"Science Stays True Here"
Advances in Ecological and Environmental Research, 17-24 | Science Signpost Publishing

Urban Ecology as a Tool for Analysis of the Urban Free Spaces System

Maria Elisa Marangoni Feghali

Architect, Urban and Landscape Designer. PhD in Urbanism-PROURB/UFRJ – Adjunct Professor at School of Fine Arts, leader of the Laboratory of Creation and Analysis of Ambiences LabCA - Federal University of Rio de Janeiro, Av. Pedro Calmon, 550, Cidade Universitaria.

Received: October 01, 2017 / Accepted: November 10, 2017 / Published: January 25, 2018

Abstract: The systems of free areas refer, within the concepts of Urban Ecology, to the relations of connectivity and complementarily, considering the environment, circulation, urban drainage, leisure, imaginary, memory and social life of urban spaces free of public or private buildings, planned or not. (LEITE, 2011; FORMAN, 1997; AHENDT, 2004; AHERN, 1995; FEGHALI, 2005).

For environmental and landscape studies, the concept of connectivity includes a set of possibilities regarding the connection of cultural and environmental values and contributes to new possibilities for planning of cities considering the challenges of sustainable urban development. In this work, we present a proposal of analysis of the potentialities of the use of a free urban area located in the Jardim Botânico neighborhood, in the South Zone of the city of Rio de Janeiro (Brazil), through the expanded analysis of the free area system as a part of the neighborhood object of this study.

The work was organized considering the definition of the area to be studied and the selection of the areas to compose the system of free areas (studied), connectivity analysis and covered area (local, urban, territorial) of the studied areas, survey of use and hierarchy of accessibility between public, private and transitional areas of free spaces, hydrographic, wind and vegetation analysis in the scope of the study and consultation of users regarding the perception of negative and positive aspects of the region, as well as potential future use of intervention in the field. The urban afforestation and the connection of the green corridors, as well as the rainwater management, were considered as relevant issues to compose guidelines of actions for the area under study.

The expanded analysis of the system of free areas, covering biophysical, urban and cultural aspects, based on the concepts of Urban Ecology, allowed us to determine the main characteristics to be considered in the intervention project of the studied area.

Key words: urban ecology, landscape, system of free areas

Corresponding author: Maria Elisa Marangoni Feghali, Architect, Urban and Landscape Designer. PhD in Urbanism-PROURB/UFRJ – Adjunct Professor at School of Fine Arts, leader of the Laboratory of Creation and Analysis of Ambiences LabCA - Federal University of Rio de Janeiro, Av. Pedro Calmon, 550, Cidade Universitaria.

1. Introduction

Among the concepts of Urban Ecology, Connectivity is an important concept to be understood and reinterpreted within the scope of landscape planning and analysis, with a particular focus on design strategies.

At the territorial scale, intervention in the landscape is transdisciplinary in which the interaction of technical teams with the different actors can integrate the overall complexity of the natural and cultural system, through the application of concepts based on ecological, cultural and socioeconomic variables. We understand that the compatibility of natural and cultural systems will play the role of formatting ecological structures consistent with urban networks and infrastructures, with agricultural, forestry and other indispensable resources for the life of human communities. (MCHARG, 2000; CHACEL, 2001)

Such a view of the landscape performance on the territory scale differs from the simplistic way in which the territory used to be treated as the sum of independent spaces, such as boroughs or neighborhoods, regions, properties, agricultural plots, among others, in which efforts were made to address sectoral objectives,functional and economic, short-term.

A broader spatial and temporal view of areas of intervention in expanded territories, and an approximation of the elements involved in the rational and sustainable use of natural and cultural resources which can contribute to a harmonious flow of useful activities to human life. (TARDIN, 2008).

This bias of thought is supported by the ecological landscape that has taken shape in the last decades bringing a set of principles applicable to planning, especially at the territorial scale, in the different landscape patterns: from urban areas, to agricultural, forestry and others, in natural or anthropogenic areas.

The main characteristics of principles of landscape ecology are the structure, function and transformation. The structure is linked to its spatial pattern, the function to flows materialized on the structure, which can be of people, animals, water, wind, energy and others, and transformation is the dynamics in spatial pattern and function over time.

Formam (1997) recognizes that the planet, continents, regions or landscape make up a heterogeneous spatial mosaic; thus, the ecological and human processes are also spatially differentiated. For the author, even more important than the recognition of this heterogeneity is to maintain the stability of the mosaic to understand the role of these setting spaces. In this way, the juxtapositions, adjacencies and connections of spatial units have multiple effects on the system, including regulating their processes.

