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Evaluation of spatial quality and use of urban park: Case study of the Joaquim Amaral Amando de Barros Municipal Park in Botucatu, SP

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ABSTRACT

Public spaces play an important role in urban life, as they are spaces that enable social relations, health and well-being. Those spaces aimed at leisure, such as urban parks, aim to offer the population, in addition to contact with nature, the development of physical activities and recreation for various age groups. The good quality of the spatial configuration encourages the permanence of users in the place and enables social interaction. However, the impoverishment of public space projects leads to their disuse. In this context, this article presents the result of a research that evaluated the spatial quality and use of an urban park. The case study was carried out in the Joaquim Amaral Amando de Barros Municipal Park, located in the city of Botucatu, SP. From an adaptation of the methodology developed by the Project for Public Spaces (2020), the elements associated with Access and Linkages, Comfort and Image, Uses and Activities, and Sociability were evaluated, using performance indicators and an index. The results show in general an excellent degree of adequacy of the physical aspects; however, the accessibility indicator was considered unsatisfactory. Accessibility problems impact the use of the park by people with motor disabilities or reduced mobility. Some weaknesses identified in the park can subsidize future design interventions and serve as a parameter for the development of projects in other parks.

KEYWORDS: Urban Park. Spatial configuration. Performance Indicators.

1 INTRODUCTION

The public space throughout human and urban history has undergone different forms of appropriation; however, even today, it represents a meeting place for the practice of passive or active leisure activities. Tuan (1975) defines it as a place that is directly linked to human relations, and therefore associates it with place, since it is derived from human experience.

Public spaces may include parks, streets, squares, and playgrounds; are represented by green and open areas (ASCHER, 1995), with free access and enable the meeting of people (YOUNG, 1986 apud HOU, 2010, p. 3). Castro (2002) corroborates these definitions and adds that these spaces incorporate the personal, cultural, and social representation of a society in each period.

Although these spaces are important for life in cities, the state of conservation of these places are not always attractive and used by the population (PRALIYA; GARG, 2019). In many cities they have become dangerous places. The lack of maintenance and impoverishment of urban public space projects has consequently the disuse of these spaces. And, according to Gehl and GemzØe (2002), good spatial quality encourages the permanence of users, resulting in the expected interactions (GEHL, 2015). Jacobs (2011) reiterates that the disuse of urban public structures has a direct reflection on the collapse of collective life in a public context.

One of the factors that contribute to the vitality of a public space is the presence of some elements, which can attract people to this place, so that they feel belonging and invited to use this space (JACOBS, 2011; GEHL, 2015; SILVA; MAGAGNIN; FONTES, 2021).

Spaces to walk, to remain still, to sit, to see, to hear and to speak are elements that, according to Gehl (1987), attribute quality to a public space. Carmona (2010) lists other factors such as accessibility, attractiveness, comfort, vitality, safety, among others.

The presence of urban furniture so that people can sit or lean on, such as benches, according to Gehl (2015), favor the use of public space. Another important element is accessibility. An accessible space must provide free access, locomotion, security, and universal autonomy. Accessibility is a condition that fundamentally impacts the way the population appropriates public spaces and is therefore intrinsically associated with the right to the city, and the participation of citizens in urban life (OLIVEIRA et al., 2021; GARCIA; LIBARDONI; PORTELLA, 2021).

Arborization is another key component to urban vitality. It promotes shading, improves air quality by decreasing pollution levels, and improves the general quality of life of the population.

Parks make up the urban landscape, the history and identity of cities, and perform environmental and social functions (KRAEMER; KABISCH, 2021; FLORES; BASÁÑEZ; ZÁRATE, 2022). Focusing on urban vitality, Jacobs (2011) highlights the importance of thinking about the quality of urban parks and green areas while planning these spaces, and not only in the quantitative aspect of them in the urban context.

For Whyte (1980), the public space must offer multiple activities to users, including the trade of food and beverages. The author highlights the importance of public spaces having places to sit, as well as a walkable, clean, attractive, and friendly environment.

