The Open Spaces Systems in Santa Cruz, Rio de Janeiro

E Nogueira¹, D Almeida¹, A Silva¹
¹Universidade Federal do Rio de Janeiro

E-mail: elizabethsabarreto@gmail.com, athias.arquitetura@gmail.com, andressaivo@yahoo.com.br.

Abstract. This paper is presenting the results of conceptual reflections and methodological studies based on the theoretical scope that guided the Landscape Architecture course of the Graduate Course in Architecture, Faculty of Architecture and Urbanism. Whose focus of analysis and research guides the study of the urban landscape considering the relations between its public spaces, uses and morphological aspect. It presents the transformations of the landscape in the region of Santa Cruz. Santa Cruz, despite being one of the most populous neighborhoods, retains little housing density due to its large dimension. The region is a complex system of residual open spaces, large housing complexes, an important industrial zone, cluster areas under military control, and discontinuous land strips separated by heavy road boundaries. The neighborhood of Paciência was the focus of this investigation, in order to observe the context of the public spaces in the regional scope, Paciência and Santa Cruz are the neighborhood in the center of our debate. The methodology consists in the apprehension of a theoretical foundation to define concepts of Territory, Landscape and open spaces systems that are developed during the course. The use of research methods makes it possible to determine its urban evolution and landscape transformation. Also it’s possible to understand urban expansion. From these study it is possible to identify important elements for local history and identity, as well as to better understand the dynamics that govern the occupation of the public spaces and how the remaining open spaces are being used by the local population.

1. Introduction
How can we measure the urban/landscape transformation of the landscape? How to understand, and to theorize about the recovery possibilities of the local identity and it structuring elements? How can we understand the sensitive relation between residents and the location? How can these relationships reflect the occupation of the public spaces?

Considering the above questions, we define the conceptual matrix that will indicate the approaches that will be performed in this article, against the background of an analytical study of a territorial portion of the Santa Cruz, Paciência and Sepetiba neighborhoods, in the suburban region of Rio de Janeiro. Part of this work is an offshoot of the investigations carried out in the theoretical-conceptual plane and in situ in the chosen region, which was the focus of discussion of the Landscape Architecture discipline. Our focal study reveals an urban-landscape complexity that defines the region, being considered a outskirts zone that concentrates industrial activities, a hybrid pattern with slums and low-income communities and relevant disconnected urban areas. There is also an expressive urban pattern formed by former seaside resorts, government buildings, residential areas connected directly with the railway expansion.
During the field visits, temporal aspects of the landscape guided our analysis among the material acquired from the SEL-RJ Research Group database.

The Morphological, and the functional aspects guided our research through dichotomies in the spatial configurations of the area defined by coastal plains and low coastal massifs, vast areas of estuary near Sepetiba Bay comprising a fragmented and urban occupation, which is an obstacle to the structuring of public policies contemplating both social and environmental problems.

As a theoretical framework to support the analysis and understanding of open spaces, the discussion was referenced in works by Mônica Bahia Schlee et al. (2009), Milton Santos (2008), Miranda Magnoli, (2006), Silva et al. (2013) and Souza (2015). We worked with the definition of Monica Bahia Schlee for Territory in our analysis. The researcher points out that it is a social construction that manifests itself on a physical basis through individual and collective appropriations, also the other author contributes to address central issues such as landscape, the environment and the very idea of free space system.

Particularly in the work of Monica Bahia Schlee there is a distinction in the construction of the concept of Territory that is very useful for our analysis. The researcher points out that it is a social construction that manifests itself on a physical basis through individual and collective appropriations, also the the in the other authors also referenced that help to address central issues such as landscape, the environment and the concept of open space.

As a result of our discussions, we defined the area in three separated landscape units departed from the common elements, and a homogeneous contiguous area. The limits of the landscape units are similar with the boundaries of the existent neighborhoods of Santa Cruz, Paciência and Sepetiba. We studied the landscape unit of Paciência, due to its distinct aspects stands out among the three neighborhoods.

The main difference among those areas is that the landscape unit of Paciência, is very homogeneous urban structure, predominantly residential and continuous, contrasting with the larger context of AP5 - Planning Area 5, where the discontinuity and heterogeneity of urban spots are the rule. We detected in our analysis that the train line was a factor in the development of the region. The train station and the Bus Rapid Transit line articulate the spaces. The existing biophysical support is comprised of plains, small hills, rivers, and wetlands.

