FAIR PLAY

Olympics as catalyst for a socio-spatially inclusive city
The case of Rio de Janeiro 2016 Olympic Games
Colophon

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Summary

In UN-Habitat’s 2010 report entitled ‘State of the World’s cities 2010/2011 – Bridging the Urban Divide’, the issue of socio-spatial segregation was identified as a current problem among different urban areas of the world. This problem, experienced by both developed and developing nations, relates mainly to the ever growing phenomenon of social polarization (rich/poor) which materializes itself in the physical organization of spaces. As the world becomes increasingly urbanized, the problem of socio-spatial segregation tends to be more concentrated and extreme in cities. There is where both rich and poor head to in search for the accumulation in the case of the rich, or for the minimum production in the case of the poor, of capital. The level of equity in opportunities these two groups and the rest of the population will find to support their development and fulfil their expectations, will define how inclusive or exclusive their cities are.

In the city of Rio de Janeiro (Brazil), object of my graduation project, the issue of socio-spatial segregation is closely related to the lack of a planning culture which guarantees the equal access of its inhabitants to resources, rights, services and other ‘goods’ urban spaces usually provide. Although the city’s master plan acknowledges some essential planning tools for counteracting this problem, their use is yet very limited.

In the coming years, Rio de Janeiro will host two major sport-related Mega-events: the 2014 Football World Cup and the 2016 Olympic Games. For many cities in the world, the use of the so called ‘Mega-event strategy’ as part of a broader strategic spatial planning framework aims on helping them tackling especially economic, social and environmental issues. Besides that, in an every time more globalized world, using these events for positioning itself in the international agenda is another but not less important goal of candidate cities.

My graduation project focus exclusively in the 2016 Olympics and how it can act as a catalyst in transforming Rio de Janeiro into a more socio-spatially inclusive city. For testing my ideas, I have chosen the district of Barra da Tijuca, one of the most socially exclusive areas of Rio and where most Olympic-related infrastructure will be built. How to make good use of the public as well as private economic resources that will be invested there for bridging or at least mitigating the problem of socio-spatial segregation in the city, is the main goal of my project. In this sense, the scope of my thesis includes the analysis and assessment of Rio de Janeiro’s 2016 Olympics Urban and Environmental Legacy Plan (CELU, 2009) in what concerns its socio-spatial framework, and a proposal for strategic spatial interventions which could better address the issues related to the same topic.
Thesis Structure

This graduation thesis is divided in six parts (chapters). A brief summary of each chapter is described below.

Part A - Introduction

The first part of this report describes the framework of my graduation thesis. There, the problem that I will be addressing in my work is introduced and contextualized in the scale of the city (Rio de Janeiro), and in the location I have selected for my proposal of spatial intervention (Barra da Tijuca district). Also, the framework I have chosen as a starting point for my research and design, Rio 2016 Olympics Urban and Environmental Legacy Plan (UELP), is pointed out. Furthermore, the aims, scientific and societal relevance, as well as the research and sub-research questions that guide my work are elaborated. On the methodology sub-section, the methods that I have used to answer these questions in order to achieve my ultimate goal are also presented.

Part B - Theoretical Framework

In the second part of this booklet some relevant literature regarding the two main subjects addressed by my thesis are reviewed. One relates to the issue of socio-spatial segregation and includes some general conceptualization of the theme and possible solutions to deal with the problem in the context of urban areas. The other explores the subject Olympic Games, namely the concept of 'Mega-event Strategy' and the positive and negative impacts that such event can generate in Olympic host cities' urban environment.

Part C - Historical Background

The third chapter of this report places the issue of socio-spatial segregation in the historical context of Rio de Janeiro's urban development. By describing some crucial moments in the history of the city where the process of socio-spatial segregation was intensified and by putting them in a timeframe, the chapter aims on providing the background for the assumption that the Olympic Games, as it was planned, is the latest event which will contribute to further socio-spatial polarization of Rio de Janeiro.

Part D - Spatial Analysis

The forth section of this report is divided in two parts. In the first part both the government’s long term Olympic urban plan for the city of Rio de Janeiro and for the district of Barra da Tijuca are analysed through a socio-spatial perspective. In this analysis, the elements of the plan that have the potential to improve the issue of socio-spatial segregation in Rio de Janeiro and in Barra da Tijuca are highlighted as well as some other elements that, on the contrary, may generate greater socio-spatial tensions within the city and the neighbourhood. The second part of the chapter analyses the existing socio-spatial context of Barra da Tijuca, more precisely some main elements that compose the district’s urban form which have direct relation with the socio-spatial dynamics of this part of the city.
Part E - Vision, Strategy and Design

In this section, a vision for the district of Barra da Tijuca and surrounding region is proposed following some concepts and design guidelines defined in the previous chapters of this thesis. In order to have this vision accomplished, a strategic plan is elaborated where some crucial spatial interventions are proposed. Following that, a specify part of the strategic plan is further detailed so that some design concepts are tested on a smaller scale.

Part F - Conclusions

The last part of this report includes the final conclusions about the research conducted during the elaboration of this graduation thesis.
Part A Introduction
1. Context

1.1 Rio de Janeiro - A socio-spatially divided city

The city of Rio de Janeiro together with its metropolitan region forms today the second largest and richest urban conurbation of Brazil. Besides concentrating a considerable number of inhabitants, approximately 12 million in total, the region stands out among other Brazilian metropolises for the great amount of economic activities that are performed in its territory, in special, the ones related to highly advanced services, typical from the ‘new economy’ (Lago, 2009). This leading position in the national economic scenario however does not imply a balanced distribution of resources amongst Rio de Janeiro’s inhabitants, an issue that is visible in the city’s urban landscape.

Historically, the way the city has been planned and managed has created the essential conditions for its exclusionary spatial characteristics. The fact that the always very limited public resources invested in urban infrastructure and services was accompanied by a rise of land value and housing costs, has pushed low income citizens to the suburbs or to inner-city areas where urbanization is almost unfeasible. In 2010, it was calculated that 22% of the city’s total population, around 1,4 million people, was living in slums¹ (Cavallieri & Vial 2012, pp. 2).

¹ More generally called slum, a subnormal agglomeration, according to the Brazilian Institute of Geography and Statistics (IBGE), can be defined as a group of at least 51 housing unities lacking of essential general public services, presently located in other’s property (public or private) or in a land recently acquired (10 years or less), and physically arranged in a disordered and dense way (IBGE 2011, pp. 19).
Measuring Rio de Janeiro’s socio-spatial segregation issue

The index that best represents the issue of socio-spatial segregation in the city of Rio de Janeiro is the Social Development Index (SDI), calculated in a study carried out by the municipal government in 2008. This index, inspired by the United Nation’s (UNDP) Human Development Index (HDI), aims on measuring the level of social development of a given geographical location when compared to other areas of the city. Nevertheless, besides socio-economic indicators such as income and level of education of the city’s inhabitants, other indicators with a more explicit connection with the built environment are used, for instance, the provision of basic urban services (water supply, sewage and garbage collection systems) and the quality of the housing unities (measured according to average number of bathrooms per person in a single unit) in the selected areas (Cavallieri & Lopes 2008, pp.2-3) (See maps left).

Source maps (from top to bottom):
- Cavallieri & Lopes, 2008
- Cavallieri & Vial, 2012
- Armazem de Dados/IPP/PCRJ, 2004
- Armazem de Dados/IPP/PCRJ, 2004
Socio-spatial structure of Rio de Janeiro Metropolitan Region

From the analysis of the maps on the previous page, it can be argued that the socio-spatial organization of the city of Rio de Janeiro follows the model centre (developed) - periphery (underdeveloped) although pockets of poverty (mainly slums) can be found within central districts, a particular characteristic of Rio.

Following Abreu’s classification (Abreu, 2008), the socio-spatial structure of Rio de Janeiro’s metropolitan region can be generally divided in four parts, each of them with its own characteristics, they are: (1) Nucleus / Core, (2) Immediate Periphery, (3) Intermediate Periphery and (4) Distant Periphery (See Map right).

The Nucleus/Core concentrates the region’s economic, political and cultural functions. This part is also served with the best urban infrastructure, public equipments and services, though with a limited capacity. The Core also houses the inhabitants with the highest income and better jobs of the city. Job opportunities are also concentrated in this area.

The Immediate Periphery is the area mainly dwelled by the low-middle class. It also has some old industrial activities and service centres with an immediate lower hierarchy then the ones in the Core, but still with regional importance. Its urban infrastructure is adequate when compared with the other peripheral areas as well as its services. Most neighbourhoods that are part of the immediate periphery have their origin in the implementation of the suburban railway lines and are a result of the densification of the areas surrounding the train stations.