Quantifying and qualifying the performance and level of success of a public space has led several authors to develop methods, guidelines and/or guidelines for the development of public spaces of permanence projects.

Mora (2009), for example, through performance indicators evaluates the space through the following parameters: the appropriation of its functionality; environmentally friendly space; active civic participation; permanent cultural expression; possibilities for recreation and safety, quality of social relations, their ability to behave and integrate different groups and behaviors, and the ease in creating a symbolic identification with the place.

Brandão (2002), in turn, uses technical auditing applied by researchers to evaluate the quality of public spaces. The evaluation is carried out by the author using quality indicators that have different weights and that from their individual result is measured the global evaluation of the space.

Using the spatial context as a key dimension for assessing the actual quality of green areas, Kraemer and Kabisch (2021) establish 33 quality indicators that describe natural elements, built elements, and the immersion of space in its context: constructed, social, and natural as well. Based on these indicators, the authors can assess the quality and potential of these spaces.

Previero (2020), develops a methodology for evaluating the quality and vitality of public spaces based on the observation of user behavior and performance indicators. The author analyzes categories such as environment and comfort, image and visual appeal, accesses and connections, safety, environment and mobility, activities and uses. Similarly, Lima (2022) uses four dimensions: access and neighborhood; areas of activity; resources and security; and spatial configuration; to delve into the study of the physical and spatial attributes of urban parks.

The New York-based nonprofit Project for Public Spaces (PPS) is active in the planning and design of public spaces. It was a pioneer in the development of a center for the dissemination of best practices, information and resources on Placemaking – in the literal translation "making places", whose central objective is to present a practical tool for proposing improvements to a neighborhood, city or region, based on an analysis of public space based on four major themes: Access and Linkages, Comfort and Image, Uses and Activities, and Sociability (PPS, 2007; HEEMANN; SANTIAGO, 2015; PPS, c2020).

The methodologies presented, in summary, allow to evaluate the quality of public open spaces through different approaches, however, all emphasize that for a public space to have vitality it is necessary that it meets the needs of its users; and, in those spaces where full vitality has not yet been achieved, the technique used to identify possible problems must, in

addition to identifying flaws, necessarily contribute to the definition of planning guidelines.

Given this context, the contribution of this article is related to an adaptation in the methodology developed by the Project for Public Spaces (2020), through the creation of an index from the indicators proposed by the PPS (2020), being applied in the evaluation of an urban park. In addition to validating the potential of the park, the article points out some weaknesses of the space, which can serve as a reference for future design interventions and as a parameter for future projects of other parks.

2 OBJECTIVE

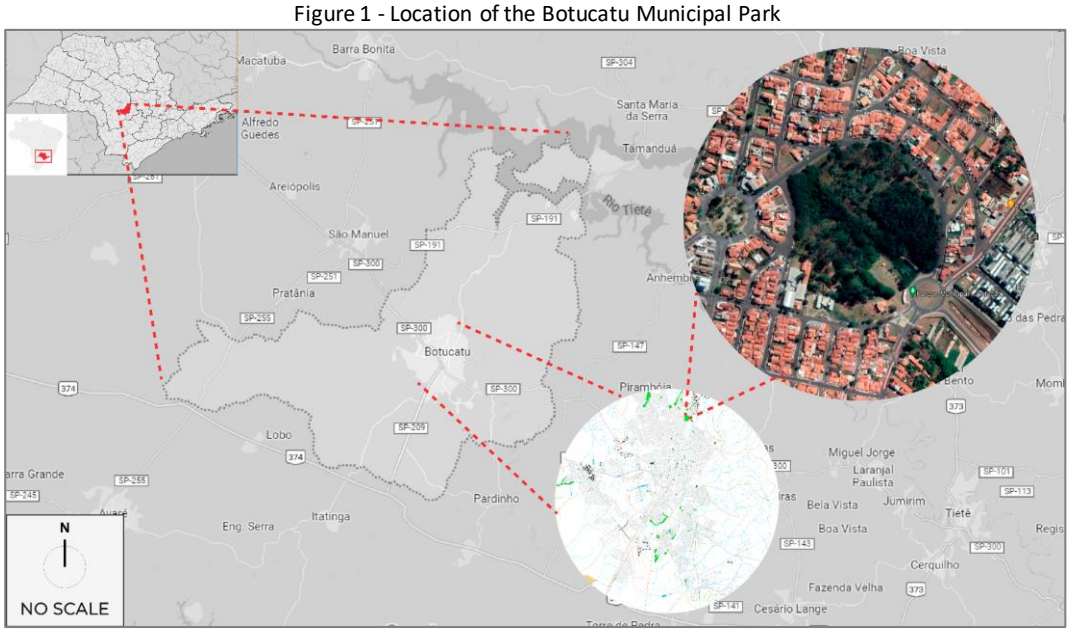
Evaluate the quality of the spatial configuration and the use of an urban park, from an adaptation of the methodology developed by the Project for Public Spaces (2020). The case study is applied in the Joaquim Amaral Amando de Barros Municipal Park, known as "Botucatu Municipal Park", located in the interior of the state of São Paulo.

