EXPLORING SPATIAL DATA COLLECTION AND VALIDATION METHODS FOR URBAN PARKS: A STUDY OF BRAZILIAN CAPITALS

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INTRODUCTION

Urban parks are characterized as a type of green area that combines predominant vegetation, regardless of size, with built infrastructure [1]. The presence, proximity, greenness and use of urban parks are the subject of several studies that associate parks with improved health. Such health benefits were found to be associated with increase in the practice of physical activities, reduction in cardiovascular diseases and premature mortality, improvements in social interaction and improved mental health [2], [3].

The present work leverages the different ways of collecting and accessing spatial data from urban parks, in the context of Brazilian capitals and identifying strategies to harmonize replicable data harmonization and validation procedures.

METHODS

Our area of study consisted of 26 capitals of the Brazilian states including its Federal District at the municipal level, following the geographical units defined as L2 units [4]. According to the flowchart we created (Figure 1), data sources were extracted from:

- Official park data provided by City Halls in geographic (vector) or textual format publicly available;
- Requested official data obtained from different local public entities when not publicly available; and
- If no available official data, geographic data was collected in Google Maps (points) and OSM (polygons).

Descriptive statistical analyzes were performed with population data estimated for 2019. We also prepared a map in order to visually represent the differences between parks availability and demographic density in each of the Brazilian capitals.

RESULTS

- Final number of 431 urban park polygons for 27 cities: 70% provided by official data sources, 30% by Open Street Map and Google Maps. Besides, we noticed an increase in the frequency of epidemic years in the second half of the time series.
- The number of parks representativeness is higher for the Southeast region (192 parks) followed by the Midwest (74) and the Northeast regions (69).
- The set of capitals with the largest urban parks area is in the Northeast (43,25 km²), Southeast (38,36 km²) and Midwest region (36,91 km²).
- We observed a reduction in the proportion of urban park areas and total park area in all regions except the South region, after removing all green spaces not identified as urban parks (Figure 3).
- After harmonization and data validation we found that most capitals presented an area difference between raw and final data, particularly for capitals in the Northeast and Southeast regions.
- For most capitals, the area of urban parks represented less than 1% of the L2 territory.
- When looking at the distribution of parks by region, the Midwest and Northeast regions had the largest areas.
- It is notable that Belo Horizonte (MG), São Paulo (SP), Curitiba (PR) and Goiânia (GO) present high demographic density and at the same time, high number of urban parks (in green) comparing to the rest of the capitals (Figure 2).

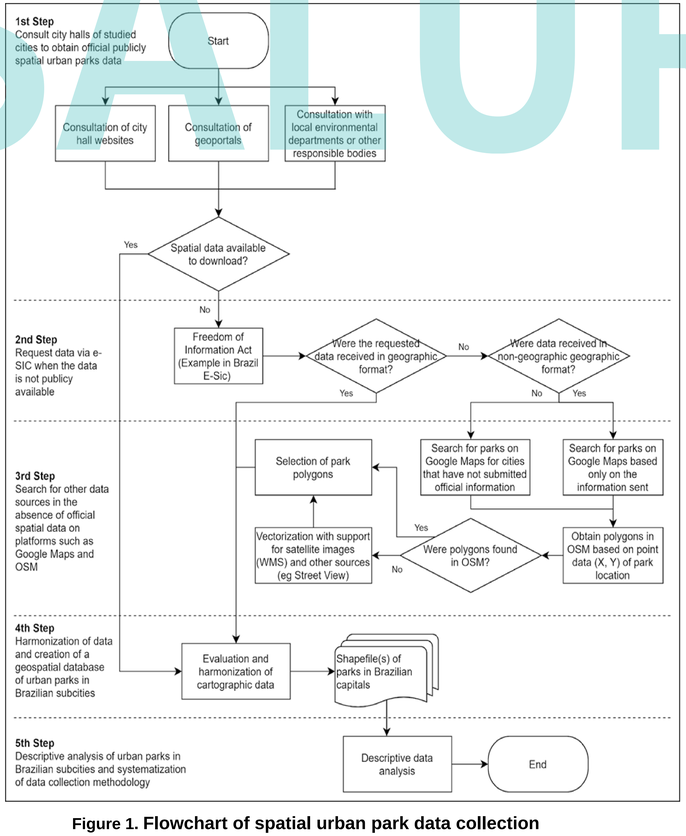

Figure 1. Flowchart of spatial urban park data collection

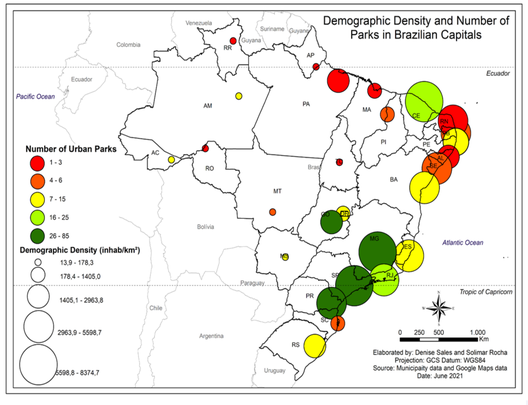

Figure 2. Number of urban parks and demographic density of Brazilian capitals.

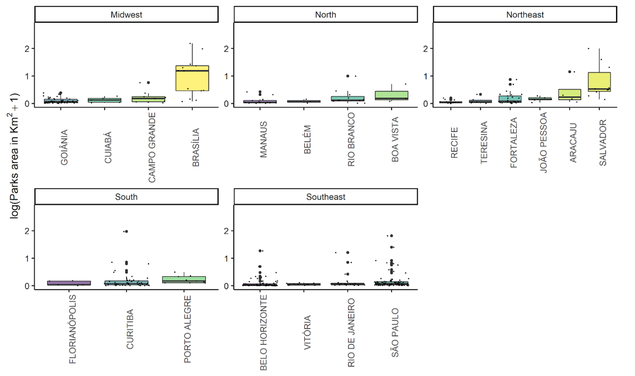

Figure 3. Distribution of park areas by regions and capitals in Brazil

CONCLUSION

This study has provided a meticulous methodology to access, collect, validate and harmonize urban park spatial data in Brazilian capitals. Standardized steps to guide this process were elaborated including the verification of discrepancies between available official data and collected data from OSM and Google maps. Differences from official and validated sources can be explained by the lack of official data availability, responsiveness of public body of and accuracy.

Creating mechanisms that can access, collect, validate and harmonize urban park data are essential for studies addressing population health burdens and inequalities and foster more policies that take into consideration the importance of parks in urban areas.

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