The Intermediate Periphery was identified as the area in which Rio’s Metropolitan’s region physically expands itself. The high numbers of its population’s growth rate are especially related to two different migration flows: one of people that are expelled from the city’s central areas because of Real Estate pressure or governmental decisions, and the other of people coming from the outside of the metropolitan region and that cannot afford living in more central locations. The centralities existing in this area, though dynamic and somehow expressive, have very low spatial qualities and are limited to the little economic possibilities of their users. Furthermore, the land occupation pattern in the Intermediate Periphery is very irregular, and in many cases, informally/illegally developed. Regarding the local urban infrastructure, public services and equipments, those are almost inexistent there.

Although Abreu does not further detail what he calls Distant Periphery it can be assumed that this area has mainly rural characteristics and not much influence in the urban dynamics of the region.

From the time of Abreu’s classification in 1987 till today, the major change of Rio de Janeiro metropolitan region’s socio-spatial structure refers to the expansion of the Nucleus/Core westwards along the coast, to the area of Barra da Tijuca (See Map above). This region started to be developed in the beginning of the 1970s when the space for new developments in most central districts of the city became too limited.
1.2 Rio 2016 Olympic Games - A unique opportunity for the city of Rio de Janeiro

When in 2009, after previous unsuccessful attempts (Oliveira & Gaffney, 2010), the city of Rio de Janeiro had finally won the bid for hosting the 2016 Olympic Games, a once-in-life opportunity for the municipal government to tackle the city’s issues of socio-spatial segregation that had arisen. Like in other Olympic cities, the planned transformation of Rio’s urban space for hosting this Mega-event aims not only to promote the city’s international image but also to improve the living conditions of Rio’s inhabitants, especially of the most deprived ones. In Rio 2016 Olympics Urban and Environmental Legacy Plan (UELP), social inclusion is pointed out as one of its main goals.

Rio 2016 Olympics UELP socio-spatial framework is further analysed later in this thesis.
2. Problem Definition & Problem Statement

2.1 Problem Definition

Global forces x Local demands

The association between the Olympic Games and the urban development of host cities is mainly observed from two distinct perspectives: global and local (Chen & Spaans 2009, pp.100). The global dimension of the Games can be related to the ability of such event in ‘creating landmarks to attract global investment, facilitating fast-track development and promoting a new urban image though place marketing’ (Qu & Spaans 2009, pp.334). In times of globalization and growing economic competition among cities, the Olympics are therefore seen as an effective tool to place a host city on the global agenda (figure top right).

From a local perspective, the Olympic Games can be seen as a unique opportunity for host cities to address their short, mid, but especially long term demands regarding the improvement of their urban space, and therefore the quality of life of their inhabitants. In this context, the Olympics can accelerate large scale urban projects, some of which would otherwise never be implemented without the event (Essex & Chalkley 2003; Hiller, 2006) (figure bottom right).
Depending on the level of socio-economic development and political will of a host city, the association between global forces and local demands can, to a certain extent, converge into a common vision for the city or on the contrary, generate (or enhance) local tensions (See Diagram below). In Sydney's 2000 Olympics, the environmental regeneration of the location in which the Olympic Park was implemented, and its transformation after the Games into a new recreational green area in the city and a tourism destination has fulfilled both global and local expectations. In Barcelona's 1992 Olympics, although a great part of the post-Olympic sites currently provides the local community as well as tourists with high-quality public spaces, the fact that the Olympic Village eventually transformed a working class district into a community largely inhabited by upper-middle and upper-class residents (Hiller 2006, pp.321), has worsened the problem of housing affordability in the city.

Based on preliminary analysis and on literature review, although Rio's 2016 Olympic Games can in part improve in the living conditions of Rio's most deprived inhabitants by the upgrade of the city's environmental and sanitary conditions, transportation system and social infrastructure, there is no evidence that this mega event will promote substantial changes in Rio's socio-spatial dynamics. In fact, it can be argued that some of the Olympic-related interventions may further intensify the process of socio-spatial segregation in the city. Examples of this issue are the projects for the Olympic Park and Olympic Village which are located in Barra da Tijuca, an area with already high levels of social development, or the Olympic Media & Referee Villages which are situated in Rio's old harbour district (see map below and figures on next page). Since the post use of these large projects are all market oriented and focused on middle/upper middle class population, these developments will not benefit Rio's middle-lower class inhabitants, but instead, push them further away from these upgraded areas. The expulsion of these socio-economically vulnerable groups may occur mainly in two different ways: directly, they are evicted from the locations where the projects will take place and indirectly, they are forced to leave through processes of urban gentrification (Rolnik 2009, pp.6-7). Without any possibility to afford remaining in these areas these people are expelled to the outskirts of the city, or to centrally located slums.
2.2 Problem Statement

Although social inclusion is regarded as one of the main goals of Rio 2016 UELP, some urban interventions related to the Games may contribute to the further socio-spatial polarization of the city. This issue is visible, for example, in the decision of the government in allocating most of the Olympic related infrastructure in Barra da Tijuca, one of the most socio-economically developed neighbourhoods of the city. The fact that any relevant socio-spatial structural change will be made in this developed area is a clear sign that Rio's exclusionary planning tradition still remains.
3. Aims of the project

Given that Rio’s socio-spatial segregation problem is not fully explored by Rio 2016 Olympics UELP, the main objective of my graduation thesis is to propose some strategic spatial interventions to further complement this plan, enhancing the social benefits that the Games could possibly generate to the city. Aiming on developing an integral approach to the problem, my project also attempts to strengthen the connection of the economic input resulting from the organization of this Mega-event with the social and environmental elements of the plan. More generally, identifying some spatial elements that have direct impact in the social dynamics of urban spaces was another goal of my thesis, ultimately guiding my design intervention.

4. Project Location

For its prominent position in Rio’s 2016 Olympic plan and for its exclusionary socio-spatial profile, I have chosen the district of Barra da Tijuca as the main location for my investigation and design intervention (see map). Once a great amount of public economic resources are to be invested in this area in the coming years, a larger group of inhabitants, especially the most deprived ones, should benefit from it.

Being the fastest growing district of the city today and emerging as a regional centrality, Barra da Tijuca is known for its segregationist urban structure and for the homogeneous profile of its residents. Gated communities, office parks and shopping malls are common elements in the neighbourhood directed exclusively to individuals with high/middle income (see figures next page top left and top right). Developed mainly by the private sector, any significant social related urban project was ever carried out in the area. Besides this peculiar socio-spatial profile, Barra da Tijuca also presents some serious environmental issues owing to the uncontrolled and predatory model of urban development implemented there (see figure next page bottom left). Yet, the district’s natural landscape is still a main characteristic that attracts new dwellers to the area (see figure next page bottom right).

Although today there is almost any slum within the borders of Barra da Tijuca, the biggest growth of population living in those informal settlements took place in its surroundings, in the greater region in which the district takes part, the Planning Area 4 (Área de Planejamento AP4). If in 2000, around 144,400 people were living in slums in this region, in 2010 this number reached approximately 237,000 (CELU 2009, pp.59). While the population in the formal part of AP4 grew 28% between these same years, the informal part grew 53% (Cavallieri & Vial 2012, pp.6). This fact is directly related to the number of job opportunities that the district and region provide, a number that has considerably increased around the same period.

The district of Barra da Tijuca will be further analyzed later in this thesis.
Introduction
Barra da Tijuca: The ‘Heart of the Games’

In Rio’s Olympic master plan, two major projects are planned in Barra da Tijuca: the Olympic Park, where most competitions will take place and the Olympic Village, where all athletes will be living during the period of the Games. To support these projects, improvements in the district’s mobility and natural environment are proposed in Rio 2016 Olympics UELP. These improvements are actually demands of the area which suffers daily from great traffic congestions and from the extensive pollution of its natural resources.

Though receiving a great amount of public resources, the 2016 Olympic plan for Barra da Tijuca misses important social ingredients in its scope. Besides having no social program such as affordable housing planned for the area, a consequence of the enormous pressure made by private agents in the neighbourhood, the few informal settlements existing there are being removed to the outskirts of the city (CPCORJ, 2013).
5. Project Framework

As a framework for my project, I have chosen Rio 2016 Olympics Urban and Environmental Legacy Plan (UELP) which combines the necessary urban infrastructure for hosting the Games with long term demands of the city. As further analysed later in this thesis, although improvements in Rio’s mobility pattern, sanitation system and natural environment structure are likely to be insufficient in promoting a more socially inclusive city, some of these interventions create the initial conditions for Rio’s socio-spatial restructuring. While these components are worked out separately by the government’s plan, my proposal is to instead integrate them as much as possible and to add the missing social layer to the scheme so that Rio 2016 Olympics UELP’s goal of social inclusion can be achieved.

Besides the four macro plans, the local plan of Rio 2016 Olympics UELP for the district of Barra da Tijuca is also chosen as a starting point for my research and design intervention (see figures).
6. Research Questions

In order to investigate the potential of Rio’s 2016 Olympic Games in promoting socio-spatial inclusion in the city of Rio de Janeiro in general, and in the district of Barra da Tijuca in particular, the following research questions will be addressed in my thesis.

