Sustainable Civil Building Management and Engineering Journal Vol: 3, No 2, 2026, Page: 18-32

Spatial Setting and Social Sustainability in Urban Public Spaces

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DOI: https://doi.org/10.47134/scbmej.v3i2.6032
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Received: 07-02-2026
Accepted: 19-03-2026
Published: 28-04-2026

Abstract: *Urban public spaces are important components of sustainable urban infrastructure because they support social interaction, community activities, and public well-being. However, many urban public spaces experience declining quality and underutilization due to inadequate spatial settings and limited supporting facilities. This study examines the relationship between spatial settings and patterns of public space utilization in Maccini Sombala Park, Makassar. The study applies a qualitative descriptive approach using behavioral mapping, semi structured interviews, and field documentation. The behavioral mapping method used is Place-Centered Mapping to identify activity concentration, spatial utilization patterns, and the influence of spatial attributes on user activities. The findings reveal that user activities are concentrated in spaces with better accessibility, safety, spatial dimensions, and supporting facilities such as seating facilities, vegetation, and jogging paths. Meanwhile, areas lacking these attributes tend to become underutilized and socially inactive spaces. The results indicate that spatial settings are closely associated with social interaction, inclusivity, comfort, and public participation within urban public spaces. Social sustainability in parks can be achieved through users' engagement with the park through active use of the space and the diversity of activities. This study highlights the importance of user-centered spatial planning in supporting socially sustainable public infrastructure and improving the effectiveness of urban public spaces.*

Keywords: *Behavioral Mapping, Social, Sustainability, Public Space, Spatial Setting, Sustainable Infrastructure, Urban Park*

Introduction

Urban public spaces play an essential role in supporting social sustainability and enhancing the quality of urban life. Public spaces function not only as recreational environments but also as places for social interaction, community engagement, physical activity, and public participation (Carr, S., Francis, M., Rivlin, L. G., & Stone, n.d.; Gehl, 2011; UN Habitat, 2025). In sustainable urban development, public spaces are considered important elements of social infrastructure because they contribute to social cohesion, inclusivity, and community well-being (Dempsey, N., Bramley, G., Power, S., & Brown, 2011; Qi et al., 2024). The quality of public spaces is strongly influenced by spatial settings and supporting physical attributes, including accessibility, safety, comfort, maintenance, inclusiveness, and the availability of activities and supporting facilities (Carmona, 2015; Mehta, 2014). Recent studies show that public space quality cannot be assessed only from its physical form. It must also be understood through actual patterns of use, user perception,

acitivity diversity, and the ability of the space to support everyday social interaction (Bishop et al., 2024; Qi et al., 2024).

Recent studies also show that public spaces with mixed-use environments (commercial, recreational, and social) have higher levels of sociability because they increase the variety of users and activities (Qi et al., 2024). The diversity of activities creates opportunities for "co-presence"—a condition in which various social groups are present in the same time and space. Research in environmental psychology and behavioral mapping confirms that patterns of human activity are strongly influenced by the physical setting of space (Rapoport, 1977; Whyte, 2009). Recent studies based on spatial observation also show that elements such as density, the distribution of facilities, and the structure of circulation routes can explain variations in the level of social activity in urban public spaces (Lau et al., 2021).

The Acting Head of the Green Open Space Division at the Makassar Environmental Agency stated that the proportion of green open space in Makassar stood at 9.077% as of 2021, compared to 12% of the city's total area in 2015. These conditions can create underutilized or socially inactive spaces that weaken the sustainability of urban public infrastructure. Maccini Sombala Park in Makassar is one example of a public space experiencing decreasing functionality and uneven spatial utilization. Several areas within the park remain underutilized, while user activities tend to concentrate only in particular zones. This condition raises an important research problem because the existence of green open space does not automatically guarantee social sustainability. A park may be physically available, yet socially ineffective when its spatial settings fail to distribute activities, provide comfort, support safety, and attract diverse users across different zones.

