THE PROCESS OF URBAN FORM PRODUCTION AND TRANSFORMATION IN BRAZILIAN COASTAL CITIES

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ABSTRACT

The analysis derives from the national research coordinated by the Open Space Systems (QUAPÁ-SEL) laboratory at the University of São Paulo/Brazil, encompassing themes related to "Open Spaces and Urban Form." In all, thirty-five cities spread across different regions and states were studied from 2007 to 2017. Despite the similarities of the urban evolution and transformation, their urban structure is equally heterogeneous and highly diverse due to historical, socioeconomic, political, and administrative particularities and, above all, to their geo-biophysical conditions. This article focuses on five cities (Santos, Vitória, Salvador, Maceió, and Recife), located along the Brazilian coast, enabling the systematization of results and a comparative approach. The first two are located on the southeastern coast and the last three on the northeastern coast. The QUAPÁ-SEL workshops are based on four themes: open space systems; morphological patterns; urban evolution; legislation. In this article, we add a new clipping for comparison, highlighting the aspects related to the expansion of the urban fabric and the morphological characteristics of the urban sprawl. The article includes analysis on individual aspects and crossed comparisons, and concludes by pointing to possible design criteria, safeguarding the particularities of each city.

Keywords: urban form, open spaces, coastal line, QUAPÁ-SEL, Brazil.[i]

INTRODUCTION

The proposed approach makes it possible to compare the different situations that each of the studied cities presents and to highlight the diversity and particularities found. Despite some similarities, they show different urban development in terms of timelines, intensities, effects, and formal results. In this paper, we seek to combine a broader and, at the same time, restricted approach to the results of the workshops held in these cities, based on the investigation lines proposed by the QUAPÁ-SEL research group: – open space systems; – morphological patterns; – production process; – urban legislation. Our reflection focused on the results of the workshops, which brought both simplification and difficulties. The workshops overlapped several layers of heterogeneity, with dynamics, results, and non-uniform reports. What allows us to establish the proposed comparison and ensure a high degree of homogeneity is the fact that the workshops were held and reported based on the four lines of investigation as described.

In order to construct an overview of the information with the general data about each of the cities, we systematize the demographic, economic, political-administrative data, as well as the most significant aspects of the geo-biophysical aspects (Figure 1). The cities have a distinct relief profile when we observe their location: in the southeastern region—Santos and Vitória—more rugged reliefs; and in the northeastern region—Salvador, Recife, and Maceió—softer reliefs and the formation of dunes, boards, valleys, and escarpments. The original vegetation was composed of Atlantic Forest species with an incidence of mangrove ecosystems, in the Southeast; and caves, lagoons, dunes and beaches, marshes and bushes, in the Northeast (Figure 2). From these data, we highlight the historical and socioeconomic character, which presents aspects such as densities (highlighting Recife and Salvador, capital cities from the colonial period), budget (highlighting the

cities that have extractive export industry as a base, such as Santos and Vitória), and the recent tourism activity consolidating the coastal occupation (in the case of Maceió).

BACKGROUND

We are interested in differentiating the morphological patterns in the urban fabric of the analyzed cities (Tângari 1999). On the one hand, we have the patterns derived from the classic urban forms, whose characteristics can be summarized by the expression of the regularity of the lots and alignments and by the clear definition between private and public space. These patterns are responsible for the urban forms and functions present in the urban centers until the mid-20th century. This city form can be found both in the legally conformed city, as well as in what is known as "the informal city," embedded both in central districts and in expansion areas.

Lately, to this "traditional form"—the result from the urbanization process—a new occupation pattern is added through with specific aspects, consisting of isolated units of exclusive uses, in the condominium set. They constitute large territories of recent, dispersed urbanization, with fragmented urban fabrics. In these areas, clarity concerning private open spaces and public open spaces loses much of its traditional meaning. In this new environment, expressways have become the identity of this new urban specialization: they establish connections, guarantee access, and condition the surrounding land use and occupation (Portas, Domingues, and Cabral 2011).