Main Research Question

- How can strategic spatial interventions supported by Rio de Janeiro’s 2016 Olympics Legacy Plan transform the district of Barra da Tijuca into a socio-spatially inclusive area and reinforce its role as a centrality to the city and metropolitan region?

Sub-research questions

- What characterizes a socio-spatially inclusive/exclusive urban space?

- What can be the positive and negative socio-spatial impacts of Mega-events in host cities?

- What is the context in which the 2016 Olympics takes part regarding the socio-spatial development of the city of Rio de Janeiro?

- To what extent Rio 2016 UELP can promote socio-spatial inclusiveness in the city of Rio de Janeiro and in Barra da Tijuca?

- What spatial elements can be added to Rio 2016 UELP so its goal of social inclusion is achieved?

- What spatial elements are missing in Barra da Tijuca so that the district becomes a socio-spatially inclusive urban space?

7. Methodology

My thesis can be classified as a design-driven research combining traditional academic methods with practice-based techniques. These methods/techniques are used to answer my research questions as demonstrated in the following diagram:
What characterizes a socio-spatially inclusive urban space?
What can be the positive and negative socio-spatial impacts of Mega-events in host cities?
What is the context in which the 2016 Olympics takes part regarding the socio-spatial development of the city of Rio de Janeiro?
To what extent Rio 2016 Olympics UELP can promote socio-spatial inclusiveness in the city of Rio de Janeiro and in Barra da Tijuca?
What spatial elements can be added to Rio 2016 UELP so its goal of social inclusion is achieved?
What spatial elements are missing in Barra da Tijuca so that the district becomes a socio-spatially inclusive urban space?

THEORETICAL FRAMEWORK

Social inclusion/exclusion and space
Mega-event strategy
Socio-spatial impacts of Olympic Games

ANALYTICAL FRAMEWORK

Historical analysis of the issue of socio-spatial segregation in the city of Rio de Janeiro
Socio-spatial analysis of Rio 2016 Olympics Urban and Environmental Legacy Plan
Morphological analysis of Barra da Tijuca district

VISION

STRATEGIC PLAN
Barra da Tijuca region

DESIGN INTERVENTION
Barra da Tijuca district (fragment)

RESEARCH QUESTION

How can strategic spatial interventions supported by Rio de Janeiro’s 2016 Olympics Legacy Plan transform the district of Barra da Tijuca into a socio-spatially inclusive area and reinforce its role as a centrality to the city and metropolitan region?
8. Relevance & Keywords

Scientific Relevance

The scientific relevance of my thesis lies in the contribution to the current international academic research on two main topics: socio-spatial inclusion/exclusion and socio-spatial impacts of Olympic Games in host cities. Since the concept of sustainable development has become a prerequisite in Olympic plans (IOC, 2009), more attention has been paid to the social content of these plans, also by scholars. In addition, as the urban infrastructure required for hosting this mega-event has substantially grown throughout time, the social impacts of this event, especially on local communities, has also increased, becoming a common subject of academic scrutiny.

Societal Relevance

For cities with high levels of socio-spatial inequity like Rio de Janeiro, hosting mega-events such as the Olympics can be a once-in-life opportunity to initiate big changes in their socio-spatial configuration. Given that a great amount of public economic resources is invested in these occasions, especially for the upgrading of the host cities’ urban infrastructure, it is reasonable that especially the most deprived citizens of these cities can benefit from these improvements.

Key Words

Socio-spatial inclusion/exclusion;
Mega-event strategy;
Socio-spatial Olympic legacy;
Rio de Janeiro 2016 Olympic Games;
Rio de Janeiro;
Barra da Tijuca.
Part B

Theoretical Framework
Exclusion of groups of people from access to all things cities has to offer, on the basis of race, religion, income, gender among other indicators, has been and continues to be a pressing problem for many cities in the world (Le Gates & Stout 2011, pp.186). The concept of social exclusion still lacks of a clear definition as it is interpreted and analysed from different perspectives. Madanipour (2011) suggests that for its multi-dimensional character, social exclusion/inclusion should be examined in three main spheres/arenas in which this phenomenon takes place, they are: the economic arena, the political arena and the cultural arena.

According to the author, in the economic arena social inclusion is best understood by the accessibility to resources which is usually secured through employment. In this sense, ‘marginalization and long term exclusion from the labour market lead to an absence of opportunity for production and consumption, which can in turn lead to acute forms of social exclusion’ (Madanipour 2011, pp.189).

In the political arena, the main form of social inclusion is to have a stake in power, meaning to provide individuals with the possibility in participating in decision making. The most evident form of political-related social exclusion is therefore the lack of political representation.

In the cultural arena, the main form of inclusion is the share of symbols and meanings. The most powerful of these are historically the language, religion and nationality. Some of the new sets of symbolic relationships include the way individual and groups identities are formed through the association with patterns of consumption, from necessities of daily life to cultural products. In this way, the main form of cultural-related social exclusion is the marginalization from these symbols and meanings.

In general, different combinations of these three dimensions of social exclusion/inclusion differ from one social group to another. In this sense, the most acute form of social exclusion is experienced when elements of economic, political and cultural exclusion are simultaneously combined. The other end of the spectrum is represented therefore by citizens who have complete access to the elements of economic, political and social inclusion (Madanipour 2011, pp.189).

The spatiality of social exclusion/inclusion can be best understood when the three dimensions mentioned above are translated into the concept of accessibility. From this perspective, political inclusion is represented by the accessibility to decision making, economic inclusion by the accessibility to resources and cultural inclusion by the accessibility to common signs and meanings. Given that most part of these forms of access need a physical setting to manifest themselves (to be stimulated or denied), the relation between social inclusion/exclusion and space becomes clear and in most cases inseparable. Another concept discussed by Madanipour (2011, pp.191) that helps with understanding this relation between social inclusion/exclusion and space is the one of spatial freedom. In his idea, ‘the more restricted are our social options, the more restricted will be our spatial options, and more excluded we will feel. On the other hand, if we have a wide range of social options, we would have a wide range of places to go, places for living, working and entertainment’.

Also important for the understanding of the process of socio-spatial inclusion/exclusion in urban spaces is that these two opposite phenomena are constructed through the physical organization and control of spaces, these last ensured by informal codes and signs and formal rules and regulations. As Madanipour puts it (2011, pp. 191), this spatial
manipulation, 'using elements from the natural or the built environment, has been socially and symbolically employed to put visible and strict limits on our spatial practices'.

Given the major role of space in the integration or segregation of the urban society, the contribution of urban planners in the promotion of socio-spatially inclusive urban environments could be to revise existing spatial barriers in the city and to stimulate the accessibility and spatial freedom for all groups of people. More specifically, as in the scale of the city, the spatialization of social exclusion takes place mainly through land and property markets, Madanipour suggests two main strategies to promote greater inclusion of marginalized groups into urban spaces: one would be the decomodification of the space so that the Real Estate market has less influence in the decision about where different groups are located in the city and the other would be the promotion of a deliberated city planning model where social exclusion can be despatialized. Building inclusionary housing unities for low and moderate income households in locations they could otherwise not afford, is an example of the first approach. Designing mixed use urban areas which encourages social diversity is an example of the last (LeGates & Stout 2011, pp.187).
2. Olympic Games

2.1 The Mega-event Strategy

The Mega-event strategy as we know it today was first developed and implemented in Barcelona’s 1992 Olympics, however, examples of using the Olympic Games for upgrading the urban infrastructure and local economy date back from much time before. In Los Angeles’ 1932 Olympics, for the first time, an Olympic Village was built with characteristics of permanent housing. Later on, after the Second World War, under a new and strong social framework, the Olympic Movement, supported by local governments, stimulated a number of interventions to promote sport activities, namely the construction of sport facilities in the host cities. The next step was to concentrate those facilities in central areas and to integrate them into larger urban renewal projects, fact that made the connection between Mega-event and urban transformation more evident (Rolnik, 2009).

Nevertheless, it was only from 1980s onwards that this connection would be intensively explored by host cities, when processes of deindustrialisation and globalisation stimulated major economic restructuring throughout the urban system of western European countries (Essex & Chalkley, 2003a). To cope with the ever growing global competition among cities, and to relieve economic, environmental, social and political pressure, the concept of ‘strategic planning’ was upgraded and reintroduced in these cities, defining priorities for area investment though strategic urban projects (Qu & Spaans, 2009). Also crucial in this process was introduction of private capital associated with public investments in new urban developments, fact that provided urban management with an entrepreneurial character (Oliveira & Gaffney, 2010).

After this change of planning paradigm in the last decades of the 20th century, the Catalonian city of Barcelona was the first to successfully introduce the Mega-event strategy into its strategic urban planning framework (Qu and Spaans, 2009; Blanco, 2009). In this sense, the 1992 Olympics were used as a tool to implement two different but correlated agendas: the provision of urban infrastructure for the city regeneration (Gold and Gold, 2008; Qu and Spaans, 2009) and the upgrade of its image within the global scenario, with an ultimate goal of attracting further investments and ventures to the city (Rolnik, 2009).

