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Spatial distribution and vegetation cover of urban green areas: case study in a tourist district of Maceió-Alagoas, Brazil

Distribuição espacial e cobertura vegetal em áreas verdes urbanas: estudo de caso em bairro turístico de Maceió-Alagoas, Brasil

Distribución espacial y cobertura vegetal de zonas verdes urbanas: estudio de caso en un barrio turístico de Maceió-Alagoas, Brasil

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Abstract

Green areas were analyzed in a tourist district in the city of Maceió, Alagoas, Brazil, based on the criteria of spatial distribution and vegetation cover. Pajuçara was taken as an object of study because it presents different forms of land occupation, despite its reduced territorial dimension. The method consisted of cartographic analysis of existing green areas and on-site visits in order to verify the maintenance status of green areas and vegetation. The results showed an uneven distribution of green areas, whose concentration is linked to the enhancement of the tourist seafront and its surroundings with high-end buildings and hotels, in contrast to the internal fraction of the neighborhood, occupied by a population with less economic power, where the areas green is nonexistent.

Keywords: Squares. Urban vegetation. Public space. Urban planning. Environmental Quality.

Resumo

Objetivou analisar áreas verdes em bairro turístico na cidade de Maceió, Alagoas, a partir dos critérios de distribuição espacial e cobertura de vegetação destes espaços. Tomou-se o bairro Pajuçara como objeto de estudo por apresentar formas de ocupação do solo variada, apesar da sua reduzida dimensão territorial. O método consistiu na análise cartográfica das áreas verdes existentes e visitas *in loco* com vistas a verificar o estado de manutenção das áreas verdes e da

vegetação. Os resultados apontaram distribuição desigual das áreas verdes, cuja concentração está vinculada à valorização da orla marítima turística e seu entorno com edifícios de alto padrão e hotéis, contrariamente à fração interna do bairro, ocupada por população de menor poder econômico, onde as áreas verdes são inexistentes.

Palavras-chave: Praças. Vegetação urbana. Espaço público. Planejamento urbano. Qualidade ambiental.

Resumen

Se analizaron áreas verdes en un distrito turístico de la ciudad de Maceió, Alagoas, Brasil, con base en los criterios de distribución espacial y cobertura vegetal. El barrio Pajuçara fue tomado como objeto de estudio porque presenta variadas formas de ocupación del suelo. El método consistió en el análisis cartográfico y visitas in situ con el fin de verificar el estado de mantenimiento de áreas verdes y vegetación. Los resultados mostraron una distribución desigual de las áreas verdes, cuya concentración está ligada a la puesta en valor del paseo marítimo y su entorno con edificios y hoteles de alta gama, en contraste con la fracción interna del barrio, ocupada por una población de menor poder económico, donde las áreas verdes son inexistentes.

Palabras clave: Plazas. Vegetación urbana. Lugar público. Planificación urbana. Calidad del medio ambiente.

Introduction

Data from the Brazilian Institute of Geography and Statistics (IBGE) shows that growth in Brazilian urban areas went from 81.2% to 84.4% in 10 years (from 2000 to 2010), indicating a fore trend of increasing urbanization in the Brazil with a consequent reduction of the rural population, in the order of 2 million people within the same period. This given, it is possible to observe an increasing demand for spaces, material and energy that can subsidize this process in cities. This fact can directly compromise the quantity and qualities of the green areas distributed in the territory.

The process of urban expansion in the capitalist pattern of development is dynamic and accelerated. This results in peculiar characteristics in urban morphology, especially in tropical cities in developing countries, in which there is clearly an emphasis on excessive soil occupation by buildings or soil covering with

impermeable materials, such as concrete and asphalt. This model of spatial configuration is erroneously linked to the synonym of urban development. In this pattern, green areas are ignored as a structuring element of healthy and sustainable urban environments.

Scheuer and Neves (2016) showed that the replacement of the natural environment by the built environment causes problems at local and regional scales, ranging from socioeconomic issues to environmental imbalances. Before the problems arising during this process, vegetation as a structuring element of spaces gains importance in the discussion of urban spaces (GOMES; SOARES, 2003).