Previous research has shown that one indicator of the shortcomings in the development of Maccini Sombala Park is the low level of visitors' desire to return to the park (Auliyah, 2017). The lack of visitors has led to the park's spaces being underutilized and repurposed. This is supported by the findings of a previous study (YANTI et al., 2015) which showed that the key performance index for Maccini Sombala Park's facilities did not meet the criteria for an ideal public space, as well as by a study on park facilities indicating that the park's facilities were inadequate (Syahyani, 2017).

Social Sustainability in Urban Public Infrastructure

Social sustainability refers to the ability of urban infrastructure and built environments to support social interaction, inclusivity, accessibility, safety, and community well-being. Sustainable public spaces should accommodate diverse users and support social activities that strengthen community relationships. Public spaces contribute to social sustainability when they provide inclusive and accessible environments, support community interaction, create safe and comfortable spaces, encourage active public participation, and support healthy urban lifestyles (Addini, 2021). Poor spatial quality may reduce public participation, limit social interaction, and lead to inactive and neglected urban spaces (Carmona, 2015; Mehta, 2014). Thus, social sustainability in public spaces should be

examined trough both spatial attributes and actual user behavior, since social interaction depends on how people access, occupy, and negotiate space in everyday use.

Sustainable public spaces should support social interaction and accommodate inclusivity by providing environments that are accessible, comfortable, safe, and equipped with adequate supporting facilities. These spatial attributes are important because they influence public participation, frequency of use, user satisfaction, and opportunities for social encounter in urban spaces (Halawani, 2024; Zeng et al., 2025). Recent studies also confirm that public spaces can strengthen social cohesion and sense of community when they enable everyday engagement, co-presence, inclusive access, diverse activities, comfort, safety, and meaningful social interaction (Gupta et al., 2025; Qi et al., 2024; Ramos-Vidal & de la Ossa, 2024; Yaralioglu & Kara, 2025). However, many studies still treat behavioral mapping mainly as a method for identifying where activities occur, rather than as a basis for explaining how spatial settings create active and passive zones, and activity conflicts within the same park.

This study aims to identify patterns of space utilization in Maccini Sombala Park, analyze the influence of spatial settings on user activities and community interaction, and examine how spatial attributes support social sustainability in urban public spaces. Social sustainability in urban spaces is closely related to accessibility, inclusiveness, safety, comfort, social interaction, and the ability of public spaces to support community life (Dempsey et al., 2011). Thus, this study contributes to discussions on socially sustainable public infrastructure by emphasizing the importance of user-centered spatial planning in enhancing urban public space quality. Public spaces with better environmental quality and spatial support tend to encourage longer duration of stay, more diverse activities, higher social interaction, and stronger community engagement.

Spatial Setting and Human Behavior

Behavioral architecture explains that human activities and social behavior are closely related to the physical environment. In the built environment, spatial form is not only understood as a physical object, but also as a setting thah influences user perception, movement, interaction, and activity pattern (Lang, 1987; Rapoport, 1977). This view is also in line with environmental psychology, which empasizes that human behavior occurs within specific spatial and social settings (Barker, 1968). In urban parks, this relationship can be observed through the way users select places for walking, sitting, gathering, exercising, playing, or avoiding certain areas.

Spatial characteristics such as accessibility, spatial dimensions, supporting facilities, safety, and comfort influence how users interact with and utilize spaces (Gehl, 2011; Mehta, 2014; Mitchell & Staeheli, 2009). Therefore, understanding spatial utilization patterns is important in developing sustainable public infrastructure that responds to community needs. Human activities are influenced by spatial characteristics such as accessibility, circulation, spatial dimensions, vegetation, seating, safety, and supporting facilities. Physical environments influence patterns of human behavior (Rapoport, 1977). Public spaces with supportive spatial settings tend to attract higher levels of activity and social

interaction. Nevertheless, spatial setting should not be interpreted as the only determinant of public space use. Temporal conditions, maintenance quality, weather, lighting, cleanliness, perceived security, and user demographis, may also affect how people choose and use park spaces (McCormack et al., 2014; Qi et al., 2024).