Thus, the concept of connectivity reinterpreted from Ecology of Landscape opens new possibilities in environmental studies and the integration between biodiversity and environmental values and cultural activities. The connectivity, in the most varied forms - by vegetation, networks and other - linearly - corridors

- or in spots, poses itself as one of the possibilities to be analysed, evaluating andbiodiversity, especially on the urban scale. (AHENDT, 2004, AHERN,1995)

In Brazil, Costa and Pellegrino (2010) point to the importance of the implantation of landscape projects in which form is not the only variable, but in which the environmental and cultural dimensions of the landscape play a relevant role without which one can not construct significant landscape projects.

Issues such as drainage, ecology and urban mobility, community participation and others are key to advancing the solution of environmental and social problems in cities, contributing to the role and importance of open spaces - both natural or landscaping treated - not as a luxury, or as negative spaces, as characterized by Ashihara (1982), but as important spaces in the construction of a cultural identity able to provide leisure and well-being to the entire urban sectors and to provide sustainable urban development.

2. Botanical Garden Borough

The neighborhood, object of study, denominated Botanical Garden borough takes this name because it is the location of the Botanical Garden of Rio de Janeiro, a scientific institution created in 1808 after the arrival of Don João VI, then the King of Portugal, to Brazil.

There is a significant amount of vegetation, due to the existence of a major urban park (Parque Lage) in the neighborhood, as a result of the neighborhood housing, Parque Lage, the historical Botanical Garden of Rio de Janeiro, which gave the name to the neighborhood, and part of the largest urban forest in the world - Tijuca Forest. All these factors give the neighborhood a degree of vegetation rare considering the urban environment.(Fig. 1and figure 2).

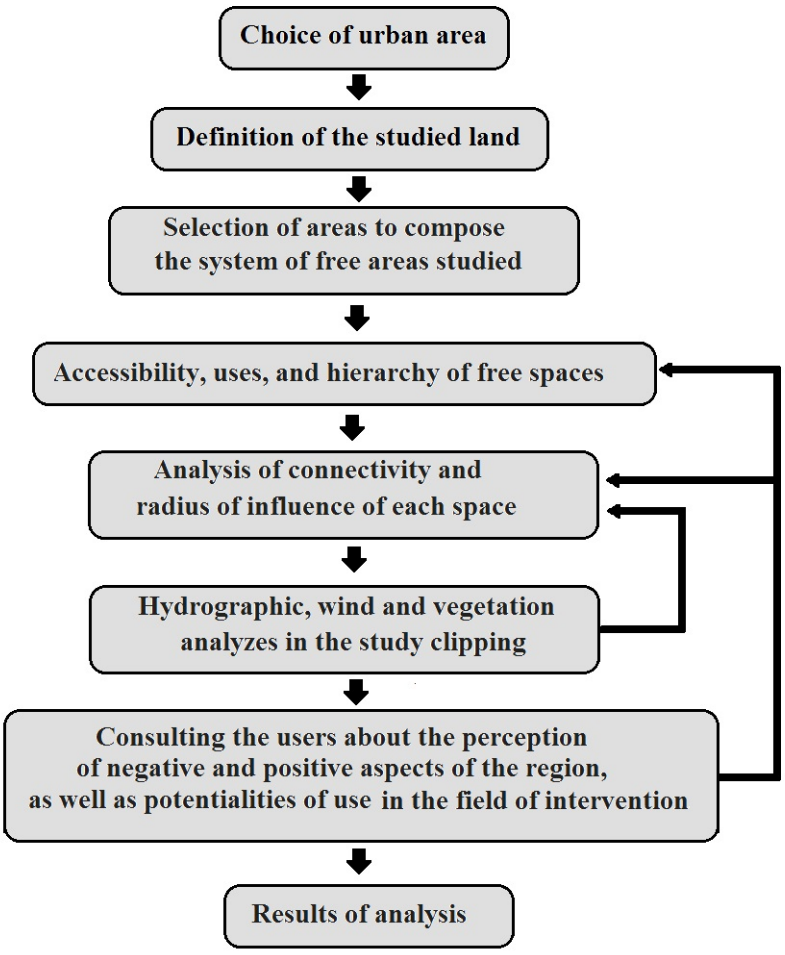
The expanded analysis of Jardim Botânico borough system of free areas, covering biophysical, urban and cultural aspects, based on the concepts of Urban Ecology, allowed us to determine the main characteristics to be considered in the intervention project of the studied area, as we shall see below.