For analytical purposes, we will call this form of recent urbanization the "extended urban" (Secchi 2009). In the cities studied, these city forms, antagonistic to some extent, occur in an associated way, where the open spaces system is presented through different shapes, scales, and functions. This new standard is a current reality, perhaps of greater dimensions than the traditional city when it comes to the amount of occupied land. Despite this, Carvalho (2003) states that both the representations and the most frequent tools used to understand the current urban complexity still carry as a reference the patterns found in the formation of the traditional city.

If, as we said, in the consolidated city, the public open spaces system is fully legible and able to be covered in the sense proposed by Certeau (2011), in the "extended urban," other elements gain importance and visibility. In addition to road infrastructures, the open spaces belonging to or associated with the ecological structure are expressed on another scale, which refers to the territory and not just to the city domain (Portas, Domingues, and Cabral 2011, 192–193). Despite the little relative importance given to these environmental structures in the organization of the territory, they currently represent one of the most expressive elements when it comes to the structuring potential of urban organization.

METHODOLOGY

In the context addressed, it is essential to qualify and differentiate how each of the cities responds to this universe of forces that are inducing the current urban dynamics. For this, we seek to highlight the physiography of the urban fabric and its components, such as blocks, lots, buildings, and vegetation (Lamas 2002; Tângari 2013a), and the agents and processes of urban form production, as discussed by Silva and Lima (2014) and Parahyba (2014).

Some of these types respect a more traditional physiography of plot, block, and urban continuity. In peripheral situations or even dispersed in the territory induced by the dynamics of urban expansion, other types present themselves as autonomous complexes, of single-family or multi-

family units, or as concentrated areas of trade and services, which constitute "containers" as described by Solà-Morales (2002) (Table 2). One of our methodological hypotheses establishes that new infrastructures, mobility systems, and environmental structures are the main defining forces of new urban cartographies (Portas, Domingues, and Cabral 2007, 71) (Figure 3).

The new infrastructures that ensure the mobility and the functioning of the new districts have been defined, for the most part, by authorities located at superior administrative levels than the municipality. These actors have excellent decision-making autonomy and are governed by their own interests. This means that infrastructures, which currently ensure the occupation of large parts of the territory, are, to a large extent, detached or poorly articulated with the local administration (Portas, Domingues, and Cabral 2007, 169). This is the case, among others, of the location of new port structures and the implementation of activities related to oil and energy, but this process also appears in the provision of social housing.

In the case of Santos, a more compact and densely occupied city, this same kind of intervention occurs from the construction of tunnels and the medium-capacity transport system (VLT). In this case, the decisions of the oil and gas companies, on the one hand, demand new infrastructure and, on the other, impose new urban dynamics. When operating in the relocation of activities, some of these companies produce emptiness, *terrain vague* (Solà-Morales 2002) or *tiers paysage* (Clément 2003), which corresponds to sites of former industrial occupation or large equipment that have become obsolete. This detachment between the local level and the higher decision-making levels is also noticeable when looking at large popular urbanizations, promoted by the federal government through the Social Housing Program (*Minha Casa, Minha Vida – MCMV*) and found in most of all the analyzed cities. These operations, as a rule, have their location in discontinuity with the existing city, promoting the expansion of urban fabric to discontinuous and dispersed areas. These housing developments are also inserted as autonomous pieces at the borders of the urban territory, as can be seen mostly in Maceió and Salvador.

FINDINGS

Respecting the differences between the analyzed cities, we noticed another complexity of transformations that are not restricted to situations of low density, discontinuity, and urban dispersion. In these cities, specifically, the transformations occur not only in the "extended urban," in the peripheries, but also in the intra-urban areas influenced by the new preferential axes of mobility. They occur not only extensively and with a low density, in situations where the infrastructure homogenizes the territory, but also intensively and with a high density, mainly in already urbanized areas where transformation through densification and high-rise building is observed. Density and high-rise buildings also occur in situations of apparent indifference as to location, provided that the minimum conditions of accessibility to contemporary relational networks are preserved (Ascher 2010).

The power of this set of situations, whether in the consolidated intra-urban fabric or in the "extended urban," is more visible and affects particularly the cities of Recife, Salvador, Vitória, and, to a lesser extent, the city of Santos. In the city of Maceió, high-rise building is less intense, and its relationship with relational networks occurs only occasionally. In typological terms, we find the occurrence of high rise from isolated buildings, in the same lot/block of horizontal ones. It is also noted that the occurrence of high-rise building is associated with the existence of large structures of commerce and services that appear in the landscape as autonomous units, as "containers" (Solà-Morales 2002).

