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**THE URBAN LANDSCAPE OF THE NORTHERN ZONE OF RIO DE JANEIRO:
A MORPHOLOGICAL STUDY**

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ABSTRACT:

This paper aims to contribute to the landscape morphology analysis as an experimental research field, by proposing a methodological framework, developed for a doctoral thesis research, presented at the University of São Paulo.

In the research work, the framework was implemented in the suburban neighborhoods located along the railroad lines in the north zone of Rio de Janeiro. The morphological analysis enabled us to understand the existing urban settlement patterns which are established by geomorphology conditions, urban design trends, built environment aspects and cultural attributes. Since we believe urban landscape is formed by a composed network of different urban tissue patterns, we need to study how this network is related to natural environment constraints and urban design concepts, reflected by different socio-cultural profiles.

Known by a large public, the official landscape of Rio de Janeiro corresponds to areas, which attract more touristic activities and have received larger public and private investments overtime than other parts of the city. However, the urban territory is also structured through less known regions, such as the north zone, which concentrates population but have not received a proportional amount of resources and infrastructure facilities.

The selection of this specific urban landscape case helped us understand this territory constitution process and its diverse urban occupation and design patterns. In this way, the paper describes the analytic criteria proposed to this kind of study, including: the urban occupation evolution; the urban morphological types and the landscape transformation trends.

Key-words: urban landscape, urban morphology, Rio de Janeiro

INTRODUCTION

Based upon the premise which considers the urban landscape as a social construction over a geographic territory, shaped by social, political, economical and technological processes, the methodological framework described in this paper includes categories which may respond to this complex set.

From the territorial point of view, the physical aspects are conditioned by the natural environment. From the social point of view, the cultural aspects are conditioned by the economical and functional profiles characterized by ideological trends.

In this way, the analytical basis proposed here was developed through the understanding of the existing relationship between society and territory and was divided in:

- urban landscape design: refers to the built environment characterization, as a result from the interaction between built and non-built environments;

- urban landscape morphology: analyses the constitution of urban models and related elements;

- urban landscape aesthetics: studies the built environment evolution over time studied through morphological types;

- urban landscape environment: evaluates the qualitative issues which come out from the confrontation between the built and the non-built environments;

- urban landscape transformation: describes the urban landscape changing processes by considering the relations between formal, functional and communication flows which define the urban space.

These categories are integrated phenomena applied to landscape morphology analysis and they help understand the complex interactions which define the urban spaces as described further on.

1. THE URBAN LANDSCAPE DESIGN

In order to understand the urban landscape environment, we need to get in touch with both physical and cultural aspects. In Rio de Janeiro, the natural environment presents expressive topographic conditions and the maritime landscape, delineating the different regions which form the urban territory.

The **central area** is situated between the Guanabara Bay, the Maciço da Tijuca and the Copacabana and Botafogo Hills. It is settled over valleys, wetlands, narrow plains, landfilled areas and hills.

The coastal line neighborhoods in the **south zone** are located over narrow plains close to the ocean, and are separated from each other through expressive hills: Sugar Loaf, Pedra da Urca and Morro dos Cabritos. The interior neighborhoods stand between Serra da Carioca and Lagoa Rodrigo de Freitas (Jardim Botânico, Gávea and Humaitá) or between Botafogo and Flamengo Beaches and Corcovado Hill (Laranjeiras, Flamengo and Catete).