After Barcelona’s Olympic Games, the Mega-event strategy has become part of deliberated urban policy approach to promote local economic growth and to position Olympic cities on the world’s agenda (Chen & Spaans 2009, pp.99). Qu and Spaans (2009, pp.334), define this strategy as follows:

‘Looking beyond the event itself, the mega event strategy is basically one using the Mega-event as an engine for urban development. Therefore it can be considered as a tool of urban governance. Usually host cities of such mega-event have to accommodate a large urban programme. (...) The scale of these projects is very large and they have a huge social, economic and environmental impact on the host cities or even entire regions. Recognizing this, cities started to make enormous efforts on trying to fit event-related projects within long-term perspective of strategic spatial planning, including the post-Olympic use of projects.’
Barcelona 1992 Olympic Games

In order to tackle the economic stagnation caused by the world’s economic crisis during the 1980s, Barcelona saw the Olympic Games as a possibility for recreating its own identity and to attract investments to the city. The preparations for hosting the 1992 Games included, among other large scale spatial interventions, a huge project of urban regeneration transforming brownfields and other degraded spaces into new urban areas with service, cultural, leisure and residential functions (Qu & Spaans, 2009).
As in the time of the 2000 Olympic bid many Australian cities were feeling themselves isolated from the world, Sydney’s submission for hosting the Games had as main objective the upgrading of the region’s international profile. In that time, as the International Olympic Committee (IOC) started encouraging candidate cities to apply the concept of sustainable development in their Olympic plans, Sydney’s Olympic master plan focused on the environmental regeneration of a huge former industrial site which was, after the Games, transformed into a series of parks that enhanced the region’s leisure opportunities (Chen & Spaans, 2009; Sydney Olympic Park Authority, n.d.).
2.2 Socio-spatial impacts of Olympic Games

Hosting Mega-events has increasingly generated great impacts on host cities’ built environment and has therefore become a central point of discussion among urban planners nowadays. The changes on the level of these impacts can be directly related to the growth in size and importance of these Mega-events over time (Essex and Chalkley, 1998; Cashman, 2002; Essex and Chalkley, 2003b; Qu and Spaans, 2009).

<table>
<thead>
<tr>
<th>The changing infrastructural impact of the Summer Games</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase one: 1896-1904</strong></td>
</tr>
<tr>
<td><strong>Phase two: 1908-1932</strong></td>
</tr>
<tr>
<td><strong>Phase three: 1936-1956</strong></td>
</tr>
<tr>
<td><strong>Phase four: 1960-1996</strong></td>
</tr>
</tbody>
</table>


In the specific case of the Olympic Games, as the number of participants (athletes, media professionals, visitors, etc.) has become every time larger, the necessary infrastructure for hosting the event has also increased, exceeding its original and limited scope of sport-related facilities. Today, Olympic plans have emerged as ‘large urban projects’ comprising not only sport venues but also a number of other interventions related to

- the improvement of mobility, environment and the social and cultural infrastructure of host cities (Qu & Spaans, 2009; Rolnik, 2009). These interventions are necessary to ensure not only the effective operation of the Games in all aspects, but also the best possible image of the host city to the outside world (Essex and Chalkley, 2003b). Furthermore, as practices of ‘sustainable development’ were lately introduced by the International Olympic Committee as basic requirements for hosting the Games (IOC, 2007, 2009), a more integral approach regarding economic, social and environmental aspects has been adopted by Olympic host cities.

On the social sphere, the concern regarding these Olympic related physical interventions relate mainly to their possible impact on the local communities of host cities, in special to the most disadvantaged and vulnerable groups of the society such as low-income populations, ethnic minorities, migrants, the elderly, persons with disabilities, and other marginalized groups (such as street vendors and sex workers) (Rolnik 2009, pp.4).

Using the knowledge about social inclusion/exclusion and its relation with the urban space acquired in the previous chapter of this thesis, the following lines attempt to categorize some positive as well as negative social impacts that can possibly be generated by hosting the Olympic Games according to the main spheres of influence/dimensions that they may occur. As it was mentioned above, as the Olympics have every time more influence in the physical restructuring of host cities, besides the three dimensions proposed by Madanipour (2011), an extra one, with a more direct relation with the urban space itself is proposed.

Starting with the socio-economic sphere, the generation of employment and wealth through the construction of facilities, the attraction of tourists and further investments by city marketing actions are considered potential positive legacies of the Games, not only during the preparation and hosting phases, but also after the event (Essex and Chalkley, 2003b). On the other hand, in cases where the expenses on these developments are extravagant,
the actual demands of local communities can be underestimated. The decrease of public investments on social services and education and the raise of local taxes are sometimes seen by local governments as necessary measures to assure the ultimate economic success of the projects related to the Olympics (Essex and Chalkley, 2003a).

From a socio-political point of view, as many actors are involved in the planning and implementation phases of Olympic related spatial interventions, also the model of governance chosen by host cities to manage them may have positive and negative effects on local communities. A possible positive social legacy can be the empowerment of local communities especially by the use of participatory planning during decision-making (Villano et al. 2008, pp.49; Ou & Spaans, 2009). Another one may be the development of the leadership of local governments (Villano et al. 2008, pp.49) in their role as managers of the urban space, especially guaranteeing that the rights of disadvantaged and vulnerable citizens are respected and their needs taken into consideration. A contrary situation would be therefore the lack of representation of these groups and the subordination of the public sector to the interests of other dominating groups. As Essex and Chalkley (2003a, p.12) argue, because the initiative to bid for the Games generally comes from ‘urban political leaderships and/or other urban elite groups, such as business groups, ... the main decision-making concerning the bid and developments can often be perceived as undemocratic and uncritical’. As a negative consequence of this political arrangement, existing intra-urban social conflicts can increase and new divergences can arise.

Regarding the socio-cultural dimension of the impacts that can be generated by Games to host cities, besides the growth of interest and participation of local inhabitants in sport activities, the strengthening of regional traditions and values added to the increase of local pride and community spirit can be seen as positive outcomes from hosting the Olympics (Malfas et al. 2004, pp.214). On the subject of participation on sport activities, Hooper (cited in Malfas et al. 2004, pp.214) argues that ‘increased sport participation provides a sense of well-being through fun and enjoyment, leading to self-fulfilment and achievement, and encourages social interaction and cohesion for those who may feel socially excluded’. Another not less possible socio-cultural impact of the Olympics might be the transformation of the image of the city to the outside world. In this aspect, if in some cases the efforts for promoting this image can be positive for local communities’ self esteem, in other cases it can involve processes of urban beautification through the eviction of socially vulnerable communities from areas exposed to visitors and the global media (Rolnik 2009, pp.6).

Last, but not least, looking from a socio-spatial perspective, the development of the Olympic related infrastructures can also have positive and negative effects on local communities. The upgrade of the urban infrastructure such as the transport and water sanitation systems, the promotion of affordable housing and the improvement and protection of the natural environment can generate obvious positive impacts in the living conditions of Olympic host cities’ inhabitants as a whole. Also the creation of new and attractive public spaces as part of Olympic related urban projects can be another, not less remarkable social asset for host cities. Furthermore, the possibility of using Olympic equipments, such as stadiums and training centres to stimulate sport, social or cultural activities involving inhabitants in social vulnerable conditions can add extra social value to the Games. Following the same principle, reusing the accommodation facilities built especially for the event to diminish problems of social housing deficit can be also a social strategy of Olympic host cites (Rolnik 2009, pp.4).

Regarding the possible negative socio-spatial effects of Olympic related urban interventions, disruption and disturbance of existing communities by these developments is a major issue host cities may experience. Inner city renewal projects promoted by the Olympics can involve the eviction
of existing working class population and their replacement through gentrification by middle class residents and consumers. Displaced residents, especially economic vulnerable ones, may suffer dislocation from workplaces and from social networks, while remaining residents may experience deprivation and exclusion in areas whose services and facilities now cater for a different social group (Essex and Chalkley 2003a, p.13).