Behavioral Mapping in Public Space Research

Behavioral mapping is a systematic observation method used to analyze human activities within specific environments (Haryadi, 1995). Behavioral Mapping is a useful method for identifying patterns of public space utilization and analyzing the relationship between spatial settings and people activities. This records where people are located, what activities they perform, and how their behaviot is distributed within a particular space (Ittelson, W. H, Rivlin, L.G and Proshansky, 1976; Zeisel, 2006). Recent studies also explain that behavioral mapping can reveal real-time patterns of public space use, including how space supports or limits user activities (Bishop et al., 2024). Compared with perception-based evaluation, behavioral mapping provides direct evidence of actual use, activity concentration, and patterns of space utilization.

Several recent behavioral mapping and activity mapping studies have examined public space use in urban parks and open spaces. These studies show that user behavior is shaped by accessibility, facilities, spatial configuration, vegetation, comfort, maintenance, and temporal variation (Bishop et al., 2024; Doğru & Kaya, 2025; McCormack et al., 2014; Neonufa et al., 2024; Sheng et al., 2021). However, the gap remains in connecting mapped activity patterns with the concept of social sustainability, especially in explaining why some park zones become socially active while others remain passive or conflictual. This study addresses that gap by using place-centered behavioral mapping to relate spatial settings, activity distribution, and social sustainability in Maccini Sombala Park.

Through behavioral mapping, researchers can identify active and inactive spaces, patterns of social interaction, and the effectiveness of spatial elements in supporting community activities (Whyte, 2009). Place-Centered Mapping focuses on identifying activity patterns in particular spaces and examining how spatial attributes influence public behavior. Behavioral mapping allows researchers to identify active and inactive areas (dead spaces), understand spatial utilization patterns, analyze social interaction, evaluate spatial effectiveness, and assess public space performance. Based on this literature, the research problem of this study is formulated as follows: how do spatial settings influence the formation of active zones and passive zones in Maccini Sombala Park, and how do these spatial-use patterns affect the social sustainability of the park as urban public infrastructure.

Methodology

Research Approach

This study uses a qualitative descriptive approach with behavioral mapping as the primary method for examining spatial utilization and social interaction patterns in public spaces. The research was conducted at Maccini Sombala Park, Makassar, Indonesia. This study uses a qualitative descriptive approach with behavioral as the primary method for

examining spatial utilization and social interaction patterns in public spaces. The research was conducted at Maccini Sombala Park, Makassar, Indonesia. A qualitative descriptive approach was selected because the study aims to interpret actual spatial use, user activities, and social interaction patterns in their natural setting rather than to test statistical causality. The unit of analysis was the spatial zone within the park, while the observed units were user activities, patterns of space use, user diversity, and forms of social interaction occurring in each zone. The results of behavioral mapping can help identify problem areas and improve facilities in public spaces. In this study, behavioral mapping was used to identify activity concentration, inactive areas, activity conflicts, and the relationship between spatial attributes and user behavior.

Data Collection Technique

a. **Behavioral Mapping.** Behavioral mapping in this study was conducted to identify patterns of activity or patterns of space utilization in the park. The behavioral mapping method used is place-centered mapping, which is a method that focuses specific places and records how individuals or group use, utilize, or adapt their behavior within those places at specific times (Haryadi, 1995). Spatial utilization pattern describes how areas within the park are used, managed, and allocated for various activities. This includes an analysis of which spaces are used most frequently, when they are used, and which areas are underutilized or unused. The categories of activities observed included standing and sitting activities, which comprised various types of recreational, relaxation, and social activities.
b. **Observation.** Systematic observations were conducted to identify user activities, spatial utilization, circulation patterns, and spatial characteristics. The observation areas were determined based on the main spatial zones of the park, namely Plaza 1, jogging and cycling path, Plaza 2, Plaza 3, Plaza 4, and connecting pedestrian areas. At each point, the researcher recorded the time of observation, activity type, user distribution, activity intensity, visible social interaction, and relevant spatial attributes such as seating, shade, vegetation, lighting, visibility, and access to circulation routes.
c. **Interviews.** Semi-structured interviews were conducted to understand users perceptions regarding accessibility, comfort, safety, and spatial preferences. The interviews were used to clarify why users preferred certain zones, avoided other zones, or used spaces differently from their intended design function.
d. **Documentation.** Photographs and field documentation were used to support the spatial analysis process. Documentation was used to verify the physical condition and spatial attributes of each observation point, including facility distribution, vegetation, circulation paths, visibility, and informal uses of space.