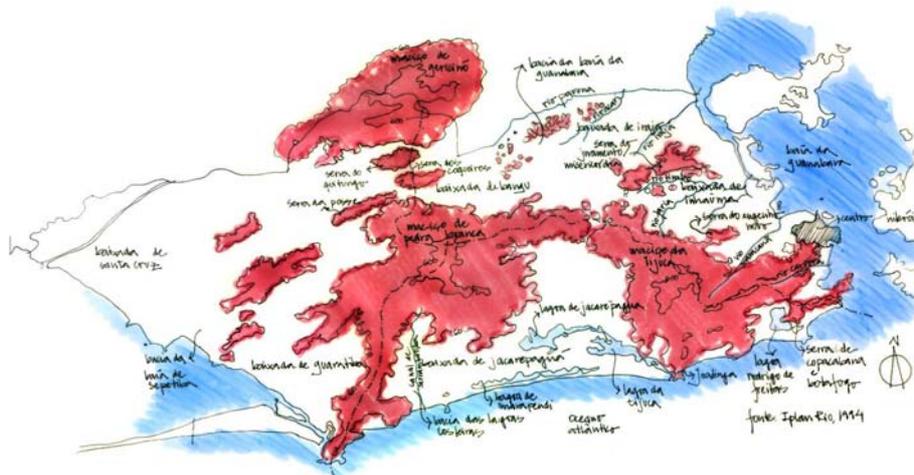


Figure 1 – Schematic map of central and south zone regions

The neighborhoods which belong to the **north zone** are settled on the extensive Baixada de Inhaúma plain, located between the Guanabara Bay and the Maciço da Tijuca. They are delineated by smooth hills, such as Serra da Misericórdia, Serra do Engenho Novo and Serra dos Pretos Forros.

Presenting intensive land occupation rates, the dense and low rise urban fabric is concentrated along the railway and high way routes, surrounded by hills, which act as a barrier to the winds coming from the ocean, resulting in warmer and drier weather patterns. The low incidence of open and green spaces contribute to a critical climatic condition shaping an arid landscape.

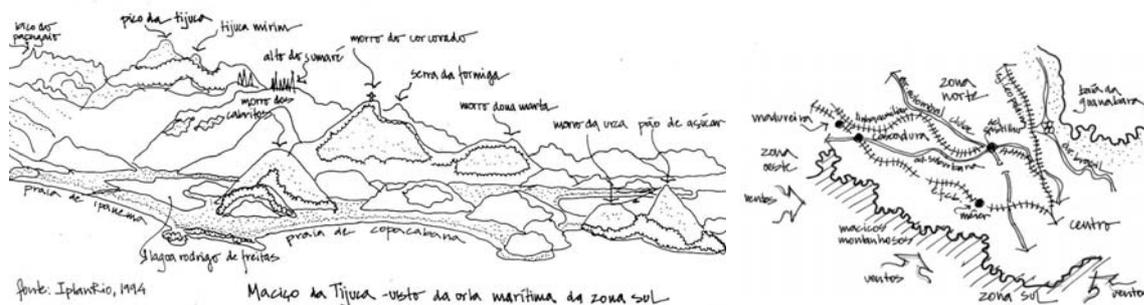


Figure 2 – The Maciço da Tijuca as a wind barrier factor



Figure 3 – The north zone suburban neighborhoods general overview
Photo: Marcos London, 1999- PUZN Archives

The west zone is formed by the Jacarepaguá, Guaratiba and Santa Cruz plains, and is separated by the other urban sectors by the Maciços da Pedra Branca and Tijuca.

The Baixada de Jacarepaguá, where Barra da Tijuca, Recreio dos Bandeirantes and Jacarepaguá neighborhoods are located, displays large plains, sand composed lands and several channels and lagoons. It forms a differentiated natural environment ecosystem characterized by the flat areas dimension and the high incidence of water surfaces.