However, the "extended urban" fabric that we find in these cities should not be associated only with low density. This peripheral environment is also populated by autonomous high-rise buildings and high-density sets, always associated with preferential mobility structures. The way in which these operations take place is characterized by the addition of fragments separated from each other and, in between, a set of open spaces, both expressive and imprecise, composed of areas of infrastructure, environmental resources, or real-estate reserve. The situations described above are particularly visible in cities currently subjected to strong processes of internal transformation and also in the processes described as "extended urbanization." The cities of Recife, Maceió, and Salvador clearly exemplify these transformations of the urban form, both in central and peripheral areas. In the case of the analyzed cities, environmental structures are strong determinants of urban occupation. In this regard, Ignasi Solà-Morales affirms that the "sustainability of views and perspectives of the great city by aerial images is directly linked to its fragmentary condition, extended by a territory encompassing since one point of view situated outside the conventional viewpoint" (Solà-Morales 2002, 67). Likewise, when we enter this broad and fragmented universe, the clarity with which we define and work the open spaces in the traditional city is replaced by a new spatial relationship, giving rise to a universe of indetermination, the semi-public (or semi-private), and new connections inside and outside.

These cities are deeply marked by the incidence and distribution of environmental resources. However, if in the traditional city, public open spaces are legible and can be walked, in the "extended urban" fabric, this relationship, in most cases, is degraded or is merely ignored or disqualified. The beaches are an example that includes several types of relationships between the city and environmental structures. The city of Santos has one of the most generous and friendly relations with a large garden walk between the building blocks and the beach itself. This relationship is repeated with different degrees of generosity and publicity in the different cities analyzed. The relationship between the city and environmental structures is really degraded in the most recent urbanizations, recognizable only on the territorial scale. Finally, it is possible to affirm that the environmental structures have the power to condition the urbanization of the territory, and this is quite visible in the analyzed cities. Furthermore, from a legal point of view, environmental restrictions have become mandatory. Therefore, even with difficulties at different levels, their influence on the occupation of the territory is increasingly visible, and, as a counterpoint, the situations of tension and degradation to which these structures are subjected are also more visible.

CONCLUSIONS

In discussing the reports, maps, and images of the cities, we were able to make some considerations as conclusions as below.

- In Recife, potential vectors of development and change in urban morphology are observed, and there is a diversity of processes: high-rise buildings, road renovation, implementation of parks and Public Social Housing Program projects.

- In Maceió, occupations are consolidated according to the imposed segregation: in the central and northern coastal plain, there is a concentration of high-income residents; in the lagoon plain, occupations are incurred by low-income populations.

- In Salvador and Vitória, there is a decrease in open spaces and an increase in high-rise buildings and densification processes, along the new roads and transportation corridors, with an increase in the occupation of the hills, mixing high- and low-income populations.

- In Santos, the continental area is the only sector available for real-estate investments, as they concentrate larger plots.

There is also a process of (re)occupation of land subject to the relocation of industries or obsolete equipment and the expulsion of the low-income population. Concluding our analysis, we can highlight some aspects that make each city unique and point out significant contrasts.

The first one refers to the region where the cities are inserted, the difference between those located in the Northeast and those located in the Southeast being clear. The conditions that guide the economy of these regions are elements that historically and culturally differentiate them either through socioeconomic indexes or the social landscapes observed (Tângari 2013b).

The second relates to site characteristics. Even located in sectors where the original biome is the Atlantic Forest, cities in the Northeast are located in the transition bands to the *caatinga* biome, where soil and climate did not favor the primary economic cultures that boosted coastal urbanization in Brazil, such as extraction, mining, sugarcane, and coffee plantations. The geo-biophysical conditions found in the cities of the Southeast were vital for their economic development.

The third refers to genesis, political history, and administrative function: those cities that served as government headquarters in the colonial period, such as Santos, Salvador, and Recife; those that remained as state capitals, such as Recife, Maceió, Salvador, and Vitória; and those that play a significant role as metropolitan centers, such as Salvador and Recife (IBGE 2007).