Observation Period

Behavioral observations were conducted over one month during weekdays in the afternoon, weekends in the morning and afternoon. The observation schedule consisted of one weekday sessions and two weekend sessions. Weekday observations were conducted

in the afternoon, from 3 p.m. to 6 p.m., because preliminary observation showed that morning activities were very limited. Weekend observations were conducted in the morning, from 7 a.m. to 10 a.m., and in the afternoon, from 3 p.m. to 6 p.m, to capture higher recreational use. Each session lasted approximately three hours. Repeated observation was carried out at the same observation points to compare temporal variation between weekdays and weekends and between morning and afternoon-evening use.

Data Analysis

The analysis focused on activity concentration, spatial utilization intensity, spatial accessibility, supporting spatial attributes, social interaction patterns, and implications for social sustainability. The analysis was conducted in four stages. First, the results of the mapping of park visitor behavior were organized based on observation points, time periods, user types, and activity categories. Second, a park layout was mapped to identify active zones, passive zones, and circulation patterns. Third, the types of spatial attributes in each zone were identified and compared with the intensity and diversity of activities observed in those zones. Fourth, interview results and photographic documentation were used to triangulate the behavioral mapping findings. Interview data helped explain user preferences, comfort levels, and perceived safety, while the photographic documentation verified the physical conditions that supported or restricted activities. The final interpretation was developed by integrating the mapped behavior, user perceptions, and spatial evidence to assess how the park's spatial arrangement contributes to or limits social sustainability.