According to the authors, the Planning Area of Santa Cruz was transformed in both socio-spatial, economic, and cultural, not to say, political context. The dynamic change of a commercial hub and Royal Family farm along the imperial Rio de Janeiro to currently being considered “assisted growth zone” by Rio’s Master Plan.

This research presents local contradictions and complexities increase due to the latter dramatic changes recently, being a mosaic of residential, industrial, social housing.

2. Objectives
The main objectives are: to analyze the open space systems at the regional and local levels –Paciência neighborhood–; obtain a range of information as a basis for investigations at different scales; use the methodology presented for the exploration of an area of the city constantly neglected by both the state and academic studies

3. Methodology
The analysis methodology was divided into three stages: 1) Exploratory visit to the study site; 2) Morphological-type analysis of landscape and free space system at urban scale; 3) Establishment of local scale morphological evaluation criteria in each landscape unit.

The first stage was performed in two groups of territorial analysis: Mapping of Flows (urban mobility) and Fixed (relevant equipment that conforms the territory), according to data from the SEL-RJ research group base.

In the second stage, the morphological-type analysis of the landscape and the open space system in the urban scale was made according to the following themes: processes of morphological constitution
and landscape transformation; physical support: relief, hydrography x vegetation cover; occupation vectors: economic activities and flows; urban sprawl evolution: occupation patterns and constructive types; transformation plans, laws and agents: milestones of the occupation process; thematic mapping over the territory; conservation and environmental preservation units; public open spaces: squares, parks, boardwalks, waterfronts, beaches; private open spaces, real estate market profile, occupation patterns and types of urban fabric and impacts of public investment and large projects.

The last stage concludes with the definition of three Landscape Units: Santa Cruz, Sepetiba and Paciência. The third, the most homogeneous of the three, was chosen for further analysis of the local scale. A synthesis table was proposed, which identifies its characteristics according to the categories of analysis: landscape design, morphological structure, socio-environmental conflicts, and occupation patterns. As a result, we also obtained a thematic map, schematic cuts, and critical discussions about the reading of landscape units.

4. Results and Analysis
Considering the analysis about the landscape units, it is possible to dimension the urban and landscape dynamics of the region.

From these analyses, all the logic three landscape units were highlighted, and the information was organized in standard table, evaluating the flows and circulation (People, Goods and Products) and Occupation and use of public spaces of the region.

This analysis presents problems and specificities due to urban-landscape qualities related to historical heritage, and identity issues.

4.1. Maps of morphological analysis
4.2. Consolidation process
Physical support: relief, hydrography x vegetation cover. The physical support map shows the geomorphological configurations of the place of study. Based on the data survey, it was identified that its territory is abundantly irrigated with rectified rivers and channels, due to the proximity of the region with Sepetiba Bay. Some prominent elevations were identified in the east/southeast part of the map. Plant compositions, such as ground cover and dense tree cover, have also been recognized for a better understanding of space. The identification of these elements is relevant, because besides defining the landscape, they can be interpreted as physical barriers that generate a discontinuity of the urban fabric.

4.3. Urban evolution map: Patterns of occupation
This map presents the urban evolution among the years, revealing the historical process that shaped the territory, demonstrating the main landmarks of the area.

4.4. Plans, laws and transforming process: landmarks in occupation process
Santa Cruz is a very prominent industrial zone, one of the most important factories is the CSA - Companhia Siderurgica Atlantica) also with important institutions, such as the military base of Santa Cruz, The Aircraft Base of Santa Cruz. These areas characterize Santa Cruz in a very strong mobility hub and commercial zone.

Some of the investment promoted in the area are the BRT (Bus Rapid Transit), and in some way the metropolitan arch and Itaguaí Port, both are in the surrounding area, but are closely related to neighbourhood.

Another great component of the area is the social housing complex such as Minha Casa Minha Vida (Low cost housing projects from the Brazilian government), but also Bairro maravilha (requalification of the existing neighbourhood, improving the accessibility, and general infrastructure).

4.5. Mapping the open spaces of the territory
The research Group SEL-RJ provided most of the data, they aim to understand the general use and occupation of the open spaces within the area, and also to comprehend the impact of the construction of this larger project such as the BRT and Arco Metropolitano.

4.6. Conservation Units and Preservation Areas
This study also observes the vegetation cover and green areas in the region, and due to the intense urbanization process, that wasn't followed with responsible planning, the green mass occupy only the
borders of the territory, being related to the mangrove of Sepetiba bay, and also some remaining of the vegetation of the surrounding hills.