The table on the next page summarizes the classification of the impacts generated by the Olympics on host cities in the four main spheres of influence in which they can take place. Besides this division, the different periods in which these impacts may occur are also indicated.
<table>
<thead>
<tr>
<th>Sphere of influence</th>
<th>Possible positive Impact</th>
<th>Period of the Games</th>
<th>Possible negative Impact</th>
<th>Period of the Games</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-economic</td>
<td>- Generation of wealth through (formal and informal) employment in the construction of Olympic related infrastructure, city marketing developments and in tourism</td>
<td>Preparation, Staging and Post-Games phases</td>
<td>- Decrease of public investment on local demands (education, health, etc.)</td>
<td>Preparation, Staging and Post-Games phases</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Raise of local taxes</td>
<td></td>
</tr>
<tr>
<td>Socio-political</td>
<td>- Empowerment of local communities by participatory planning processes</td>
<td>Bid, Preparation, Staging and Post-Games phases</td>
<td>- Intra urban social conflicts resulting from undemocratic and uncritical decision making</td>
<td>Bid, Preparation, Staging and Post-Games phases</td>
</tr>
<tr>
<td></td>
<td>- Development of the leadership of local governments in decision making</td>
<td>Bid, Preparation, Staging and Post-Games phases</td>
<td>- Weakening of the leading role in decision making of local government due to the overpower of other stakeholders</td>
<td>Bid, Preparation, Staging and Post-Games phases</td>
</tr>
<tr>
<td>Socio-cultural</td>
<td>- Growth of interest of local population in practicing sports</td>
<td>Preparation, Staging and Post-Games phases</td>
<td>- removal of elements (and sometime people) that are detrimental to the promotion of the image of the city from the view of the media and visitors</td>
<td>Preparation and Staging phases</td>
</tr>
<tr>
<td></td>
<td>- Strengthening of regional traditions and values</td>
<td>Preparation, Staging and Post-Games phases</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Transformation of the image of the city internationally</td>
<td>Preparation, Staging and Post-Games phases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socio-spatial</td>
<td>- Upgrade of urban infrastructure (transport and water management systems, affordable housing, public spaces)</td>
<td>Preparation, Staging and Post-Games phases</td>
<td>- Temporary interdict of parts of the city</td>
<td>Preparation, Staging and Post-Games phases</td>
</tr>
<tr>
<td></td>
<td>- Upgrade of the natural environment with possible use for recreation and tourism</td>
<td>Preparation, Staging and Post-Games phases</td>
<td>- Ultimate displacement of local inhabitants (especially low income) directly or indirectly (gentrification) for the construction of Olympic related large urban projects</td>
<td>Preparation and Post-Games phases</td>
</tr>
<tr>
<td></td>
<td>- Post use of Olympic equipments (e.g. sport stadiums, training centres) for sport, social and/or cultural activities</td>
<td>Post-Games phase</td>
<td>- Underuse of Olympic related equipments (e.g. sport stadiums, training centres), the so called ‘White Elephants’</td>
<td>Post-Games phase</td>
</tr>
<tr>
<td></td>
<td>- Transformation of the Olympic/Referee &amp; Media Villages and other Olympic related temporary accommodation (e.g. hotels, etc.) into affordable housing</td>
<td>Post-Games phase</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Part C

Historical Background
Socio-spatial development of the city of Rio de Janeiro

Before 19th century

Although the foundation of Rio de Janeiro dates back to 1565, only in the 19th century the city started experiencing the phenomenon of socio-spatial fragmentation of its urban space. For more than two centuries, the nonexistence of a public transport system and the constant threat of overseas military invasions forced Rio's inhabitants to live relatively close to each other. Furthermore, the physical characteristics of the city's soil, mostly composed by mangroves and marshlands, constituted an extra practical obstacle for the spreading of the city's urban fabric, only possible after costly infrastructural works. In this context, while the majority of Rio's population was composed by slaves (Brazil was a Portuguese exploitation colony till 1822), the local elite houses and most important public buildings were mainly distinguished from others by their form, despite their location (Abreu 2008, p. 35).
19th century

In the first half of the 19th century there was already a subtle division of Rio’s urban territory within different social classes, especially after the arrival and establishment of the Portuguese royal family in the city in 1808. It is only after 1870 though, that the division process becomes more evident. Till this date, only the most well-off inhabitants were able to move away from the congested, most of the times unhealthy urban nuclei of the city. Settling first in rural areas closer to the centre, this group was the only at that time with mobility privileges. The others, slaves and less well-off citizens, would stay in the centre, where all job opportunities were still concentrated. Because these new housing areas could only be inhabited after issues of accessibility were solved by the government with works of land infill, drainage and the construction of paths and roads, it can be argued that already in that times the improvements of Rio’s urban infrastructure aimed on favouring mainly the elite of the city. Following the same logic, in the city centre attention was primarily paid to the areas where this elite developed its daily activities in commerce and services.

Top / Map of the city of Rio de Janeiro in 1854 in which a new area of urban expansion is highlighted. PCRJ/SMU/IPP, 2008
Bottom / Housing estate outside Rio’s urban core in 1865 (in Humaitá). Source: flickr.com
From all new elements introduced in Rio’s urban space, the development of the city’s transport system was the most decisive one in what regards its socio-spatial organization throughout time. The year of 1870 is emblematic for the establishment of a comprehensive system of public transport directed not only to the city’s elite but also to less privileged inhabitants of Rio. In opposite directions, horse-drawn trams would facilitate the expansion of the first group to the south and steam trains would enable the second group to also move away from the centre, north- and westwards. Qualitative-wise, it is important to mention that while the trams would support an area with an already certain degree of urban development, meeting an existing demand for a better, fast and regular connection with the centre, the trains would, on the contrary, serve areas so far very weakly connected to the city core and still with a strong rural character. At this specific moment of the city’s history the process of socio-spatial segregation would be extremely accelerated, marking the human geography of Rio till the present time.
Although the implementation of the above mentioned public transport system had generated deep transformations in the city's socio-spatial structure, namely the decentralization and polarization of its inhabitants within the Rio's territory, this fact did not diminish the pressure over the most central districts of the city. Following new commercial and service functions established in these areas, a considerable number of migrants, many of them with very limited economic resources, had no other choice than living close to the existing job opportunities. Date from this time the growth of the so called 'cortiços', a typical housing typology developed by private land owners (or rented from those to secondary developers) to accommodate, generally in very bad spatial conditions, the low income working class of Rio.

Top / The spots on the map mark the collective houses (cortiços) existing in the centre of the city of Rio de Janeiro in the end of the 19th century. Source: Vaz, 2002.
Bottom / Collective space in a 'cortiço' in Rio de Janeiro,1906. Source: arquitetonico.ufsc.br
20th century

The next and most relevant period of Rio’s history which influenced the city’s socio-spatial structure took place between the years 1902 and 1906. At this moment, the rapid growth of the Brazilian economy as the biggest coffee exporter in the world and its definitive insertion in the capitalist system demanded some deep structural changes in many of its cities’ urban spaces, especially in Rio, the country’s capital then. Besides the expansion and modernization of its harbour, the city’s most central districts urged for the upgrade of their image as a modern capitalist centre. The enlargement and sanitation of existing streets and the construction of sumptuous avenues and boulevards with new symbolic buildings implied that the remaining low income collective houses located in these central areas would have to be in great part extinguished. Having very few options, their residents would be forced to move to the outskirts of the city or to establish new settlements on the hilly slopes of these same central districts, giving rise to a new urban typology called ‘favelas’ (slums).

Noteworthy in this period was the active role of the government, especially on the municipal level, in the transformation of Rio’s urban space. If till then the participation of local authorities were mostly limited to the regulation and the stimulus (or control) of private ventures, after 1902 they would directly invest in urban infrastructure, exclusively in the city centre and in bourgeois neighbourhoods. By doing so, the government accelerated and consolidated de process of socio-spatial segregation already in course since the previous century.
Top / Morro do Pinto Slum in 1912. Source: nuevomundo.revues.org
Bottom / Morro da Providência, known as the first slum of Rio, in the end of the 19th century. Source: arquitetonico.ufsc.br
Between 1906 and 1930, the development of Rio's urban space continued to occur in two distinct directions enhancing the socio-spatial division of the city. While in the most central districts of Rio (also along the coast) the infrastructural works for their modernization and beautification were intense and heavily supported by the government, the suburban neighbourhoods of the city, with an increasing number of industries, did grow without almost any governmental help and therefore basic public infrastructure.