3 CASE STUDY

The Botucatu Municipal Park, called "Joaquim Amaral Amando de Barros Municipal Park", object of study, is located in the municipality of Botucatu, a city of medium demographic size. With an estimated population of 149,718 people (IBGE, 2021), the municipality is located in the Central-South region of the state of São Paulo – 22°53'09" South Latitude and 48°26'42" West Longitude – and distant 235 km from the state capital (BOTUCATU, c2023).

The park is located in the Jardim Paraíso neighborhood, in the northern region of the municipality (Figure 1), near important access roads, such as Dr. José Barbosa de Barros Street and Camilo Mazoni Avenue, which allows easy access for the population of the municipality between this location and the central area of the city. The region where the park is located is characterized by being consolidated, with predominantly residential land use.

Figure 1 - Location of the Botucatu Municipal Park



Source: Botucatu City Hall, 2021; Google Earth, 2023, adapted by the authors, 2023.

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The space offers a diversity of activities for active and passive leisure, such as outdoor gym, playground, a trail through the preserved forest, kiosks, grassy terrace used for shows and events, there is also the Receptive Center "Architect Eugênio Monteferrante Neto" which has an auditorium and space for exhibitions (ACONTECE BOTUCATU, 2016).

The park has an ornamental lake with deck for contemplation, rest areas, benches along the paths, drinking fountains, bathrooms, trash cans and free wi-fi internet access.

4 METHODOLOGY

The methodology used in this article is exploratory quantitative-qualitative, applied in a case study. To evaluate the spatial quality and use of the urban park, it was defined by adopting the method proposed by the PPS (2020), incorporating some adaptations to this original method, defined from the studies conducted by Mora (2009), Previero, Fontes, Magagnin (2019), Previero (2020) and Lima (2022).

The methodological procedure for the case study presented here is divided into two stages: i) definition of quality indicators, and ii) definition of the form of evaluation of these indicators.

4.1 Definition of quality indicators

To evaluate the spatial quality and use of the Botucatu Municipal Park, the performance indicators belonging to the methodology developed by the PPS (2020), called the Place Diagram (Figure 2), were adopted. The hierarchical structure is composed of 4 main themes - Access and Linkages, Comfort and Image, Uses and Activities, and Sociability, which group several indicators and make it possible to evaluate in a global way a space of successful public use.