The concept of green areas has changed over time. Initially, green areas were related to gardens, which had an aesthetic purpose and were related to human senses. Only in the 19th century, green areas started to have a practical function in urban centers (LOBODA and ANGELIS, 2005). Therefore, we can understand that green areas have always had their functions related to the needs and characteristics of each historical era, besides reflecting the trends and customs of society.

Lima and Amorim (2006) showed that the presence and maintenance of urban green areas are important factors for the environmental quality of cities, as long as they assume a balance in the dichotomy between the built environment and the natural environment. Based on the above, the authors show the relevance of green areas for ornamentation and aesthetics of urban spaces, since they are places of recreation and leisure, in addition to contributing to noise reduction, retention of dust particles suspended in the air, performance in reoxygenation of the atmosphere and shading by the presence of trees.

Pinheiro and Crivelaro (2014) also aimed to show the advantages of public green areas, emphasizing their ecological function due to the presence of vegetation, non-waterproofed soil and existing fauna. These factors directly

contribute to improving the quality of the climate, air, water and soil. The authors also focused on the social function of these areas as environments for interaction and leisure for the population, in addition to the aesthetic function by modifying the monotony of the landscape by visual enhancement. They also pointed out the educational function for making it possible to develop extra-class activities and environmental education programs, and the psychological function for people's contact with the natural elements that contribute to the feeling of relaxation and well-being.

Mascaró and Mascaró (2010) showed other environmental functions from the presence of vegetation in urban centers, such as the change in the speed and direction of the winds within the intra-urban scale, the interference in the frequency of rains – according to the amount of tree mass –, and the reduction of air pollution by the process of respiration and photosynthesis of plants.

Speck (2017) pointed out that, in the context of the capitalist model, urban vegetation can directly interfere in the local real estate issue, once afforestation can have a notable impact on pedestrians' walkability. In this context, urban afforestation could add value to properties, just as it can be associated with improvements in retail viability.

The problems observed today due to the scarcity of green urban areas and the search for a better quality of life in cities show the need for actions that aim to favor a pleasant urban environment as well as adapted to the local climate. Therefore, greater attention must be paid to the planning and management of green areas, as the actions undertaken with this purpose are reduced or even non-existent in urban planning.

Thus, it can be seen that the biggest problem regarding green areas in cities refers to the fact that in many cities or districts, these spaces are planned in small quantities and often in dimensions that are disproportionate to the number of users it is intended to serve. In addition, the spatial distribution and maintenance

of the vegetation cover in these areas are inefficient, configuring only as dispersed locations in the neighborhoods, without performing their real functions (LOBODA; ANGELIS, 2005).

In this context, it is important to have studies aimed at urban green areas as a structuring element of urban and environmental quality. This theme was widely discussed in several researchs that aimed to promote reflections on the importance of urban planning and green areas for the quality of cities and their inhabitants, as in the example of Lima et. al. (2020); Eckert and Brandli (2020); Souza et. al. (2019); Pereira and Barbosa (2019); Brandão, Nunes, Barbosa (2019); Gonçalves et. al. (2018); Souza, Koehler, Ribaski (2018); Campos and Castro (2017); Araújo and Ferreira (2016); Albuquerque and Lopes (2016); Scheuer and Neves (2016); Barbosa, Menezes and Rocha (2012); Bargas and Matias (2011); and others.

The urban expansion process in the city of Maceió – the city where the study area of this research is inserted – shows that the new occupations tend to be concentrated on the North coast in neighborhoods that have a large territorial extension. This urban growth has occurred in an accelerated and disordered way with the expressive increase of the waterproofing of the soil in imbalance with the natural conditions of the environment. In addition, there is a quantitative and qualitative lack of control of green areas by municipal management, directly compromising urban environmental quality (BARBOSA, 2005; CAVALCANTE, 2007).

Thus, this article aimed to analyze urban green areas in a consolidated district in the city of Maceió, Alagoas, Brazil, based on the criteria of spatial distribution and vegetation coverage of these urban spaces. The neighborhood of Pajuçara was taken as an object of study because it has different forms of land occupation, despite its reduced territorial dimension. In addition, it is possible to identify two distinct patterns of land occupation: one that is located in the region

close to the seafront, with a strong tourist vocation, and the other region located in the inner part of the territory, with a lower middle-class population.