Figure 1: neighborhood views: Tijuca forest (above). Figure 2: Rodrigo de Freitas Lagoon (below). Author's acquisition.

3. Methodology

The work was organized considering the definition of the area to be studied and the selection of the areas to compose the system of free spaces, connectivity analysis and covered area (local, urban, territorial) of the studied areas, survey of use and hierarchy of accessibility between public, private and transitional areas of free spaces (fig.3), hydrographic, wind and vegetation analysis in the scope of the study (fig.4) and consultation of users regarding the perception of negative and positive aspects of the region, as well as potential future use of intervention in the field (fig.5). The urban afforestation and the connection of the green corridors, as well as the rainwater management, were considered as relevant issues to compose guidelines of actions for the area under study.

Below, a chart detailing the steps of the methodology, allowing the visualization of the relationships between the elements analyzed.



4. Results

Figure 3: location of the land (left) and connectivity and radius of coverage of the free areas (right). Author's intervention on google maps.

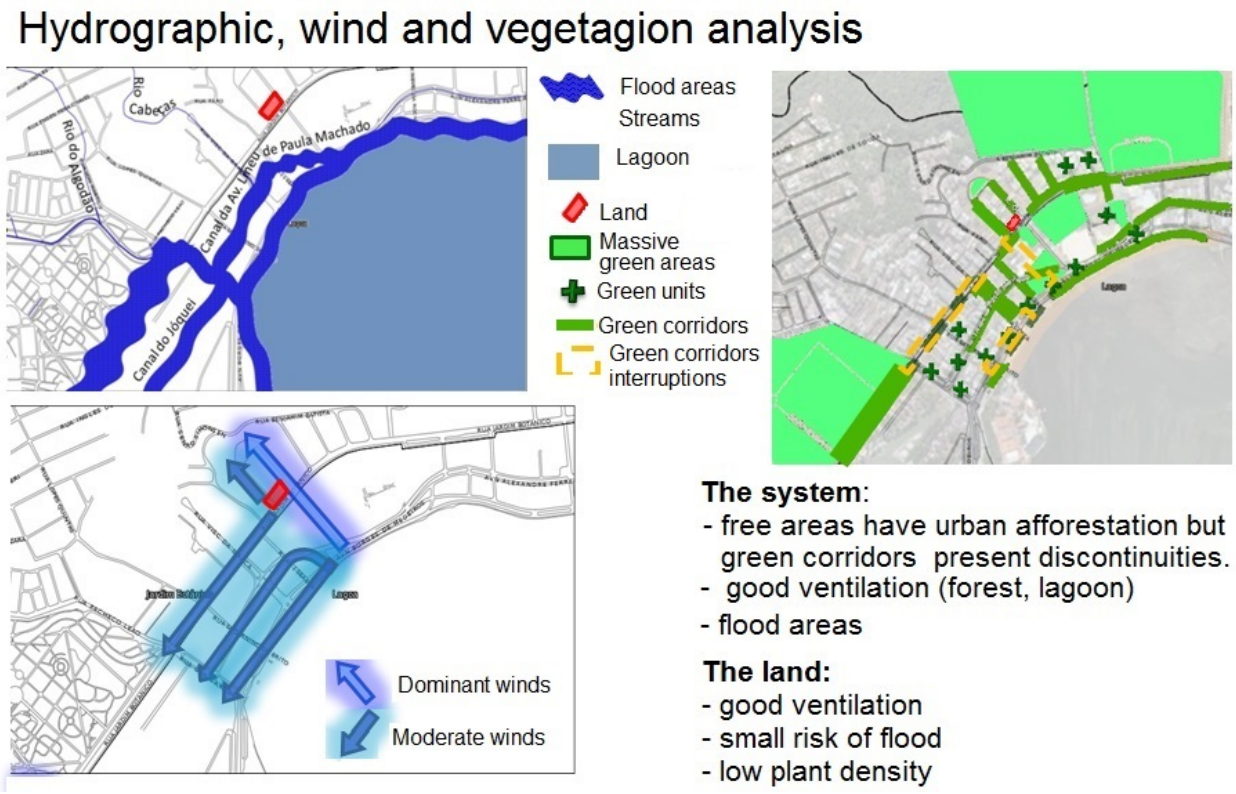


Figure 4: dynamic hydro and wind (left), vegetation map (right). Author's intervention on google maps.