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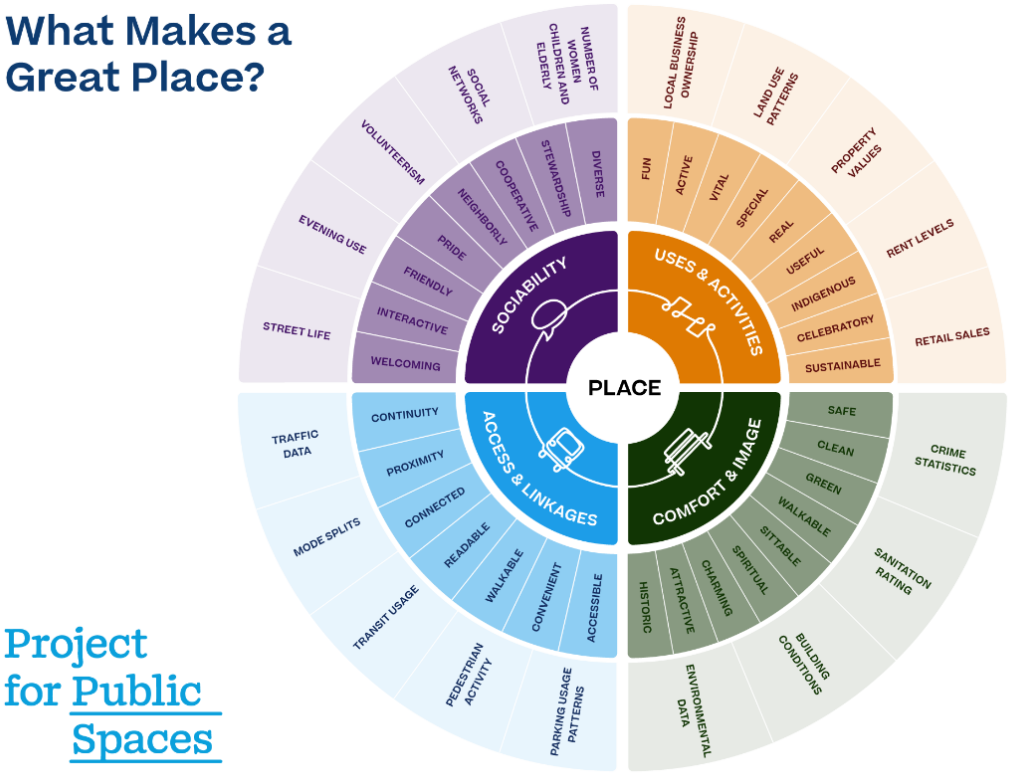
Figure 2 – The Place Diagram



Source: PPS, c2020. Available in: https://www.pps.org/article/grplacefeat.

The *Access and Linkages Theme* is composed of 8 indicators and allows to evaluate the external and internal accessibility of the urban park. Each indicator is evaluated by means of a question that allows to identify some characteristics that contribute positively to the place being used by the surrounding population and the municipality.

A successful public space must therefore be accessible, enabling easy access for users to get to the rental and move around internally. It should enable visibility, at short and long distances (HEEMANN; SANTIAGO, 2015; PPS, c2020). The visibility of public space is intrinsically related to the provision of security; thus, a safe space is more used by the population (SEIXAS, 2015; LIMA, 2022).

This theme evaluates data related to the traffic around the public space, the possibility of using different modes of transport to access the place, which is associated with the provision of infrastructure for walking, cycling, public transport or individual motorized transport modes (SEIXAS, 2015; HEEMANN; SANTIGO, 2015; PPS, c2020).

The elements that make up the dimension access and linkages must be evaluated both visually and physically (SEIXAS, 2015; PPS, c2020). This dimension is, therefore, evaluated based on the observation of the physical space, the characterization of the access roads as established by the Urban Mobility Plan of the municipality, the verification of the availability of different modes of transport, accessibility of the space and its surroundings, and its permeability.

The *Comfort and Image Theme* is composed of 7 indicators and evaluates, according to Seixas (2015, p. 29) the "safety, respite or rest". Each indicator is measured by means of a question that contributes to the identification of positive characteristics of the place. According to the PPS (c2020) the availability of resting places is generally neglected, and the presence of women in the place is an extremely relevant data in this evaluation, since "[...] they tend to be

more demanding about the public spaces they use" (HEEMANN; SANTIGO, 2015, p. 28). Successful public space should be comfortable and pleasant looking. The evaluation of this dimension includes perceptions about safety and cleanliness, as well as the availability of places to sit (HEEMANN; SANTIAGO, 2015; PPS, c2020).