Materials and Methods

The case study includes the green areas of the Pajuçara district, located in the city of Maceió, Alagoas, Brazil. The neighborhood was selected because of its green areas which are disconnected and poorly distributed in the territory, expressing the capitalist logic of production in Brazilian cities characterized by the valorization of spaces concentrated in the region close to the waterfront in discontinuity with the inner region of the neighborhood.

For the analysis of the quantity and distribution of green areas in relation to the urban perimeter, cartographic base in CAD format provided by the municipality of Maceió was used and the vegetation coverage was verified using the Google Earth software (free version). Interviews and questionnaires with regulars in these urban spaces were not possible due to the COVID-19 pandemic.

On-site visits were also carried out in order to ascertain the spatial distribution, dimensioning and maintenance of vegetation cover in these areas, in addition to photographic surveys for the preparation of maps and analyzes, in order to allow a better territorial perception.

Study area: the Pajuçara district

The Pajuçara district is located on the Coastal Plain of the city of Maceió, capital of the State of Alagoas, Brazil. It has a territorial area of 6.56 km² and an estimated population of 3,711 inhabitants, according to the last demographic Census (IBGE, 2010). The population density of the district is 565.70 inhabitants/km². It is one of the most traditional neighborhoods and its waterfront is one of the city's postcards, especially because of the natural pools. It is limited to the neighborhoods of Ponta Verde, Ponta da Terra, Poço and Jaraguá (Map 1).

Map 1- Location of the Pajuçara district in the city of Maceió, Alagoas, Brazil.



Source: Google Earth (2021) adapted by Ricardo Barbosa (2021).

The neighborhood is located in Administrative Region 1 and is part of the Controlled Density Macrozona in the Coastal Plain, according to the Maceió Master Plan (2005). It also includes the Residential Zone of type 2 (ZR2) and the Residential Zone of type 4 (ZR4), according to the current urban and building legislation (MACEIÓ, 2007). These Zones are areas intended for the use of predominantly residential land with the possibility of implementing commercial, service and industrial activities.

The Pajuçara district has significant public spaces, most of which are located on the seafront which is considered an important landscape for the city's natural heritage (MACEIÓ, 2005). This landscape is characterized by the sandy beach and clear sea and by the coconut and almond trees arranged along the entire

seafront. Beside the sea, it has living and leisure spaces with wide sidewalks, bike paths, parking lots, areas for the practice of sports (courts, soccer field and skatepark) and events (Multi-eventos Square), in addition to bars and beach huts, fish hut and magazine stands.

Therefore, the neighborhood has two consolidated regions with different characteristics: a predominantly residential region, located in the innermost part of the neighborhood; and a tourist region, characterized by the concentration of hotels, vertical buildings and various commercial and service uses, such as restaurants, supermarkets, pharmacies. The residential region of the strip close to the seafront has buildings of high construction standard, unlike the inner urban region of the neighborhood, which is characterized by densely packed residences without distances between buildings. In addition, the tourist region has wider streets and the presence of vegetation, diverging from the inner region with narrow streets without trees, as can be seen in Chart image 1.

Chart image 1 - Land occupation in the strip close to the shore (at the right) and inside (on the left) of the Pajuçara district (in the center).