Top / Rio's coastal area in 1911.
Source: Royal Geographical Society, available at Facebook/Fotos do Rio de Janeiro Antigo
Bottom / Rio's suburban neighbourhood of Penha in 1909.
Source: Revista da Semana, available at Facebook/Memórias do Subúrbio Carioca
The period between 1930-1964 has a special importance for the history of Rio’s socio-spatial development for the spatial contradictions that were built during that time. If the process of spatial segregation following the model centre developed / periphery underdeveloped was somehow desired by the richest sectors of the society, this spatial arrangement became disadvantageous for their own economic development. As the distances between the living and working spaces of the working forces were growing every time more with the occupation of areas further away from the centre (the first suburban settlements were also experiencing processes of land speculation at that moment), an option for this working force, to some extent supported by a government with strong populist character, was to join the groups that were already living in precarious conditions close to the valuable areas of the city, where most of the jobs opportunities were also located. In this context, not only public areas but also private properties that were found empty for the difficult physical conditions they presented for development or for reasons of land speculation were illegally occupied by low income dwellers. Although it can be argued that in this period of time the socio-spatial segregation process of the city was attenuated by the physical rapprochement between the two socio-economically extremes groups of Rio’s society (Abreu 2008, pp.144), the difference in spatial quality encountered in the areas inhabited by these two groups is an evidence that this socio-spatial segregationist was in fact intensified in a smaller intra-urban scale.
The resumption of the process of socio-spatial segregation of the city of Rio de Janeiro, according to its original pattern dating from 1870, took place from the half of the 20th onward. After 1950, when the scarcity of space for new developments in the already consolidated central areas of the city started to become a problem (especially for the Real Estate market), two main initiatives for dealing with this problem can be verified, both of them detrimental to the less well off inhabitants of Rio. Following the development of the automobile industry, a number of large scale projects regarding the construction of roads, bridges and viaducts were conducted in the city, linking its developed urban centralities (also in the suburbs) with other similar locations in the region. As it happened in the beginning of the 20th century with the modernization and beautification of the city centre, low income communities that were in the way of these developments were evicted from their original site. The other initiative that influenced the socio-spatial structure of Rio in that time was the demolition of a number of slums illegally situated in valuable private areas of some central districts of the city so that in their places new high profile developments could be build. The displacement of slums from public land (especially on the top of the city's hills) was also verified in these same areas, a prerequisite for economic appreciation of surrounding Real Estate market new developments. In this context, many of these low income communities were resettled in the periphery of city, in areas with very low quality spatial conditions.
Following the same logic of the initiatives described in the previous paragraph, that is the search for new areas for the expansion of the formal city focused on Rio’s elite groups, a new axis of urban development started being explored by the Real Estate market from 1970s onwards. In this period again, the role of the government was decisive for the further socio-spatial segregation of Rio’s urban space. While heavy public investments were made in order to connect this new area with the rest of the city (through the construction of roads and the implementation of some basic public services), the suburban districts of the city that always presented some serious spatial issues were left behind. This new area, called Barra da Tijuca, is up to the present time the most and only important axis through which the city (the richest part of it) expands itself, though problems resulting from the saturation of its existing urban infrastructure can be already felt by its residents and visitors.

Although along the 1990s improvements on the spatial quality not only of some suburban centralities of the city but also of some existing inner-city slums, were conducted through large scale projects of urban regeneration (Rio Cidade Program) and slum upgrading (Favela Bairro Program) sought to reduce the gap between the developed and the undeveloped parts of Rio, these initiatives, though important, were not sufficient to change the socio-spatial dynamics of the city.
21st Century

As the last large urban projects planned for Rio de Janeiro in the coming years - the urban regeneration of Rio’s old harbour district and the development of new living & working areas in Barra da Tijuca as a result of the preparation for the 2016 Olympic Games - do not involve consistent programs for low income inhabitants. Existing programs for the construction of affordable housing for this group are still concentrated in peripheral areas of the city, poorly connected to its dynamic centre (Barandier Jr, 2012), it can be concluded that till the beginning of the 21st century the socio-spatial development of Rio de Janeiro is still based on socio-spatial exclusionary processes.

Main source of the text: Abreu, 2008
Part D

Spatial Analysis
1. Rio 2016 Olympics UELP socio-spatial framework

1.1 General aspects of the plan

Rio 2016 Olympics UELP (2009) was elaborated by the city's municipal government (through its Department of Urbanism) as part of Rio's bid for hosting the 2016 Olympic Games. The plan comprises a set of general proposals of urban interventions that aims on adapting the physical requirements of the event to the long-term spatial demands of the city, those last expressed in Rio's master plan (see table below).

In the plan, two different scales of spatial intervention are established: macro and local. The macro plan comprises those interventions that exceed the areas where the Olympic activities will be performed and explores four main themes: (A) Transportation & Road System, (B) Natural Environment, (C) Urban Water Management/Sanitation and (D) Housing & Social Development. The local plans, 6 in total, are focused on the locations where the Olympic equipments will be installed and in their immediate surroundings. Besides the themes explored in the macro plans, attention is also paid to the restructuring of the urban space of these localities through the reorganization of their urban tissue and public areas. The chosen themes have direct relation with the ultimate goal of Rio 2016 Olympics UELP, that is the improvement of Rio de Janeiro’s inhabitants’ quality of life by (CELU 2009, pp. 7-8):

- the protection of the city's natural environment;
- the promotion of social inclusion;
- the attraction of investments to the city;
- the improvement of Rio's mobility and accessibility and
- the balancing of distribution of public services within the city's territory.

<table>
<thead>
<tr>
<th>Urban legacies / convergences</th>
<th>Games Candidature Files</th>
<th>Rio de Janeiro Master Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodation/Housing</td>
<td>Olympic, Referee &amp; Media Villages, supporting hotels</td>
<td>Housing deficit decrease, housing production stimulus, development of housing in central districts</td>
</tr>
<tr>
<td>Urban Transportation</td>
<td>Accessibility to Olympic Venues</td>
<td>Urban Transportation Master Plan: transport system rationalization / investments in road infrastructure and public transport</td>
</tr>
<tr>
<td>Urban Sanitation &amp; Natural Environment</td>
<td>Environmental sustainability: minimum impact on natural environment</td>
<td>Universal sanitation, pollution control, environmental heritage protection, increase of forestation</td>
</tr>
<tr>
<td>City Appreciation</td>
<td>Focus on environment &amp; landscape appreciation and protection and on social inclusion</td>
<td>Focus on the natural and cultural heritage protection and in a more just and balanced distribution of urbanization benefits</td>
</tr>
</tbody>
</table>

Source table: CELU 2009 (translated by author)
1.2 Rio 2016 Olympics UELP - Macro Plans

The following analysis of the four macro plans of Rio 2016 Olympics UELP has its main focus on the possible impacts of the plan’s proposed interventions on the socio-spatial structure of the city of Rio de Janeiro. For each theme (Natural Environment, Urban Water Management/Sanitation, Transportation & Road System, Housing & Social Development) the existing situation with the problems identified by the government as well as the planned interventions to solve them are mapped and examined from a socio-spatial perspective.
Natural Environment

• Existing situation

Over the last years, the city of Rio de Janeiro has experienced a rapid and uncontrolled growth of its urban space generating great pressure over the city's natural environment. Between the years 1984 and 2001, Rio’s natural surface, basically composed by forests on hilly parts of the city and of wetlands and sandbanks on lower parts, decreased around 16% of its total size (CELU 2009, pp.42). Although 19,1% (23,408 ha) of Rio's territory is environmentally protected by law, these areas are also threatened by the expansion of both formal and informal urban settlements, fact that causes the disturbance of the city's ecosystem and the mischaracterization of its natural as well as cultural landscape (CELU 2009, pp. 44-45). Furthermore, as many informal settlements are located close to these natural areas, these communities become more vulnerable to environmental disasters such as landslides and floods every time the local ecosystem is damaged (see maps on next page).

• Rio 2016 Olympics UELP interventions

In order to restore and protect Rio's remaining ecosystem and natural landscape, and to conciliate them with the city's urban growth, the measures to be implemented by Rio 2016 UELP include:

- Reforestation of the city's main forests, wetlands and sandbanks;
- Upgrading of the infrastructure of existing natural parks for recreational and touristic purposes;
- Implementation of an efficient monitoring system to strengthen the boundaries of environmentally protected areas so that further invasions are avoided and to control/measure the quality of the natural environment itself (water, air, vegetation, etc.);
- Reduction of energy consumption in public buildings: 30% in existing buildings and 50% in new ones.

Socio-spatial implications of Rio 2016 Olympics UELP interventions

Besides the evident benefits that an upgraded natural environment can generate to the inhabitants of Rio de Janeiro as a whole (better air and water qualities, etc.), the proposed programs of reforestation (some of them already in course for a few decades) have the potential to generate employment especially among the most socio-economically vulnerable groups in the city. Today, around 1000 people already work in such programs in different areas of Rio (CELU 2009, pp.48).

Regarding the planned improvements of the city's natural parks infrastructure, besides the wide range of new jobs related to leisure and tourism these spaces can generate, these upgraded green spaces themselves can work as places for contact and interaction among different social groups.

Lastly, as the borders of the city's main environmentally protected areas are better monitored, less are the chances of having socio-spatial conflicts in these zones.
Variation of the city's natural surface 1984-2001
Source: maps by author based on PCRJ/SMAC/IPP, 2005

Slums inside/close to protected areas
Source: maps by author based on PCRJ/SMAC/IPP, 2005

Natural Environment / Existing Situation

Natural Environment /
Rio 2016 Olympics UELP Interventions
Source: map by author based on CELU, 2009
(B) Urban Water Management/Sanitation

• Existing Situation

One of the biggest issues related to Rio's sanitation has to do with the fact that still today the city does not have completed its sewage, water supply and garbage collection systems. In 2000 90.65% of the city's population had access to these three systems together although in 23.5% of the cases the sewage was treated individually, apart from the city's general system (CELU 2009, pp.51-52). Regarding the management of Rio's urban water (rain water), because a great part of the city is formed by lowlands, the drainage of these lower areas is another problem to be solved. In occasions of heavy rainfall or sea level rise different parts of the city are flooded, not only because of the extra amount of water alone but also because of the sewage and garbage that are discharged on rivers and other water bodies, overloading the city's drainage system. Given that many informal settlements are located in these floodable zones, these communities are therefore very vulnerable to environmental disasters.