For this theme the Place Diagram defines as attributes to be evaluated: data from crime statistics, the level of sanitation, the condition of buildings, and environmental data (HEEMANN; SANTIAGO, 2015; PPS, c2020). The evaluation of this dimension is carried out through the visual perception of space (KOHLSDORF, 1993) regarding its aspects of naturalness, conservation and civility, organization, and legibility (NASAR, 1998), harmony, rhythm, and visual balance.

The *Uses and Activities Theme* is composed of 7 indicators that are evaluated through questions that allow to verify the diversity of activities present in a public space, which are structural pillars of the construction of a place, because the lack of options of activities leads to the emptying of the space (HEEMANN; SANTIAGO, 2015; PPS, c2020).

In this theme the PPS (c2020) evaluates the following parameters: presence of local businesses, land use patterns, property values, level of rents, and retail sales. The evaluation of this dimension is carried out through the identification of the availability of options of activities in the place, and in the elaboration of a behavioral map of the users (RHEINGANTZ et al., 2009).

The *Sociability Theme* is a key concept for a public space with vitality. It has 8 indicators that are evaluated through questions. Sociability is difficult to achieve, however, it becomes an unmistakable characteristic when present. It denotes how comfortable people feel in the space; and can be identified in the meeting of friends, in the interaction with strangers. The presence of these elements brings a strong perception of public space as a place (HEEMANN ; SANTIAGO, 2015; PPS, c2020).

For this evaluation, the PPS (c2020) uses the following parameters: number of women, children and the elderly, social networks, volunteering, night use, and street vitality. The evaluation of Sociability is, therefore, carried out through the visual perception of space, associated with the application of behavioral map of users (RHEINGANTZ et al., 2009).

4.2 Definition of the way in which quality indicators are evaluated

For the evaluation of the responses of the indicators, the works developed by Mora (2009) were used as reference; Previero, Fontes and Magagnin (2019); Previero (2020) and Lima (2022), since the PPS does not propose the development of an index.

In this article, in the evaluation of each indicator (each question) a score ranging from 0 to 1 point should be assigned, where in the case of a positive integral answer "yes" the value of 1 point is assigned, in an evaluation where the result is "partial" the value 0.5 point is assigned and in the case of a negative evaluation (there is no indicator) the value 0 point is assigned.

The final grade of each of the Dimensions or Themes analyzed will be measured by means of the arithmetic mean of the indicators of each Theme, according to Equation 1. The Global Spatial Quality Index is calculated by the sum of the partial indices.

$$Pf_i = \frac{\sum(P_a)\times 100}{Pm}$$

Equation 1

At which:

P_f = Final dimension score i (%)
P_a = Score of each of the indicators
P_m = Maximum possible dimension score

To calculate the maximum global index of the public space, the researcher must repeat the calculations of Equation 1 by entering the maximum possible values, that is, all the positive responses to the indicators of each Dimension or Theme.

The relationship between the grade measured in the field and the maximum score obtained in each stage will result in the percentage of achievement of the actual grade and can be compared with five levels of classification of spatial quality (Table 1), which will indicate how much the public space is favorable or not to the use and appropriation by its attendees. The scale of values presented is adapted from the studies of Mora (2009); Previero, Fontes and Magagnin (2019) and Lima (2022).

Table 1 - Degree of adequacy of the space

Score	Degree of adequacy	Description
0 – 20%	Very Bad	Tottaly unsatisfactory
21 – 40%	Bad	Unsatisfactory
41 – 60%	Regular	Partially satisfactory
61 – 80 %	Good	Satisfactory
81 – 100%	Excellent	Completely satisfactory

Source: Mora, 2009; Previero; Sources; Magagnin, 2019; Lima, 2022, adapted by the authors, 2023.

5 RESULTS

The evaluation of the spatial quality and use of the Botucatu Municipal Park classifies the area as "excellent", that is, the area is fully satisfactory and adequate to the use and appropriation by the users. This classification is directly related to the good quality of the access and linkages, and the excellent evaluation of the dimensions comfort and safety, uses and activities, and sociability (Table 2), thus legitimizing the success of the use of this space.