Result and Discussion

Behavioral Mapping and Spatial Utilization Patterns

Figure 1. Maccini Sombala Park, Makassar

Figure 2. Existing study area

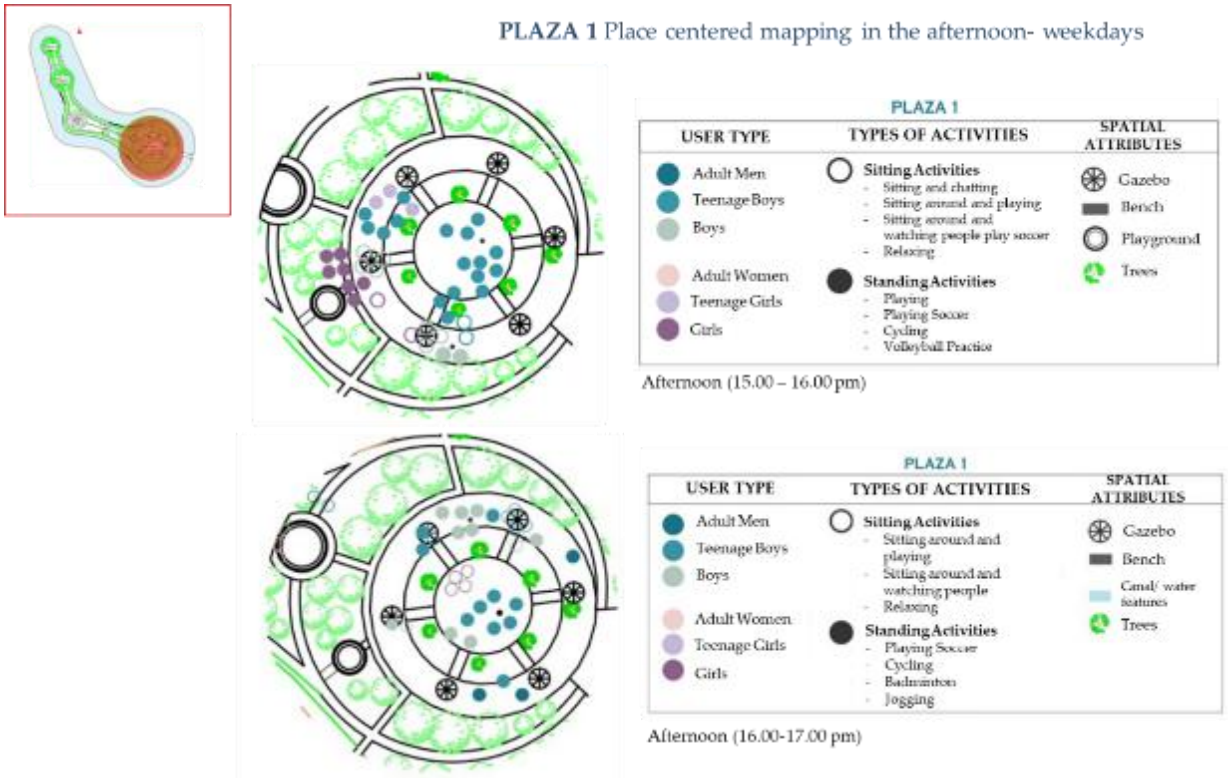

Figure 3. Behavioral mapping at Plaza 1 – Afternoon (Weekdays)

Figure 4. The types of activities taking place at Plaza 1 in the afternoon – weekdays

Figure 5. Behavioral mapping at jogging path – Afternoon (Weekdays)

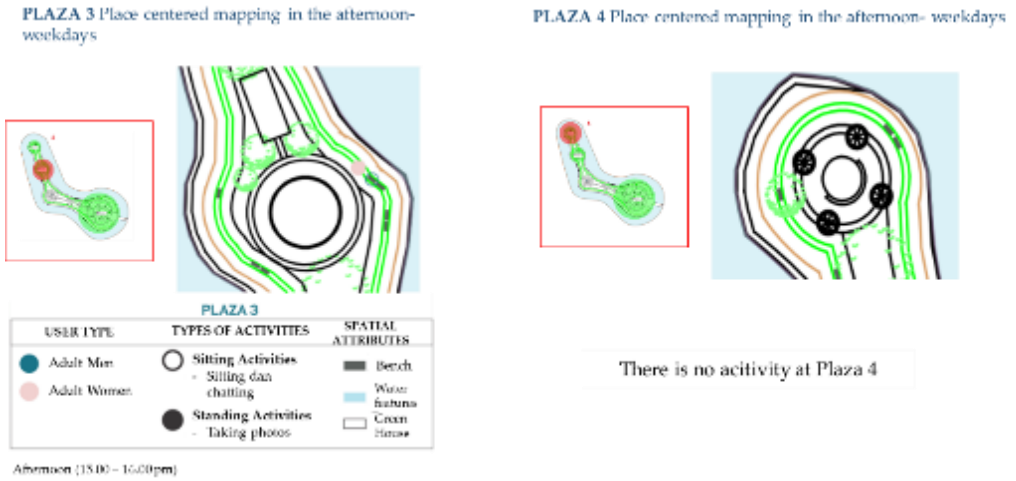

Figure 6. Behavioral mapping at Plaza 3 and Plaza 4 – Afternoon (Weekdays)

On weekdays, there is hardly any activity in the morning. Things start to pick up in the afternoon. User activity increases in the afternoon, particularly in zones that are close to entrances, supported by circulation paths, and equipped with facilities such as seating, gazebos, vegetation, and jogging tracks.