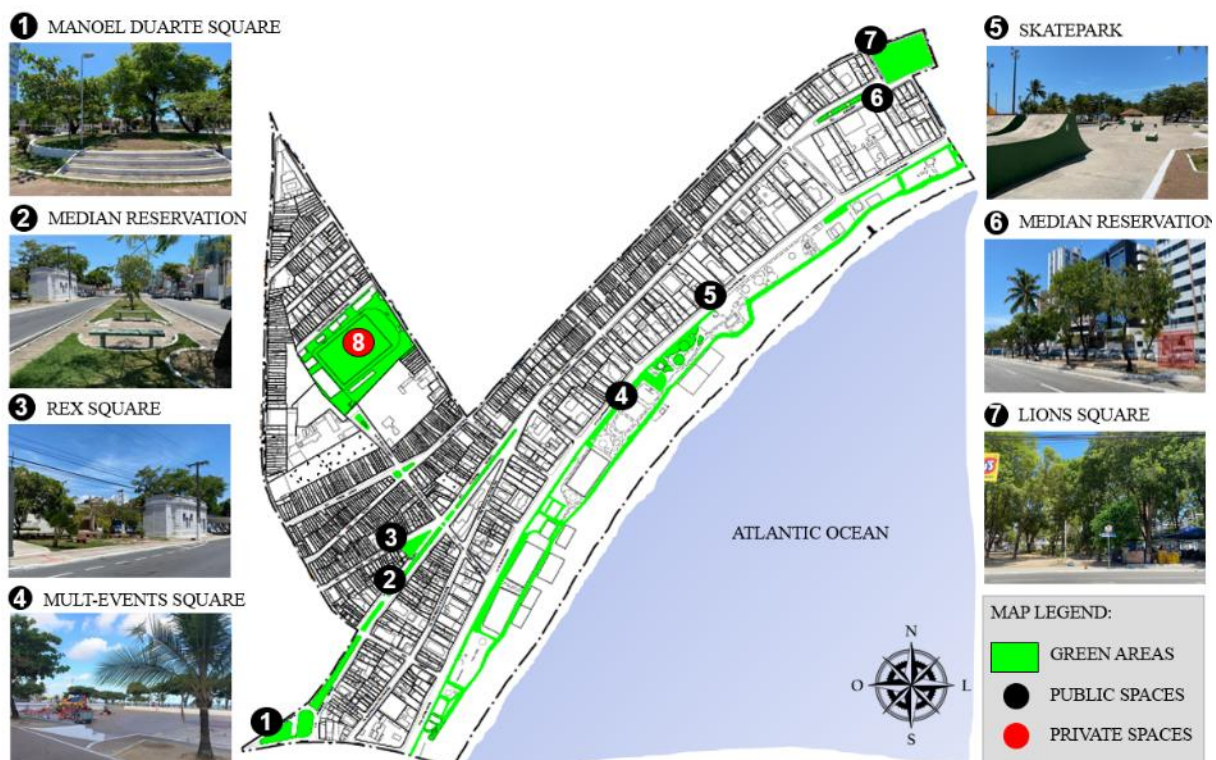
Source: Google Earth (2021) adapted by Ricardo Barbosa and Mabel Lyra (2021).

Images 1 and 2 show the pattern of land occupation in the blocks located in the inner region of the neighborhood, with narrow streets and sidewalks and without trees and residences without frontal and lateral clearances, occupying the entire perimeter of the block. Image 3 shows a median reservation located in the blocks close to the shore. Images 4, 5 and 6 show the coastal avenue with four lanes, flanked by wide sidewalks and predominantly lined with coconut trees, establishing the typical landscape of district's tourist postcard.

Mapping of the main green areas and urban vegetation in the Pajuçara district

The district has significant public spaces with the presence of vegetation in squares, median reservation, private land and on the seafront. The highest concentration of vegetation is in the waterfront, as it can be seen by the green spots in Infographic 1. However, grassy, shrub and tree vegetation of different species and sizes can also be seen in median reservations and in squares, as in Manoel Duarte Squares, Rex Square, Multi-eventos Square and Lions Square.

Infographic 1 - Location of urban green areas in the Pajuçara district.



Source: Mabel Lyra's collection, Feb. 2021.

The green areas mapped in the neighborhood correspond to four squares (Images 1, 3, 4 and 7), two central flowerbeds (Images 2 and 6) and a recreation area on the seafront (Image 5). Point 8 highlighted in red is a training ground for a soccer team in the city. Thus, it is a private area, without public access, although it corresponds to a vegetated area of great extension. Thus, this area was not considered in this study.

Analysis and discussion

It is possible to observe that the Pajuçara district has most of the green areas in the region close to the seafront, in disagreement with the few existing spaces in its internal region. Thus, it can be seen that the neighborhood is a strong example of poor spatial distribution of urban green areas with disconnected vegetated spaces. The inexistence of green areas in the inner region of the neighborhood serves the capitalist logic of maintaining green areas as an element of social status.