Table 2 - Synthesis of the general spatial quality of the park

Dimension or Theme	Result obtained in the field (actual value)	Results (%)	Maximum possible value (ideal value)
Access and linkages	6.00	75.00%	8.00
Comfort and Image	6.50	92.86%	7.00
Uses and activities	7.00	100.00%	7.00
Sociability	7.50	93.75%	8.00
Global Index	**27.00**	**Global Index $_{max}$**	**30.00**
	90%		**100%**

Source: Prepared by the authors, 2023.

The evaluation of the dimension *Access and Linkages* shows that the Botucatu Municipal Park is considered "satisfactory" (Table 3). Among the items evaluated, three indicators deserve to be highlighted for having an evaluation "partially attended" or "not attended".

The indicators that evaluate the adjacent sidewalks, streets and paths of the park were evaluated as "partially satisfactory", because although it has been found the presence of sidewalks in the surroundings and in the internal area of the park connecting the main

attractions of the space, sometimes they are interrupted and do not present regular floor, evidencing potential barrier in the locomotion of people with disabilities or reduced mobility.

Table 3 - Evaluation of the Access and Linkages Dimension

	Questions considered	Answers	Points
1	Can you see space from a distance? Is its interior visible from the outside?	Yes	1.00
2	Is there a good connection between the space and the adjacent buildings, or is it surrounded by blank walls? Do occupants of adjacent buildings use the space?	Yes	1.00
3	Can people easily walk to the place? For example, do they have to dart between moving cars to get to the place?	Yes	1.00
4	Do sidewalks lead to and from adjacent areas?	Partial	0.50
5	Does the space function for people with special needs?	No	0.00
6	Do the roads and paths through the space take people where they actually want to go?	Partial	0.50
7	Can people use a variety of transportation options – bus, train, car, bicycle, etc. – to reach the place?	Yes	1.00
8	Are traffic stops conveniently located next to destinations such as libraries, post offices, park entrances, etc.?	Yes	1.00
		Sum	**6.00**
		Final dimension punctuation	**75%**

Source: Authors, 2023.

The indicator related to accessibility was evaluated as totally insufficient. It received this classification, because it was identified that in the gatehouse, the main entrance of the park, the poor state of conservation of the pavement of the sidewalk, the lack of adequate floor with "[...] regular, firm, stable, non-shaking surface for wheeled devices [...]" (ABNT, 2020, p. 53), in addition to the absence of an accessible ramp between the public promenade and the gate level, they contribute negatively so that anyone can access the internal area of the park to enjoy the spaces and activities offered by the place (Figure 3b).

Figure 3 - Images of the park: External view (a), gatehouse (b), bike path (c), and crosswalk and ramp (d)


a


b


c


d

Source: Authors, 2023.

As for the positive aspects of the park, the visual permeability of the space is remarkable, which, although surrounded throughout its perimeter, provides a complete view of its interiors from the outside, due to the presence of a hollow fence (Figure 3a). The presence

of bike lanes and crosswalks duly signposted (Figures 3c and 3d), and public transport stops, evidence the availability of urban infrastructure for the different means of transport that facilitate access to this place.

The *Comfort and Image* dimension obtained a final score of 92.86% in its evaluation (Table 4), thus conferring an excellent degree of adequacy to the category.

Table 4 - Evaluation of the Comfort and Image Dimension

	Questions considered	Answers	Points
1	Does the place make a good first impression?	Yes	1.00
2	Are there more women than men?	Yes	1.00
3	Are there enough places to sit? Are seats conveniently located? Do people have a choice of places to sit, either in the sun or shade?	Yes	1.00
4	Are spaces clean and free of litter? Who is responsible for maintenance? What do they do? When?	Yes	1.00
5	Does the area feel safe? Is there a security presence? If so, what do these people do? When are they on duty?	Partial	0.50
6	Are people taking pictures? Are there many photo opportunities available?	Yes	1.00
7	Is there a good relationship between vehicles and pedestrians? Or do vehicles dominate pedestrian use of the space, or prevent them from easily getting to the space?	Yes	1.00
		Sum	**6.50**
		Final dimension punctuation	**92.86%**

Source: Authors, 2023.