At this phase, we recognize the importance to add people of the studied area community as one of the components of analysis. For this purpose, we used open questionnaires and filtering of more frequent words used by the respondents as evidence of strengths and weaknesses of the urban area under study. These results, when analyzed in combination with yhe aspects demonstrated in the maps, fig 3 and 4, indicated the potentialities of the terrain project in focus. A group of seventy respondents were randomly selected in different places and times. We used wordle.net program to rank the most frequent questions that appeared as response, as we will see in the sequence:

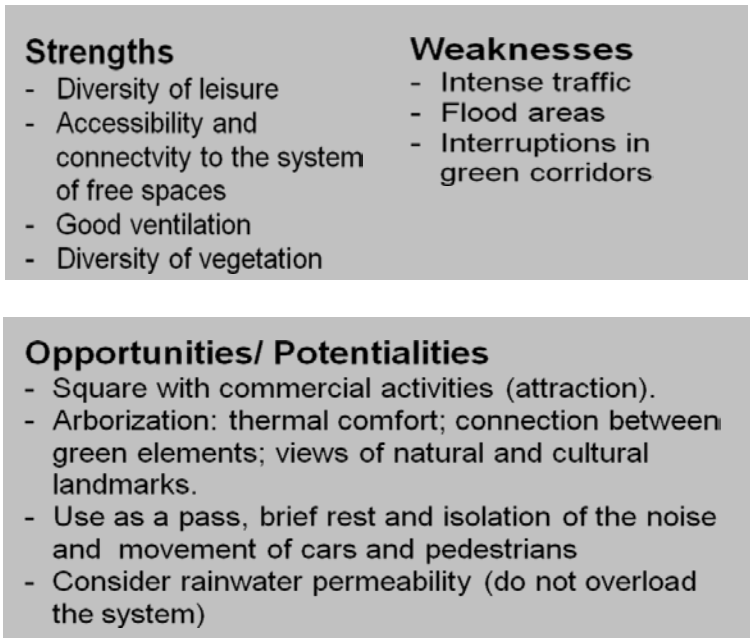


Figure 5: strengths, weaknesses and potencialities.

5. Conclusion

The expanded analysis of the system of free areas –covering biophysical, urban and cultural aspects (Urban Ecology), allowed the determination of priority characteristics to be considered in an intervention project of the field of study, to develop landscape intervention projects based on the potential revealed by the presented analysis. This research was developed in 2014. After its conclusion, the land was destined to a commercial enterprise.

Acknowledgements

Thanks for the collaboration of the students Mônica Costa and Heloiza Pereira in field research and professors Marcos Feghali and Marco Marangoni for reviewing this paper.

References

[1]. AHERN, J. **Greenways as a Planning Strategy**. *Landscape and Urban Planning*, n. 33, pp. 131-135, 1995.

[2]. AHENDT, R. **Linked Landscape: creating greenways corredors through conservation division design strategies in the northeastern and central United States**. *Landscape and Urban Planning* 68, p. 241-269.

[3]. AMAJB. Associação de Moradores do Jardim Botânico. http://www.amajb.org.br/historia-do-bairro-2/

[4]. ASHIRARA, I.El diseñõ de espacios exteriors. Barcelona:Gustavo Gilli, 1982.

[5]. COSTA e PELLEGRINO in FARAH,I; SCHLEE,M; TARDIN,R. **Arquitetura Paisagística Contemporânea**. São Paulo, Editora SENAC, 2010,P216-227.

[6]. CHACEL, F.**Paisagismo e Ecogenese**. Rio de Janeiro, Fraiha, 2001.

[7]. FEGHALI,Maria Elisa. **Morfologia Ambiental uma Perspectiva para o Projeto Paisagistico.** Dissertacao de mestrado.PROARQ- Universidade Federal do Rio de Janeiro, 2005.

[8]. FORMAN, Richard. **Landmosaics: The Ecology of Landscapes and Regions.** *Cambridge University Press*, 1997.

[9]. LEITE, Maria Angela Faggin Pereira. **Um Sistema de Espaços Livres para São Paulo**. *Estudos Avançados* [online], vol.25, n.71, pp. 159-174, 2011.

[10]. MC HARG,I.**Projectar com La naturaleza**. Barcelona, Gustavo Gilli S.A, 2000.

[11]. Portal GeoRio.: http://portalgeo.rio.rj.gov.br/armazenzinho/web/BairrosCariocas/main_bairro.asp?area=028

[12]. TARDIN, R.**Espaços Livres Sistemas e Projeto Territorial**. Rio de Janeiro, Sete Letras, 2008.