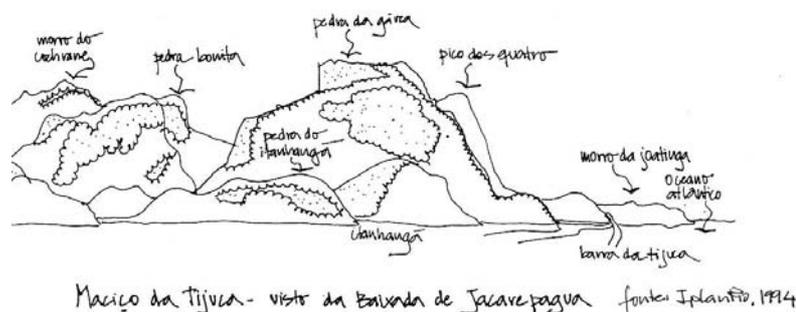


Figure 4 – The Maciço da Pedra Branca and Baixada de Jacarepaguá

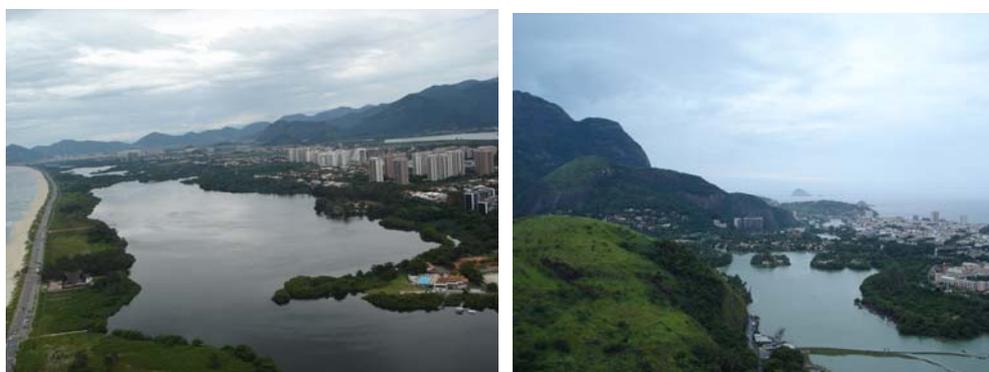


Figure 5 - Marapendi and Tijuca Lagoons
Photos: Vera Tângari, 2007 – SEL-RJ Archives

Along with the peculiar natural environment of Rio de Janeiro, the urbanistic and building legislation codes perform an important role in land use and occupation patterns as related to the landscape design. In this way, we have to consider the legal parameters set for both built and non-built spaces distribution, location and conception, which resulted from the application of consolidated models.

The composition of the built and non-built environments in Rio has been strongly conditioned by the urbanistic legislation which, when defining the volumetric character of the built spaces, has a direct influence on the non-built ones (Cardeman & Cardeman, 2004).

The land parcelling, land occupation and construction parameters are defined by the public sector and shape specific patterns for the different portions of the city, and may indicate the land values distribution over the urban territory. Among these parameters, the land parcelling and property systems induce the urban lots utilization alternatives and the consequent street, block and building types.

Since 1992, for planning purposes, the city was divided in Planing Areas and Administrative Regions, according to the geo-morphological, social, economical and cultural conditions, enabling a better understanding of the complexity of the urban territory through a stratified data-base.

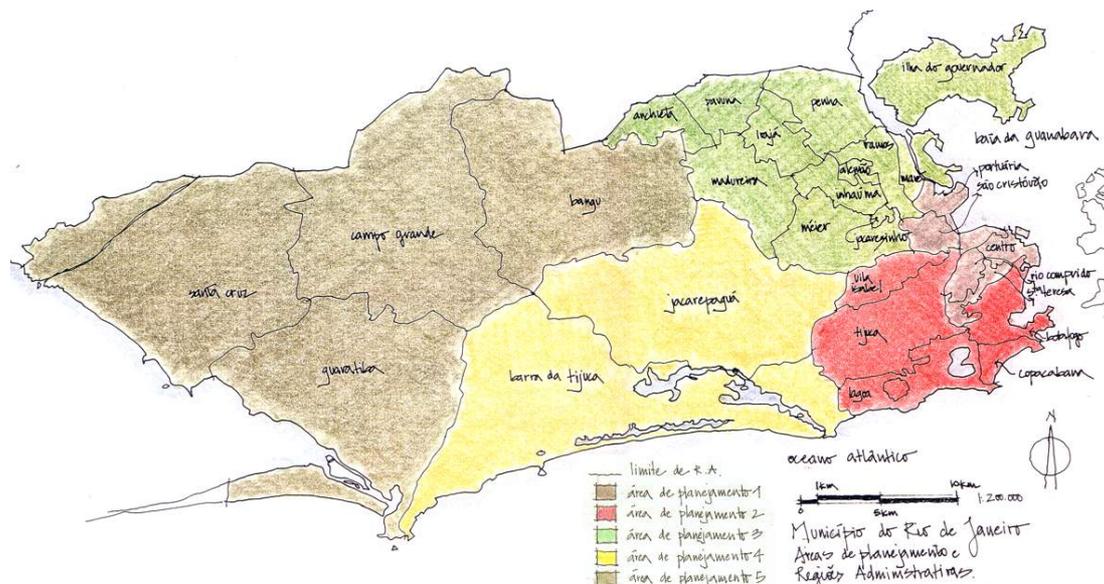


Figure 6 – Administrative and planning divisions

The Planning Area-3 (AP-3) corresponds to the **north zone** of the city, our case-study area, and presents the larger population concentration and the higher building density. The available flat portions of land were completely parcelled and the hills, occupied by several slums. The land parcelling process, which resulted from the subdivision of old rural farms during the XIXth and the beginning of the XXth centuries, was intensified by the implementation of railway and highway systems and directed to the medium income social groups (industry and administrative workers).