The only aspect that was evaluated as partially satisfactory refers to security, although the place brings the feeling of an apparent security, no active security team was identified, either in the concierge, or in the space as a whole. Through visual perception it is possible to verify the good state of conservation of the internal areas of the park and the elements associated with naturalness, civility, organization, and legibility (Figures 4a and 4b).

Figure 4 - Images of the park: Lake, path and bench (a); Kiosk with benches (b)

a

b

Source: Authors, 2023.

The park presents along its entire length several options for users to sit, either along the paths, in the kiosks, on the deck next to the lake, or near the playground and fitness center. It was found that the landscape of the place provides several points for excellent photographs, since the space as a whole holds great qualities in its appearance.

The evaluation of the dimensions *Uses and Activities* (Table 5) evidences the high availability of activities present in the place, thus conferring an Excellent index to this theme.

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Table 5 - Evaluation of the Uses and Activities Dimension

	Questions considered	Answers	Points
1	Are people using the space or is it empty?	Yes	1.00
2	Is it used by people of different ages?	Yes	1.00
3	Are people in groups?	Yes	1.00
4	Are there different activities taking place – people walking, eating, playing soccer, chess, relaxing, reading?	Yes	1.00
5	Are all parts of the space used?	Yes	1.00
6	Is there variability of things to do?	Yes	1.00
7	Is there a management presence, or do you identify that anyone is responsible for the space?	Yes	1.00
		Sum	**7.00**
		Final dimension punctuation	**100.00%**

Source: Authors, 2023.

With a maximum score (100%), this dimension fully met all the indicators evaluated. The park offers the various groups of users, children, adolescents, adults, and the elderly the possibility of performing active or passive leisure activities simultaneously, without one standing out from the other (Figure 5).

Figure 5 - Images of the park: Trail through the forest (a); Esplanade (b); Playground and gym (c); Receptive center (d)


a


b


c


d

Source: Authors, 2023.

A significant number of groups of children and adolescents were observed playing on the trails (1 km of trails) arranged inside the forest, and on the grassy esplanade (Figures 5a and 5b). This last space is also widely used for games with pets, since the park allows their access, and depending on the number of animals that enjoy the park was found the presence of specific drinking fountains for pets. Groups of users were also observed sitting, talking or eating, in the grassy areas and on the benches present in the kiosks and along the paths, groups taking pictures on the deck near the lake, children playing in the playground, people using the gym and walking.

The dimension of *Sociability* is associated with uses and activities, since it is the existence of leisure options that attracts users to the place, acting as a magnet for social interactions. This theme obtained an excellent degree of adequacy, for having reached a final score of 93.75% in the maximum grade. The excellent classification measured in the previous theme is reflected in this evaluation (Table 6).

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Table 6 - Evaluation of the Sociability Dimension