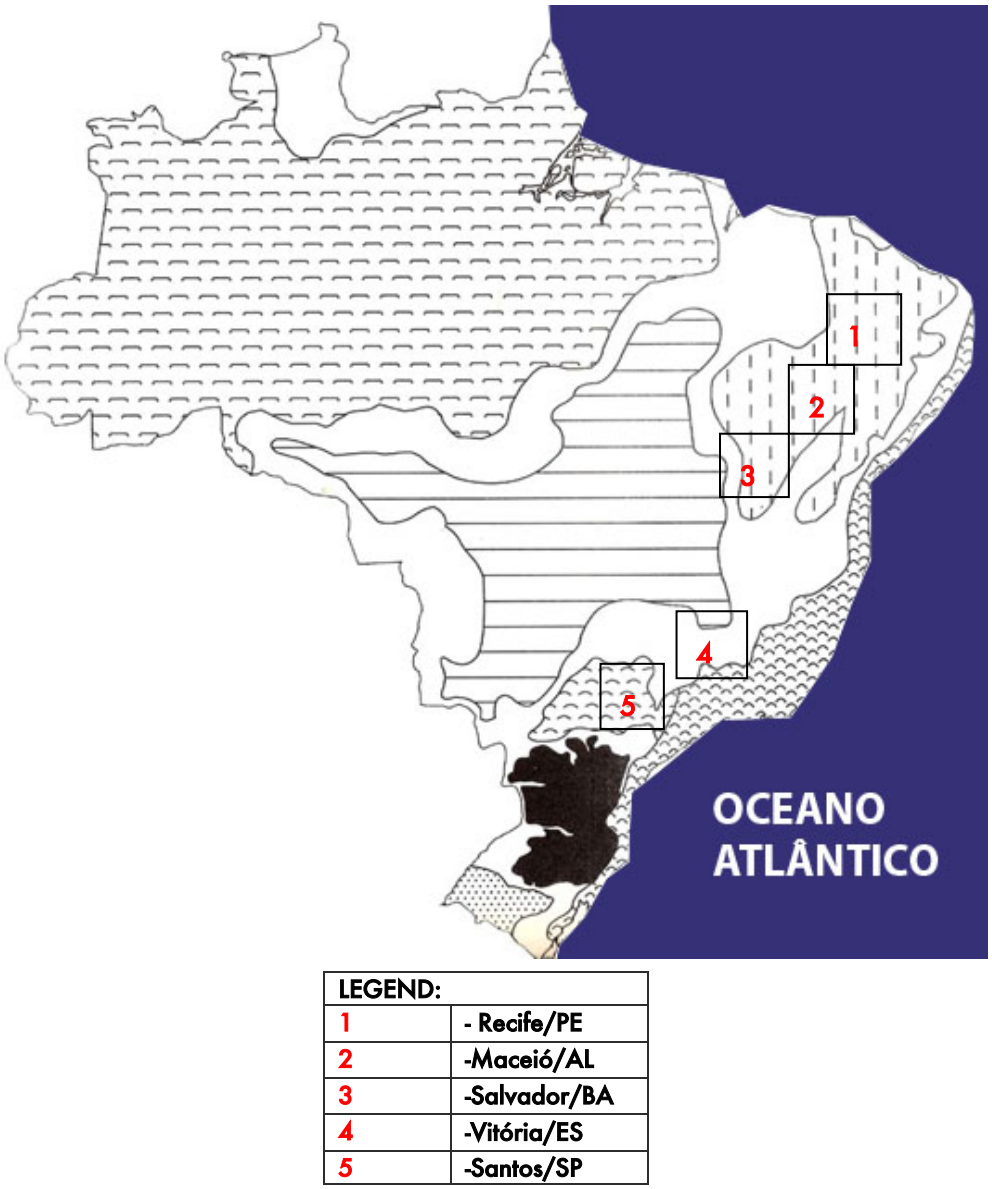
The fourth corresponds to economic functions. In this sense, port facilities associated with extractive activities, with petrochemical or mining hubs, act as differentials. The cities of Salvador, Vitória, and Santos fit into this category. At the other end, some cities work as mixed centers of services and tourist centers, such as Recife and Maceió.