2. THE URBAN LANDSCAPE MORPHOLOGY

2.1. Historical urban fabric models

In historical terms, the Rio de Janeiro urban fabric was shaped by diverse occupation models, composing a set of specific morphological configurations which reflect, in one hand, expressive natural aspects and, in the other hand, urban design ideological trends. Based on the analysis made by Barnett, we may identify five urban design models in the different parts of Rio (Barnett, 1986):

I. the portuguese city colonial model: central area, its surroundings and the old sectors of the southern and northern zones;

II. the french city barroque and eclectic models: some sectors of the central area, such as along the Presidente Vargas and Rio Branco Avenues and around Cruz Vermelha Square;

III. the english city garden-city model: recent neighborhoods, such as Ilha do Governador and Urca, in some residential districts in the southern neighborhoods (Botafogo and Laranjeiras) and in the northern ones (Tijuca and Grajaú);

IV. the french/american neoclassical high-rise building model: central area, Flamengo, Copacabana and some parts of the northern zone (Tijuca),

V. the utopic modernist city model, applied in the expansion areas and recent neighborhoods located on the west zone.

By comparing these models we may observe the different building densities and types. These urban design models may be evaluated according to their morphological profile, studied in several scales and dimensions. They are a result from external cultural references which were reflected and reproduced in the country as a whole and in the different parts of the city, and were adjusted in order to fit local conditions. Some peculiar urban morphological types emerge from this process, as will be presented below.



Figure 7 – Urban fabrics of the Central Area and the Copacabana and Barra da Tijuca neighborhoods
Photo: Marcos London and Silvio Macedo, 1999- PUZN Archives

2.2. Morphological elements: the open spaces system

The urban landscape morphological elements are composed by the conjugation of the built and non-built environments and its related elements (Menneh, 1997). The association of open spaces and the buildings shapes the distribution, the location and the permeability of the last ones, being conditioned by its scale and hierarchy as related to the urban design and planning characteristics (Magnoli, 1986; Macedo, 1986; Ashihara, 1982)

As a result from the building design and regulation decisions, the open spaces system includes differentiated types, from the traditional ones, such as the streets and the squares, to the less conventional ones, such as the beaches, the alleys, the parks, the natural reserves, the condominium leisure areas, the clubs, among others. The historical influences, as already discussed, helped to define the urban landscape configurations of the city and its related elements.

In Rio de Janeiro, since the colonial times, there were codes to rule the relationship between the private and the public spaces. Coming from the portuguese tradition, according to Nestor Goulart dos Reis, these rules remained unaltered until the second half of the XIXth century, and respond to the general ambiance of the central area and surroundings (Reis, 1976).

The modernization trends, from the second half of the XIXth century on, caused the adoption of new influences, with the use of high-rise buildings and the neoclassical urban design. The boulevard and the park-way avenues are a good example of these cultural changes. The sum of european and american urban and architectural patterns along with the original portuguese colonial structure has resulted in an urban fabric made by elements from different times, presenting diverse building and open spaces types, as detailed below.

3. THE URBAN LANDSCAPE AESTHETIC- A TYPOLOGICAL SURVEY

The aesthetical analysis deals with the subjective values applied by society in the formal elaboration of the landscape, as expressed in architecture, among the most important elements. In this way, the architecture historical evolution dictates the aesthetical evolution of the urban landscape itself, since it is one of the most expressive cultural manifestations of the relationship between society and territory.

Several authors sought to distinguish the landscape aesthetical differentiation through the building processes used by society, such as Milton Santos, when defining the terms “natural landscape” and “artificial landscape” (Santos, s.d.) and Silvio Macedo, when explaining the environment changes over time (Macedo, 1993).

Macedo (1993) states that society applies to the settlements a landscape qualitative value, according to certain attributes: exceptionality, aesthetic, affectivity and symbolism. These depend upon the social cultural movements which are during the XXth century, according to the author, increasingly influenced by the mass communication media.

The urban aesthetical definitions are characterized by collective images being reproduced all over the city, since they mean, in a specific time periode, the “good” and the “beautiful” landscape, showing off the modernization waves which incorporate significant cultural changes, leaving behind traces of what was, in the past, contemporary and progressive.

These collective images reproduce architectural and landscape archetypes, whose understanding enables us to deepen the analysis of the urban form expression and to use this potential knowledge to seek for better sensibilization and experimentation of our cities. (Thiis-Evensen, 1987; Zucker, 1959; Rossi, 1995; Krier & Krier, 1979).