Squares are places where it is possible to find grasses and trees that promote soil permeability. Praça do Rex is considered a Special Cultural Preservation Unit (UEP), according to the Maceió Master Plan (2005), and has a bus stop and Lions Club of Maceió Pajuçara building, which encourages its use by many users. It has diverse vegetation with different species and sizes and sectors without adequate landscape planning. In addition, the existing grass does not have adequate maintenance and the existing concrete urban furniture does not favor the ideal conditions of comfort, since the space lacks accessibility and visual attractions.

The median reservations in the neighborhood also have diversified grasses and trees and no planned sectorization. It has concrete furniture without comfort and maintenance. There is still a need for more paved spaces for pedestrian

circulation. The sidewalks are not maintained, compromising adequate accessibility, especially for people with reduced mobility.

Manoel Duarte Square has an expressive number of medium and large trees that promote shading and good aesthetics for the surrounding areas. The square is in an area of intense vehicle traffic. Thus, it is characterized more strongly as a space of transition than of permanence. Its urban furniture also needs maintenance and its sidewalks do not consider adequate accessibility.

Lions Square is one of the most used in the neighborhood and has significant vegetation coverage that contributes to shading, in addition to assisting with landscape and aesthetic functions for the surrounding area. The square has a large craft fair that opens every day and attracts mainly tourists. It also has a newsstand and a taxi stand that provides greater use of space by users. The existing urban furniture needs maintenance and the expressive vegetated spaces are maintained by regulars who live nearby. The negative points are the poor accessibility of the sidewalks (a recurrent feature in the squares of the neighborhood) and a Sewage Pumping Station that is located in the square and at certain times of the day promotes a bad smell to the surrounding areas. The absence of sports and leisure equipment also contributes to the fact that the square is not entirely inviting for activities of permanence and contemplation, despite its size and expressive vegetation.

Skatepark and Multi-eventos Square are spaces for living and leisure located on the seafront. It has an extensive area with concrete paving and urban furniture suitable for the practice of sports. At the Multi-eventos Square, various artistic and cultural activities are held. Thus, its layout has access ramps, ensuring adequate accessibility and bleachers for events. It is largely frequented by residents of the neighborhood, especially at night (due to the few shaded areas) and on weekends.

Thus, it is possible to verify that the existing green areas have different characteristics, but similar problems. The vegetation is predominantly grassy and arboreal and the poor planning of the landscaping and the lack of maintenance of the vegetation is a recurring aspect in all the analyzed spaces. Another recurring aspect is the scarcity regarding accessibility of sidewalks whose lack of maintenance creates holes and makes walking dangerous with the possible occurrence of pedestrian falls and makes access to people with reduced mobility impossible.

Finally, it was observed that the sectorization and urban furniture without maintenance makes most of the green areas in the neighborhood just transition places, not favoring the permanence of users, except by spaces located on the seafront. Even large green areas, such as Lions Square, have reduced use due to the lack of planning and maintenance.

Final considerations

This paper comprehended the synthesis of the knowledge acquired in bibliographic reviews and was based on a case study in a tourist neighborhood with distinct land occupation characteristics and the distribution and maintenance of urban green areas notably influenced by the capitalist logic of urban space production.

The results showed a poor spatial distribution of green areas in the neighborhood with a clear priority for the region close to the seafront, as it is an area of great circulation of tourists and place of residence of people with higher per capita income. Thus, the green areas assume an aesthetic function linked to the enhancement of the surrounding buildings, despite their ecological and social function as a space for leisure and recreation.

It was also observed that most of the existing green areas have landscape planning and the maintenance of deficient urban furniture, which compromises

the use of permanence space, making them only places of passage. The maintenance of vegetation is also deficient. However, the green areas located on the seafront have another look, showing that these spaces are treated by urban planning managers according to their aesthetic function for maintaining the landscape of postcards and that environmental and social functions are neglected.

Finally, it is important to emphasize that urban planning should conceive urban green areas as spaces for socialization and humanization, in order to guarantee the fulfillment of their function, not only aesthetic, but above all social and environmentally.

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