The considerations made do not exhaust the understanding of urban form and open spaces expressed by the landscapes of the cities studied as described in the reports, cartographies, and iconographies produced by the QUAPÁ-SEL Laboratory of FAU USP. They indicate that we must continue and deepen our debates, enriched by the vital collection that the researchers' network has at their fingertips, and to face the complexity of new urban realities.

Cities	**Recife**	**Maceió**	**Salvador**	**Vitória**	**Santos**
State	Pernambuco	Alagoas	Bahia	Espírito Santo	São Paulo
Region	Northeast	Northeast	Northeast	Southeast	Southeast
Population	1,608,488 inhab*	1,005,319 inhab*	2,902,927 inhab*	352,104 inhab*	433,565 inhab*
Surface	218 sq km	511 sq km	693 sq km	98 sq km	281 sq km
Density	7,364 inhab/sq km	1,969 inhab/sq km	4,187 inhab/sq km	3,586 inhab/sq km	1,545 inhab/sq km
IDH	0.772	0.735	0.759	0.845	0.840
GDP/Capita	US$11,587**	US$7,769***	US$7,196**	US$46,046****	US$43,992**
Relief	Ocean plains, rivers	Dunes, lakes	Plains, valleys	Hills, islands	Ocean plains, hills, islands
Biome	Atlantic Forest	Atlantic Forest	Atlantic Forest	Atlantic Forest	Atlantic Forest
Vegetation	Mangrove, forest remains Agriculture	Mangrove, forest remains Agriculture	Mangrove, forest remains Agriculture	Mangrove, forest remains	Mangrove, forest remains

* 2014 / ** 2012 / ***2011 / ****2010

Figure 1 – Table of collected data from the cities of Recife, Maceió, Salvador, Vitória, and Santos
Source: http://www.cidades.ibge.gov.br/xtras/home.php.



LEGEND:	
1	- Recife/PE
2	-Maceió/AL
3	-Salvador/BA
4	-Vitória/ES
5	-Santos/SP

Figure 2. Brazilian biomes–location of the studied cities. Source: Map by Jonathas M. P. da Silva according to Ab'Saber (2003)

Cities	Recife	Maceió	Salvador	Vitória	Santos
patterns	-historical district -horizontal and compact fabric -high-rise downtown -peripheral low-/medium-income public housing complexes -low-income housing in plains and valleys	-horizontal and fragmented fabric peripheral -low-/medium-income public housing complexes -low-income housing in hills and valleys -peripheral touristic complexes	-historical district -horizontal and fragmented fabric -mixed blocks -shopping malls -low-income housing in hills and valleys -peripheral low-/medium-income public housing complexes	-historical district -horizontal and fragmented fabric -medium-rise blocks along the coast -relevant port district -mixed blocks -peripheral low-/medium-income public housing	-historical district -homogeneous occupation along the coast -vertical and compact fabric -horizontal and mixed blocks -relevant port district -urban park along coastal areas
types	-linear alignments on historical districts -horizontal blocks -informal occupation in residual areas -fenced blocks -mixed blocks -informal occupation -high-income fenced blocks -interstitial areas of environmental protection	-vertical blocks on the seafront -horizontal blocks -informal occupation in residual areas -fenced blocks -low-income housing in peripheral areas -high-rise close to the shore and downtown -interstitial areas of environmental protection	-linear alignments on historical districts -mixed blocks -high-rise blocks in expansion areas -commercial "containers" -aligned blocks on hills and valleys -informal occupation on hillsides -interstitial areas of environmental protection	-blocks with mixed types -continuous horizontal and vertical blocks -high-rise from the shore to the interior -informal occupation on hillsides -low-income housing in peripheral areas; -linear alignments on historical districts -interstitial areas of environmental protection	-linear alignments on historical districts -blocks with mixed types -vertical blocks on the seafront -commercial "containers" -informal occupation on hillsides -low-income housing in peripheral areas
general map					
site					
	valleys	valleys	valleys	hills	lowland
residential districts					
	mixed blocks	low-income housing	new urban	oceanfront	oceanfront

Figure 3 - Morphological patterns and types: Source: QUAPÁ-SEL LAB, 2014

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