3.1. Patterns applied to urban blocks

In Rio de Janeiro, when we observe the more common urban block patterns, it is possible to conclude about the typical configurations of urban design solutions which characterize the city historical evolution (Reis, 1976; Vaz, 1994, Abreu, 1981):

- the portuguese colonial blocks, with one-store and two-store houses, from the XVIIth century to the second half of the XIXth century;

- the blocks occupied by urban farm houses, from the middle of the XIXth century on;

- the english garden-city blocks with two-store houses and three-store buildings, with eclectic and art-déco architectural styles, from the beginning of the XXth century on;

- the french neo-classical block with eclectic middle-rise buildings, from the beginning of the XXth century on;

- the french neo-classical block with high-rise buildings, from the middle of the XXth century on;

- the modernist super-blocks occupation, with isolated towers, from the middle of the XXth century on, spreading out the ideology of the neighborhood-unit.

3.2. Adaptation and reproduction: the general urban patterns and the northern zone neighborhoods

In this research, when we focused on the case-study area, we may conclude that there is a mixture of patterns which came from other parts of the city and were adapted in order to fit the local urban dynamics, more intensively regulated by the private sector, since the public investments were mostly led to the higher income neighborhoods (central area, southern zone and, recently, the western zone). This adaptation process is characterized by the need to attend both social and physical different environments.

In the neighborhoods surveyed for our research we could observe the urban development of the most important districts in the northern zone, divided in three historical phases, as related, according to Pechman, to: the the implementation of the railway lines and the decay of the agriculture activities, between 1870 e 1920; the intense commercialization of housing units for middle and low income dwellers from the beginning of the 1900's on, and the intensification of bus lines routes and commercial activities, from 1970 on, shaping a new real-state market activity in the area.



Figure 8 – A suburban common housing type: the “avenida”

4. THE URBAN LANDSCAPE ENVIRONMENT

4.1. Evaluation criteria

Along with the issues related to the design trends, the morphological types and the aesthetical values, the environmental quality plays an important role in the urban landscape analysis. In this paper, we propose to discuss it in terms of the built environment quality as related to the following attributes:

- the **aesthetical** quality, as observed in a visual context, resulting from the architectural, urban and landscape design patterns;
- the **social environment** quality, to be considered as a consequence of the cultural context, conditioned by the subjective values coming from different social groups, their needs and desires;
- the **natural environment** quality, as referred to the natural conditions of the territory, which incorporates the aesthetic and the social aspects along with the physical ones.

When we compare the distinct landscape patterns, we may evaluate them according to the attributes above leading to conclusive considerations in respect to the context where these patterns occur. In Rio, for instance, two paradigmatic examples help us understand this approach: Copacabana and Barra da Tijuca.

In **Copacabana**, the relationship between the built and the non-built environments is characterized by the contrast: a dense high-rise occupation pattern close to the beaches and the hills. In climatic terms, there are several constraints for the adequate ventilation and sun lightning of the buildings, which act as a barrier to the winds coming from the ocean. However, the social mix of the local dwellers is an inclusive characteristic, leading to a diverse set of profiles, uses, needs and cultural values.

In **Barra da Tijuca**, the urban design conception has resulted in a more adequate relationship between the built and the non-built environments, with lower densities and better climatic conditions. Nevertheless, the design solutions and the real state market approaches led to a more segregate and homogeneous social environment which unable social inclusion, cultural interaction and public life.

When applying this analysis to the **northern zone**, we will find examples of both patterns, leading to more or less adequate natural environments, more or less inclusive social contexts: along the main streets, higher densities and commercial activities, and in the inner sectors, more homogeneous and less dense occupation, with predominant low rise housing buildings.

Although there is a diverse social profile and a rich use of the public spaces, we may observe several environmental problems: the occupation of hills, the lack of vegetation and the topographic and soil conditions as related to rainwater and sewage systems.



Figure 9 – Copacabana, Barra da Tijuca and Meier

4.2. *The degree and scales of landscape changes*

As already discussed, different urban patterns were applied in the city in different time periods and in different parts, and caused the urban landscape modification in the street, block, building and open space levels, conjugating natural and artificial elements.

The Copacabana urban pattern has influenced the occupation both in the southern and in the northern zones, resulting in a similar configuration, despite natural environmental differences. In the same way, more recently, the Barra da Tijuca pattern is being applied in other sectors, causing an intense change of the street landscape.