4.7. Open Public Places: Squares, parks, pedestrian streets, waterfront sidewalks, beaches, and others
This mapping serves to identify the amount of free space in within the region. The open spaces draw a historical pattern, besides allowing a reading of the territory regarding its uses and occupations. The fact that few spaces have been found, mostly squares, demonstrates, among other factors, that there are few opportunities for human actions and manifestations with biophysical and cultural diversity.

4.8. Landscape Units
The division of the study area into units and subunits, together with the elaboration of the table with scales and evaluation patterns, allows a characterization of the spaces and apprehension of a part of the territory, so that we can promote general understanding. Thus, the subdivision of the territory into defined parts allows to understand each of its parts and the interrelationship with the entire region. To separate the territory into landscape units, the main criteria used was land use and occupation. The occupation density spots in the urban fabric were identified, as well as the different uses, grouped by similarity, to determine a landscape unit.

Thus, 5 landscape units were defined: 1) Avenida Brasil, expansion and development area; 2) Urbanized area, centralities; 3) Predominant green, permanent protection area (APP), hills; 4) Dominical area, edge, mangrove; 5) Industrial area (Figure 3). Being chosen area 2, for concentrating most of the urbanized area. Within this Landscape Unit, other Landscape Subunits were also compartmentalized, defined using the local commercial hubs as criteria. Thus, around each region, a landscape subunit corresponding to a neighborhood was defined: 2.1) Paciência; 2.2) Santa Cruz; 2.3) Sepetiba. The study focused on the landscape subunit 2.1.

Figure 2. Landscape Units.

In order to analyze the Landscape Subunit, the methodology used provided a framework to be fulfilled regarding the morphological evaluation criteria, taking into consideration the landscape design, the morphological structure, the socio-environmental conflicts and the occupation patterns.

For each of these analyses a map was prepared to graphically present the data collected for each region.
### Table 1. Patterns of evaluation.

| Landscape | Morphological structure | Socio-environmental conflicts | Occupation standards |
|-----------|-------------------------|-------------------------------|----------------------|
| physical support, intervention = occupation | formal elements and processes = structuring | evaluation criteria = performance | aesthetics and appropriation = modeling |
| Paciência | Matrix with compact fabrics. Corridors composed of rail, BRT and highways. Presence of vegetation fragments and scattered irregular tissue | Environmental adequacy present in the mostly preserved margins. Environmental inadequacy present in piped and polluted rivers, occupation of banks and slums | Residential areas dictate typological model. Manufacturing areas along the BRT. Scattered institutional areas |
| Mostly regular horizontal spread. Centrality next to Paciência Station. L - hills, roads, railways, BRT, water | | | |

### 4.9. Subunit 2.1

![Maps of Subunit 2.1 analysis](image)

**Figure 3. Maps of Subunit 2.1 analysis**

### 5. Final Considerations

This analysis contributes to understand the process of occupation and development within the territory and, it is a powerful tool to help to provide to the local government an overview of the current situation of the public open spaces in the area.
With this kind of information, it is possible to promote new rules and laws of occupation, in order to provide a better environmental approach, also to mitigate the impact of the industry and also years of bad planning to the local community.

References
[1] IBGE (2011). IBGE: censo demográfico de 2010. Brasília: IBGE.
[2] Magnoli, M. M. (2006). Em busca de outros espaços livres de edificação. In Revista Paisagem e Ambiente – Ensaios. v.21. São Paulo: FAUUSP. p. 143-173.
[3] Santos, M. (2008). O espaço e a noção de totalidade. São Paulo: Edusp.
[4] Schlee, M. B.; Nunes, M. (2009). in J.; Rego, A. Q.; Rheingantz, P. A.; Dias, M. Â.; Tângari, V. R. Sistema de espaços livres nas cidades brasileiras – um debate conceitual. In Revista Paisagem e Ambiente: ensaios, v. 26, São Paulo: Fau-Usp, 2009. p. 225-247.
[5] Silva et al. Unidades de paisagem e o processo de compreensão da forma urbana. In Paisagem e Ambiente: ensaios - v.31. São Paulo: Fau-Usp, 2013, p. 61-80.
[6] Souza, M. (2015). Os conceitos fundamentais da pesquisa sócio-espacial. Rio de Janeiro: Bertrand.