• Rio 2016 Olympics UELP interventions

Acknowledging the fact that deficient sewage, garbage collection and drainage systems can be very harmful not only for Rio's natural environment but also for the city inhabitants' health, Rio 2016 Olympics UELP spatial interventions on the theme of urban water management/sanitation comprise the following measures:

- Sewage system upgrading in the areas of influence of the 2016 Olympic Games which are weakly served by the city's large scale sewage system;
- Garbage collection system upgrading though physical mechanisms (dams/filters) installed along rivers and other water bodies and through programs for cleaning up and restore degraded areas (riverbanks, beaches, etc.) in different locations in the city.
- Drainage system upgrading mainly though the dredging and cleaning up of rivers and lagoons in areas with high incidence of floods.

• Socio-spatial implications of Rio 2016 Olympics UELP interventions

Like the interventions on Rio's natural environment, the upgrading of the urban water management/sanitation of the city has direct relation with the improvement of the living conditions of Rio's citizens in general. In addition, the programs of restoration and maintenance of the city's natural open spaces (rivers, lagoons, beaches, etc.) can also generate employment among Rio's poorest inhabitants and enhance the potential of these upgraded areas in becoming new public spaces for leisure and social interaction.
Urban Water Management / Existing Situation

Source: Map by author based on CELU, 2009

Spatial Analysis

Planning Area 5 (AP5)
86.29% houses with all public services*
50% houses connected to sewage system

Planning Area 4 (AP4)
82.43% houses with all public services*
67.6% houses connected to sewage system

Planning Area 2 (AP2)
94.98% houses with all public services*
95.4% houses connected to sewage system

Planning Area 1 (AP1)
92.63% houses with all public services*
90.6% houses connected to sewage system

Planning Area 3 (AP3)
93.91% houses with all public services*
86.5% houses connected to sewage system

KEY
- mountains (H > 100m)
- Planning Area (Área de Planejamento)
- * Public services: water supply, garbage collection & sewage system
- ** Data from the year 2000

Urban Water Management / Rio 2016 Olympics UELP Interventions

Source: Map by author based on CELU, 2009

Spatial Analysis

KEY
- sewage system upgrading
- drainage system upgrading
- lagoon upgrade (shelving & further protection)
- beach upgrading & protection
- sand collection from foreshore
- beach restructuring
- garbage collection program
- Olympic sites

Source: Map by author based on CELU, 2009
(C) Transportation & Road System

• Existing Situation

Already for some decades, the transportation of the city of Rio de Janeiro has mainly relied on its road system, leaving behind other more efficient transportation modes such as train and metro. Another issue related to the mobility pattern of Rio is that, because of the spatial retractions imposed by the city’s natural topography, the number of existing structural roads connecting the different parts of this system are few in number and mainly oriented east-west, a reason for constant traffic congestions. A third point discussed in Rio 2016 Olympics UELP relates to the mismatch between the city’s existing transportation system and land use pattern, fact that compromises the efficiency of the system and a balanced development of Rio’s urban space. Lastly, regarding the limited non-motorized modes of transportation available in Rio today, although the use of bicycles can be verified in many parts of the city, the poor infrastructure (cycle paths) and missing connections with other transport systems can be seen as a missed opportunity for stimulating a more economically, environmentally and socially sustainable urban environment.

• Rio 2016 Olympics UELP interventions

The interventions related to the upgrade of Rio’s transportation & road system have a central position in Rio 2016 Olympics UELP for its direct impact in the logistics of the Games. Given priority to public high capacity transportation systems, the plan includes:

- The upgrading and modernization of the city’s air and railway systems (through renovations of Rio’s international airport and strategic train stations, and the purchase of new trains);
- The extension of an existing metro line (connecting the centre with Barra da Tijuca);
- The implementation of a new high capacity transport system (BRT - Bus Rapid Transit);
- The enlargement of some existing strategic roads and the construction of other mobility related infrastructure (bridges, etc.);
- The improvement of the accessibility of main train, metro and bus stations to physically disabled people.

The interventions mentioned above, especially the implementation of the BRT system, aim on improving Rio’s mobility pattern not only by serving areas lacking of high capacity transport modes but also by improving the connection between the northern and the southern parts of the city.

• Socio-spatial implications of Rio 2016 Olympics UELP interventions

Besides the upgrade in comfort for the users of public transport in general, the interventions proposed on the theme of transportation and road system are expected to have direct impact on the poorest inhabitants of Rio (or to some part of them). The fact that the new BRT lines intersect other transport lines (especially the suburban railways) creates new opportunities for peripheral areas to develop themselves as strong centralities in the city, providing jobs and other benefits to larger groups of the society. At the same time, these new or improved connections facilitate the access of people living in these peripheral areas to the centre of the city, where many facilities are located (jobs, leisure, etc.).

Regarding the possible negative impacts of these mobility related interventions to the socio-spatial structure of Rio, two main issues can be pointed out here, given the historical background of the city. One relates to the direct displacement of low income communities to give space to the contraction of these interventions (Faulhaber 2012, pp.49). The other one relates to the indirect dislocation of these same groups through processes of gentrification as the areas surrounding these interventions become more valuable after these spatial improvements.
Transportation & Road System / Existing Situation
Source: Map by author based on CELU, 2009

Transportation & Road System / Rio 2016 Olympics UELP Interventions
Source: Map by author based on CELU, 2009
(D) Housing & Social Development

• Existing Situation

As the Human Development Index (HDI) of Rio show, the social vulnerability of a considerable number of the city's inhabitants has to do not only with low socio-economic (income) and cultural (education) standards of its population but also with the poor spatial quality of some communities within Rio's urban environment (mainly represented by slums). Analysis of the 2000 National Census indicates that the housing deficit³ existing in the city today is concentrated among Rio's poorest inhabitants. Furthermore, it was also verified that in the numerous precarious settlements of the city, the main spatial issues relate to the lack of proper public services supplying these areas, followed by problems generated by the high density and the informality (in terms of land tenure) of these communities (CELU 2009, pp.58). Between 1991 and 2000, while the formal part of Rio grew 3.63%, its informal settlements grew 23.80% (CELU 2009, pp.59).

Another issue that affects Rio's socio-spatial structure today relates to the process of urban sprawl verified through the emptying of the most central districts of the city. As it was stated in Rio 2016 Olympics UELP, given that these areas are already equipped with urban infrastructure, they have the potential to partly accommodate the city's housing demand (CELU 2009, pp.59).

³ The general definition of housing deficit can be understood in two main dimensions. One relates to the need of construction of new housing unities both to replace and to increase the existing housing stock. The other reflects the problems regarding the spatial conditions of part of these existing housing unities that are not related to the proportion (number) of the housing stock itself but to particular internal aspects of these housing unities (FJP 2005, pp.3).

• Rio 2016 Olympics UELP interventions

In order to mitigate the social problems of the city, Rio 2016 Olympics UELP proposes some interventions focused mainly in the construction/upgrading of Rio's social infrastructure including new affordable housing and socio-cultural/educational/sportive equipments. In what regards the improvements on the housing deficit problems of the city, three are the main directions explored by the plan: one relates to the upgrading of the spatial conditions of some existing slums, another to the transformation of a number of empty buildings into housing in most central districts of the city and a last one to the construction of new housing complexes in specific areas of Rio. These two last interventions aim primarily to accommodate the families that are evicted from sites where Olympic related construction works are to be executed. The maps at the end of this paragraph indicate all spatial interventions regarding the theme of housing and social development planned by Rio 2016 Olympics UELP.

• Socio-spatial implications of Rio 2016 Olympics UELP interventions

Although some measures proposed by Rio 2016 Olympics UELP are expected to improve the quality of life of inhabitants of Rio through the upgrading of their living environment (with new and better houses, and more general social equipments), some aspects of the plan, in combination with the master plan of the Games can be seen as promoters of further socio-spatial conflicts in the city. This conclusion can be better understood when the table showing the convergence of goals between the Olympic plan and the city's master plan is further analysed.

Starting with the goal of accommodation/housing, the fact that the post use of all Olympic related accommodations (for athletes, referees and media professionals) are not planned for low income dwellers, it is not possible to relate them with the decrease of the city's housing deficit, at
Lastly, a point that was ignored in Rio 2016 Olympics UELP refers to the lack of participation of Rio’s inhabitants, especially the ones directly affected by Olympic related projects, during the plan’s elaboration phase. Although participatory planning is stimulated by the city’s master plan, Rio 2016 Olympics UELP acknowledges governmental agents as the only promoters of the city’s urban development (CELU 2009, p. 7). As a consequence of this way of planning, many conflicts have arisen between Rio’s municipal government and local low income communities living in areas under the influence of Olympic projects and marked to be evicted.