We call that process the landscape “modelization”, conditioned by socio-economical and cultural factors and responsible for the transposition of urban patterns, their adaptation and the consequences over the environmental quality. The utilization of specific models by the public and the private sectors help to compose a diverse repertory of images and cultural values which, when intensively appropriated by the production and the consumption markets, end up becoming new landscapes archetypes. The different scales and degrees applied to the use of these archetypes may lead to special landmarks which will, in the long run, be incorporated by the urban memory.

In Rio de Janeiro, the public sector was in charge, most of the times, of the greatest changes in urban space with a great amount of investments applied to landfill works, route systems and creation and remodelling of existing open spaces. In a local scale, through the urban legislation, the public sector is responsible for a more extensive and gradual modification, through land parcelling and construction processes.

The private sector has also caused changes in different scales. In the urban scale, it was responsible for the real state market regulation, making the decisions about investments in the building industry. In the local scale, the smooth changes are held by private owners which are responsible for the permanent improving and remodelling of their homes and business activities.

The change of the aesthetical and cultural values, which relects on the landscape, is a sign of these transformation processes, coming from the private or public sector. The environment quality modification will vary accordingly to the scale and degree of these changes.



Figure 11 – Ipanema and Leblon as a influence of Copacabana´s pattern

5. THE URBAN LANDSCAPE TRANSFORMATION

5.1. *The metropolitan landscape: from a systemic point of view*

The world urban ladscape transformation in the last fifty years was a consequence of the physical and demographic growth which has occurred around the world after the Second World War. This process reflects the interaction of diverse systems - technological, social and cultural – over the same territory.

According to Magnoli, in urban centers like Rio de Janeiro, the landscape analysis requires a systemic approach needed to understand how each part fits its place, in time and in space, with its specific characteristics which reflects the whole (Magnoli, 1983).

The urban development of the city has followed the world tendency of dealing with space as a trade merchandise, leading to an intense land value increase and an extensive population dispersion. Since the central areas and surroundings were occupied by the higher income social groups, the lower income groups settled either in distant neighborhoods, paying for the transportation onus, or in preserved and protected areas, decreasing its environmental quality.

During the 1970´s and the 1980´s, the metropolization process took place and the Metropolitan Region of Rio de Janeiro was created as an administrative entity. We observe that two movements took place: the urban sprawl over the peripheral areas, which suffered an intensive, not always legal, land parcelling activity, and the densification of the downtown, southern and northern neighborhoods, through a strong real-state activity and a fast slum settlements growth.