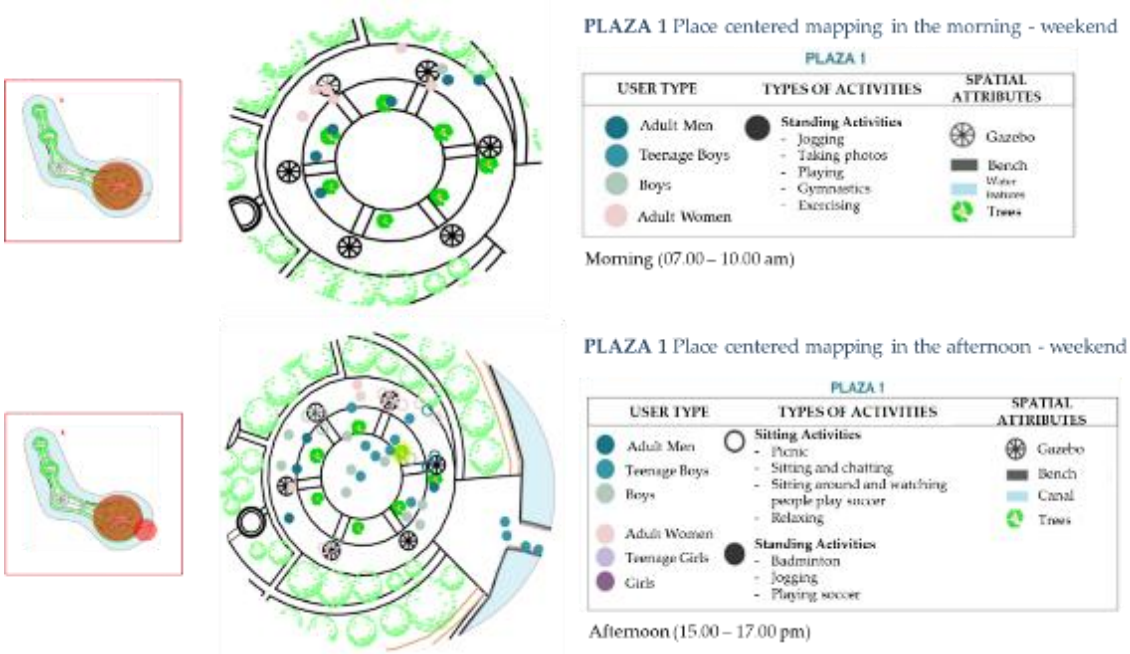

Figure 7. Place centered mapping at Plaza 1 – weekend

Figure 8. Behavioral mapping at jogging/cycling path – weekend

Figure 9. Behavioral mapping at Plaza 3 – weekend

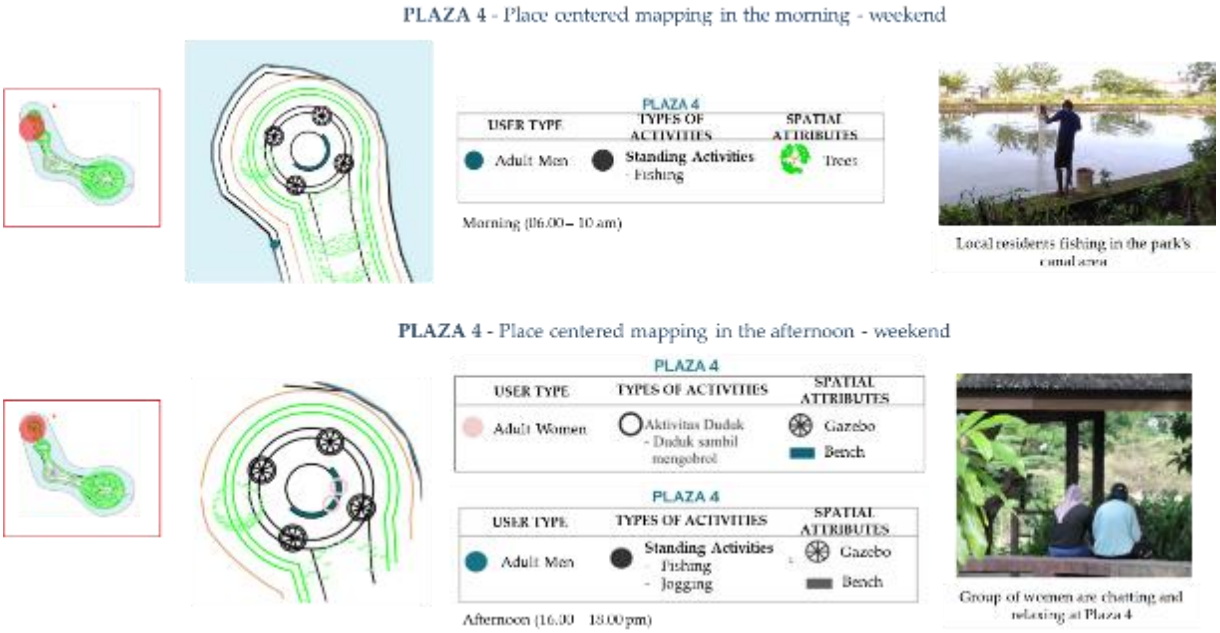

Figure 10. Behavioral mapping at Plaza 4 – weekend

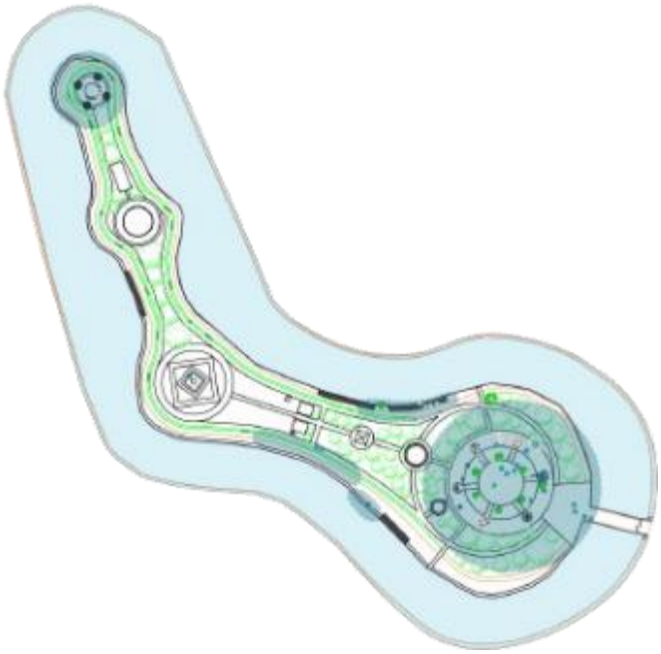

Figure 11. Spatial utilization patterns

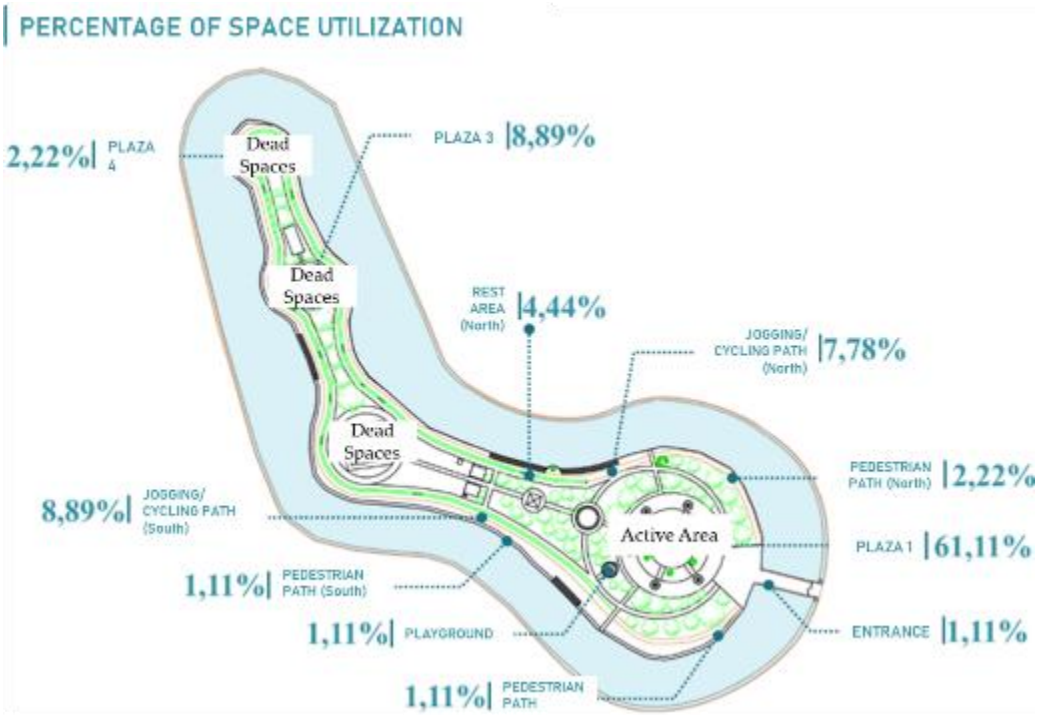

Figure 12. Percentage of space utilization

Behavioral mapping results indicate that user activities are concentrated in Plaza 1. This area accommodates various activities including jogging, playing sports, relaxing, sitting and chatting, taking photographs, and social gatherings. The diversity of activities in Plaza 1 indicates that this area functions as the main active zone of the park. It supports both optional activities, such as relaxing and taking photographs, and social activities, such as