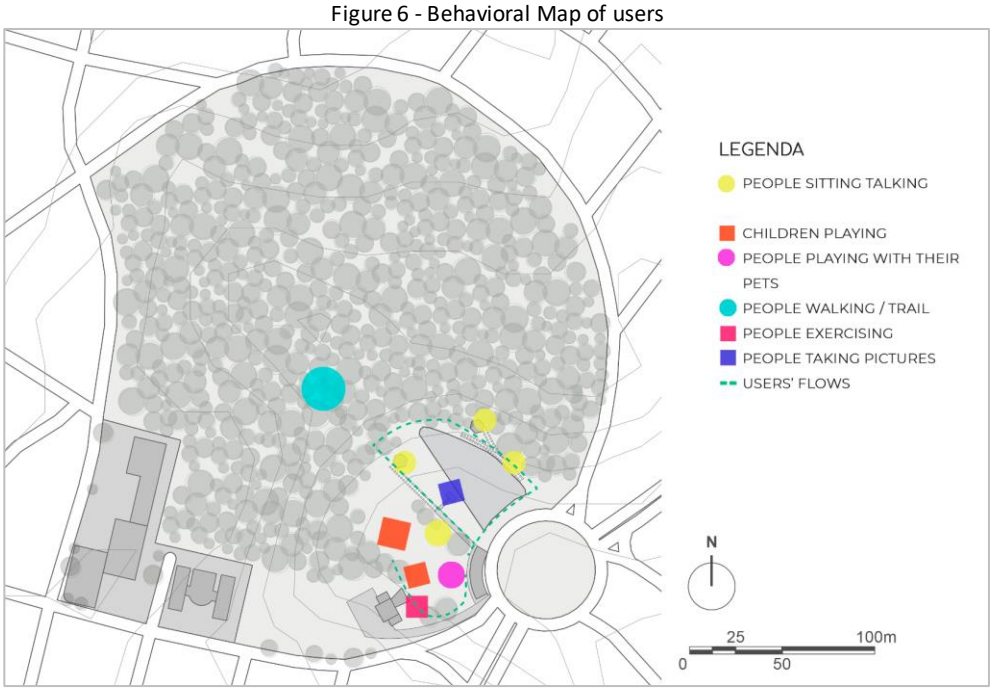
	Questions considered	Answers	Points
1	Is this a place where you would choose to meet your friends? Are others meeting friends here or running into them?	Yes	1.00
2	Are people in groups? Are they talking with one another?	Yes	1.00
3	Do people seem to know each other by face or by name?	Yes	1.00
4	Do people bring their friends and relatives to see the place or do they point to one of its features with pride?	Yes	1.00
5	Are people smiling? Do people make eye contact with each other?	Yes	1.00
6	Do people use the place regularly and by choice?	Yes	1.00
7	Does a mix of ages and ethnic groups that generally reflect the community at large?	Partial	0.50
8	Do people tend to pick up litter when they see it?	Yes	1.00
		Sum	**7.50**
		Final dimension punctuation	**93.75%**

Source: Authors, 2023.

The only aspect that did not obtain maximum score refers to the eventual mixture of ages and ethnic groups that may reflect the community in general. During the period of data collection, the elderly, people with disabilities or reduced mobility were not found using the park. The absence of this group of people may be associated with the lack of accessibility of the place, identified as unsatisfactory in the analysis of the dimension access and linkages.

In addition to the evaluation through performance indicators, from the visits to the park it was possible to map the use of space during the week and on weekends, illustrated in the behavioral map (Figure 6). People were identified sitting talking at the kiosks and benches along the paths, just resting or admiring the scenery, children playing, people with pets, walking the trail, exercising, and taking pictures. In short, the park is utilized to its full potential.

Figure 6 - Behavioral Map of users



Source: Open Street Map, 2022, adapted by Authors, 2023.

The Botucatu Municipal Park presents an excellent index of sociability. It was possible

to identify numerous groups of people enjoying the activities offered by the place, and this scenario is fundamental, according to Jacobs (2011), so that there is vitality in free public spaces.

6 CONCLUSION

Among the challenges present in contemporary cities stands out the use of public spaces. The absence of people in these spaces can be associated with various reasons and contributes negatively to its vitality, making it dangerous in the environment where it is inserted.

The evaluation of the Joaquim Amaral Amando de Barros Municipal Park, in Botucatu, carried out with the methodology developed by the PPS, with adaptations by the authors, showed that the park presents an excellent degree of adequacy in relation to the dimensions of comfort and safety, uses and activities, and sociability. In relation to the dimension of access and linkages, problems in relation to accessibility are highlighted.

The methodology proved to be effective, because it allows, in an objective way, to identify aspects that directly interfere in the quality of the public space, and that can be used by municipal managers in the proposal of guidelines for the improvement of the use and vitality of these spaces.

A safe, sustainable, and healthy city is achieved, according to Gehl (2015) starting from good urban planning. A welcoming plan that promotes social interaction is fundamental to the development of cities and their public spaces. Thus, the methodology used in this article can be further improved with the participation of users in the evaluation process, through the application of questionnaires or structured interviews, for example, so that the population has a voice in what it considers a successful public space.

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