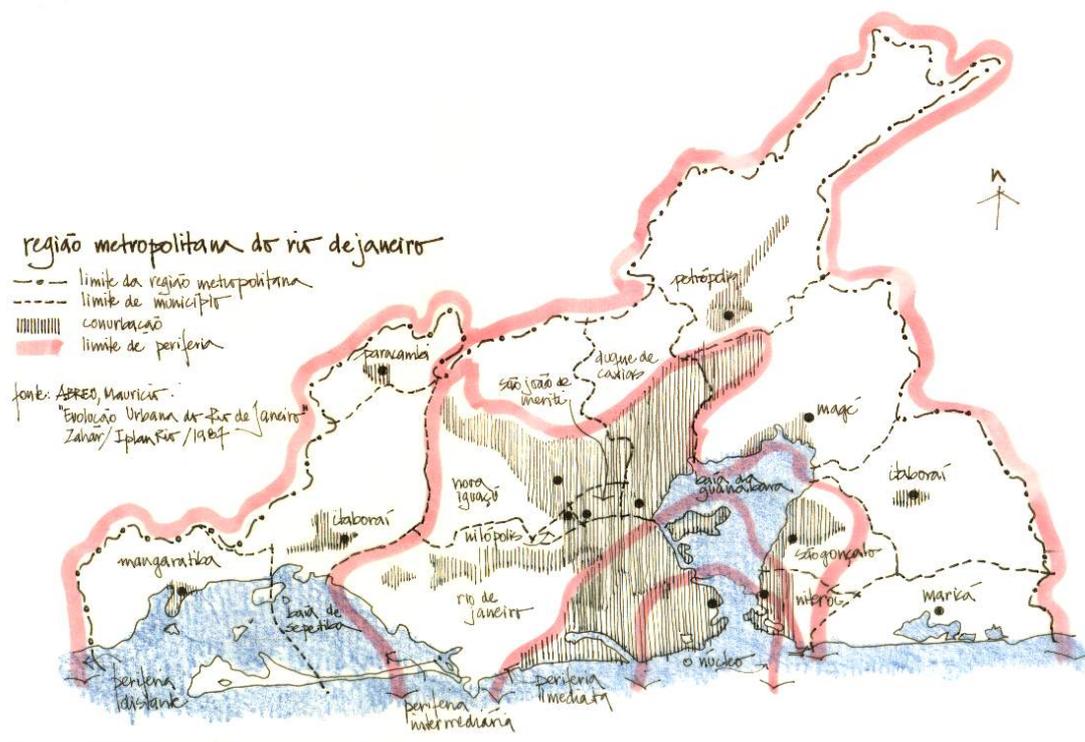


Figure 12 – The metropolitan region

In this context, public transportation is a big issue, and the bus system was the alternative chosen with large investments from both private and public sectors. The metropolitan growth has contributed to consolidate the historical characteristics of the existing zones, districts and neighborhoods, such as : concentration of public investments and tertiary activities, in the central area and southern zone; higher-income residential and trading activities in the southern and western zone, in the sectors close to the coastal line; lower-income residential activities in the northern and part of the western zone, with some local trading centers.

The **northern zone** corresponds nowadays to the most populated neighborhoods, summing up to 3 million people with medium densities ranging from 100 to 150 hab/ha. The implementation of industries, in the middle of the XXth century, intensified the demographic concentration in these regions.

5.2. The intra-urban space structure

As capital of the empire and the republic government for almost two centuries, Rio de Janeiro has undergone several transformations related to the urban form, urban function and urban public image. According to Villaça and Needell, the higher income residential location and the transportation systems were the main aspects of the intra-urban structure constitution and were responsible for the main changes of the urban space form (Villaça, 1998; Needell, 1993).

One of the consequences of this process is the consolidation of the “centrality” issues: creation, dispersion, move and decay. The study of the centralities formation and diversification is based upon the observation of the commerce and service activities location, since they are associated with the functioning of urban centers and sub-centers (Villaça, 1998). In this structure, the duplication and adaptation of continuous urban patterns, as discussed before in this paper, is more easily understood. For instance, the introduction of the *shopping center* as a recent retail pattern does not modify the consolidated centralities, but

suggests, according to the author, a careful observation about the new centralities creation and the correspondent consequences on the intra-urban structure.

In Rio de Janeiro, the *shopping center* locations have contributed to the decay of some activities on the traditional commercial centers. The Barra da Tijuca neighborhood, which concentrates a large number of *shopping centers*, is an illustrative example of this new urban space pattern, since it offers high quality residential complexes located close to retail and leisure activities.

In fact, the urban development held in the city over the XX th century has deepened, according to Abreu, the economical differences, the social segregation and the centralities location already perceived in the precedent century (Abreu, 1981). The author points out that the early 1900's are a historical landmark for the urban space "modellization", under the modernization efforts held by political, economical and social forces.

We may say that the city has also undergone, in the last fifteen years, a set of urban landscape remodelling efforts, aimed to re-shape its image, ranging from urban centers re-design to slum improval investments. However, these efforts were not enough to change the spatial segregation and un-balanced development observed in the urban scenario.

FINAL CONSIDERATIONS

By the exposed framework discussed in the paper, we may conclude that the urban ladscape analysis must be done through a conjugation of analytical criteria which express the urban formal and functional patterns, conditioned by both natural and social environments profiles.

The environmental quality must be seen under an approach with considers the urban space as a complex social system, where symbolic and aesthetical values play an important role together with the technical ones.

The present concern about the natural environment preservation adds to an increasing demand for social needs, in terms of housing, job opportunities, buying opportunities, consumption, leisure, transportation and accessibility. The response to an isolated aspect leads to an unbalanced urban system, compromising the environmental quality the society needs. Following an integrated approach, the urban landscape evaluation should always relate the built and the non-built environments and their appropriation by the social groups

In the case of Rio de Janeiro, particularly in the northern zone and in the railway suburbs studied, the topography and the climatic conditions should be mandatory to certain settlement solutions in order to have better ventillation, sun lightning and percolation conditions. On the other hand, the population social profile and history should influence urban and landscape design alternatives which may increase social inclusion, mixture and dynamics, combined to a careful respect to cultural references and symbolic attributes.

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