chatting and gathering. This pattern suggests that spatial settings with better access, visibility, comfort, and facility support are more likely to generate active social use.

The concentration of activities in Plaza 1 is influenced by several spatial factors: proximity to entrances, larger spatial dimensions, easier accessibility, availability of gazebos and seating, presence of vegetation and shading, and the availability of jogging and cycling tracks. These findings provide practical guidance for urban park design. Active public spaces should not rely only on large open areas, but should combine accessible entrances, clear circulation, shaded resting areas, seating, visual openness, and activity-supportive facilities. For spatial planning, this means that facilities should be distributed across several zones rather than concentrated in one area. For public infrastructure policy, the findings suggest that park evaluation should include actual use, activity diversity, and inactive-zone identification as indicators of performance.

The findings show that spaces with better physical support attract more users and facilitate more diverse community activities. In contrast, Plaza 3 and Plaza 4 are relatively underutilized because they are located farther from the entrance are difficult to access due to damaged pedestrian paths, have many activity-supporting facilities that are in bad condition, and are perceived as unsafe by users, particularly children. Other factors influencing the minimal use of Plaza 3 and 4 include irregular and incomplete maintenance, cleanliness, shade distribution, lighting, visibility, smaller spatial dimensions, and differences in user characteristics such as age, purpose of visit, group size, and preferred activities. Therefore, the underutilization of Plaza 3 and Plaza 4 reflects a combination of spatial limitations, safety perceptions, and the availability of supporting facilities that do not meet users' activity needs.

The uneven utilization of space indicates spatial inequality within the park, where certain areas are unable to support active social interaction effectively such as Plaza 3 and Plaza 4 which are located far from the entrance. The results of the behavioral mapping also revealed areas where conflicts arise between different activities, such as pedestrian paths and jogging trails being used by local residents for fishing. This conflict shows that the park does not yet provide clear spatial allocation for all recurring activities. Fishing activities indicatte a real user demand that should be considered in park management. Without proper spatial planning and regulation, informal activities may interfere with pedestrian movement. This finding is important for landscape architects and local government because social sustainability requires not only the provision of facilities, but also the management of compability between acitivities.

Conclusion

The results of the study show that the spatial utilization at Maccini Sombala Park is divided into two areas: the passive zone (dead space) and the active zone. Dead space refers to areas that are underutilized or not utilized at all by users. In addition, there are areas in the park that cause conflicts between activities because certain activities, such as fishing, do not have designated areas. Some spaces have changed their intended use because the facilities available in the park are not evenly distributed. Areas with the highest usage rates

feature good accessibility, sufficient space, and supporting facilities such as seating. This indicates that the availability of facilities supporting various activities, along with ease of access, can foster a wide range of activities, inclusivity, and repeat visits, thereby transforming these areas into active zones within the park that contribute to the park's social and environmental sustainability.

The study concludes that spatial setting is an important factor in shaping the social sustainability of urban public spaces because it affects activity distribution, comfort, perceived safety, social interaction, and user participation. Based on these findings, urban planners should improve connectivity between active and passive zones by strengthening entrances, circulation routes, wayfinding, and spatial visibility. Landscape architects should redistribute supporting facilities such as seating, shading, lighting, vegetation, and activity nodes to reduce the concentration of use in Plaza 1 and activate Plaza 3 and Plaza 4. Local governments should conduct periodic maintenance as part of public park management, particularly to identify inactive zones, maintenance issues, imbalances in facilities, and conflicts between formal and informal activities. Future research should include longer observation periods, seasonal variations, and more detailed user demographic data to explain how different groups use urban parks over time.

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