On the same topic (accommodation/housing), it is also questionable to what extent the stimulus for housing production in Rio’s most central districts will benefit the city’s less well off citizens. Apart from the fact that any social housing will be part of the Referee & Media Village project’s programme, increasing processes of land speculation and gentrification are already noticeable in such central areas. Statistics show that in Centro district, the square meter price for housing had raised 54.5% between July 2010 and July 2011 (FIPE ZAP). The consequence of this phenomenon on social inclusion is that it becomes less feasible for the government to stimulate the production of social housing in those valued areas as land gets increasingly expensive. In addition, as living costs raise, chances are bigger that local low income communities are forced to move to the outskirts of the city.

Another issue regarding the same subject relates to the locations of the new housing projects where people evicted from the areas developed for the Olympics will be resettled. As the maps show, these projects are almost entirely located far from the original site of the relocated communities and in areas where, besides upgrades in the transport system, no spatial improvement is made.

On the topic of ‘city appreciation’, the assumption that the Olympic plan does follow Rio’s master plan guideline of a balanced and just distribution of urban infrastructure, public services and other urbanization benefits within the city falls apart when most Olympic related infrastructure (Olympic Park and Olympic Village) is allocated in Barra da Tijuca.
Housing and Social Development / Existing Situation

Growth of slums 1991-2000

Source: Map by author based on Cavallieri et al. 2007 & CELU, 2009

Housing and Social Development / Rio 2016 Olympics UELP Interventions

Source: Map by author based on CELU, 2009

Map of evicted slums and relocation sites
source: Faulhaber, 2012
1.3 Rio 2016 Olympics UELP - Barra da Tijuca Local Plan

The local plan for the district of Barra da Tijuca in one and the most important of the six local plans designed in the Rio 2016 Olympics UELP since it is in this area in which most Olympic related infrastructure (Olympic Park and Olympic Village) will be built. Given that the main problems identified by the government in the area relate to the district’s mobility (inexistence of high capacity transport system) and natural environment (pollution of natural resources), the main proposals of Barra da Tijuca local plan are:

- Implementation of a Bus Rapid Transit (BRT) along districts main roads;
- Enlargement of some existing roads and construction of some bridges;
- Upgrading of the district natural environment by the remediation of lagoons and rivers and reforestation of its riparian vegetation and by the creation of a natural park near the Olympic Park;
- Upgrading of water management/sanitation of the area by improvements of the region’s sewage, waste collection and drainage systems.

Some of the interventions mentioned above overlap with the interventions of Rio 2016 Olympics UELP macro plans described in the previous subsection of this thesis.

Socio-spatial implications of Rio 2016 Olympics UELP interventions

From the socio-spatial perspective, apart from the upgrade of the district’s public transport system which in fact will improve the accessibility to the area connecting it to other parts of the city, it can be argued that the interventions planned for Barra da Tijuca could better address its social issues. Improvements in the natural environment and in sanitation alone are not expected to bring any change in the district’s socio-spatial dynamics although they might be able to improve the quality of life of Barra’s inhabitants in general. In effect, there is a risk that with these improvements, land prices will raise even more and so will the segregationist character of the district.

The most striking point of the Barra da Tijuca local plan relates to the fact that its scheme does not address the theme of (affordable) housing and social development. Controversially, Rio’s 2016 Olympics UELP indicates that between 1991 and 2000 the region in which the district takes part (Planning Area 4 - AP4) had the highest growth rate of slum population (approximately 100%) among all other parts of the city (CELU 2009, pp.59). Contrary to the city’s housing policy guidelines and using the Olympic plan as justification, the municipality of Rio has already evicted some of these communities from the Barra da Tijuca region. Not offering possibilities for resettling them within the same area is an evidence of the social segregationist content of the government’s plan.

Depending on how it will be developed and managed, the one and only element of the plan able to bring real social benefits to the district is the natural park planned near the Olympic Park. The location of this park can be questioned however since it replaces a low-income community.

Map of the municipality showing the BRT source: website municipality
**Transportes e Sistema Viário**
- Via Parque: Implantação da Via Parque na sua totalidade ligando a Avenida Arnon Senna e Avenida Abelardo Bueno
- Novas pontes
- Avenida Grande Canal
- Urbanização da Avenida Grande Canal
- Duplicação da Avenida das Américas
- Duplicação e urbanização do trecho final da Av. das Américas entre a Av. Salvador Allende e o Recreio Shopping
- Implantação do Corredor T5 com BRT (Plano Macro)
- Implantação de sistema tronco-alimentador, operando em via segregada do tráfego geral, que se estende da Barra da Tijuca até a Praia.
- Implantação do BRT Zona Sul-Barra (Plano Macro)
- Implantação de Sistema tronco-alimentado, a ser operado em via segregada do tráfego geral, que se estenderá do terminal Alvorada, na barra da Tijuca, até a estação General Osório
- Implantação da Ligação C com BRT (Plano Macro)
- Implantação de Sistema tronco-alimentado, a ser operado em via segregada do tráfego geral, que se estende de Deodoro até a Barra da Tijuca
- Alargamento da Avenida Salvador Allende (Plano Macro)
- Alargamento da Avenida Salvador Allende entre a Avenida das Américas e a Estrada dos Bandeirantes
- Alargamento do trecho final da Av. Abelardo Bueno e da Av. Ayton Senna (Plano Macro)
- Implantação da Linha 4 do Metrô (Plano Macro)

**Estruturação do Espaço Urbano**
- Reurbanização de áreas públicas no entorno do equipamento e acessos
- Reurbanização de áreas públicas ao longo dos corredores de intervenção

**Meio Ambiente**
- Criação de parque nas margens da Lagoa de Jacarepaguá contíguo ao Parque Olímpico
- Implantação de Parque Ecológico de recuperação e proteção a mata ciliar
- Criação do Parque da Cidade de Deus
- Implantação de um cinturão verde nos limites do bairro

**Saneamento Ambiental**
- Programa de Proteção do Sistema Lagunar de Jacarepaguá (Plano Macro)
- Implantação de 4 Unidades de Tratamento de Rio - UTR’s nos rios dos Pedras, Avil, Armeo Pavuna e Pavuninha
- Dragagem do Sistema Lagunar de Jacarepaguá (Plano Macro)
- Dragagem em diversas cursos d’água, nas bacias das lagos e Oceano Atlântico
- Estabilização da Barra do Canal de Sernambetiba (Plano Macro)
- Dragagem de canais e construção de guias corrente na barra do Canal de Sernambetiba
- Reabilitação Ambiental da Baixada de Jacarepaguá (Plano Macro)
- Reabilitação do trecho de Jacarepaguá à Barra da Tijuca
- Programa de Saneamento da Baixada de Jacarepaguá - PSBJ (Plano Macro)
2. Barra da Tijuca socio-spatial analysis

2.1 Precedents - Barra da Tijuca Master Plan (1969)

Isolated in the north, east and west by mountains and in the south by the sea, the area known as Baixada de Jacarepaguá – Jacarepaguá Lowlands – was till the 1960s a remote and scarcely occupied region in the western part of Rio de Janeiro city. By mid-1960s, the authorities started working on extension plans for the city and its surrounding metropolitan region, with the perspective of a considerable population growth as a consequence of the migratory process in course in the country. As a starting point, taking advantage of the favourable economic situation in terms of capital availability, the government heavily invested on infrastructural works – especially road networks for the automobile - to link the already consolidated parts of the city with this yet almost deserted region. Its dimensions – 160km², of which 122,5km² were suitable for urbanization – corresponded to approximately 25% of the entire city's usable surface (Resende, 2005). As an extension of the neighbourhoods situated along the coast of the city – mostly occupied by high income residents – the new district of Barra da Tijuca was intended, since its beginning, exclusively for this segment of society which had most benefited from the 'economic miracle' experienced in the country at that moment.

In 1969, invited by the local authorities, Lucio Costa presented his plan for Barra da Tijuca (see plan on the next page).

According to Costa (1969), the development of Barra da Tijuca represented a unique opportunity for reuniting the city of Rio de Janeiro. For its strategic position, at the geographical centre of the city, Barra da Tijuca was seen by the planner as the missing link between Rio’s north and south regions, which have grown throughout the time in opposite directions (see pictures on the left).
Main design concepts of the plan

**Structuring elements**

In what concerns the large scale spatial structuring of Barra da Tijuca, Costa adopted a pragmatic approach by defining two main axes - north-south/east-west - of development (see map on previous page). Those axes, which in fact were inherited from previous plans designed for the region, oriented the whole urban design scheme. To somehow counterbalance the linear pattern of spatial organization, a number of building nuclei and other special buildings were arranged sparsely along these two axes.

**Hierarchy of centralities and functions**

Also rational was the selection of the locations for the different functions proposed by Costa for the area. Organized under a hierarchical order, basically three levels of spatial influence can be verified. The lower one consisted of a number of autonomous single-family houses or apartment buildings nuclei dispersed along the main east-west axis. Noticeably based on Clarence Perry’s (1929) concept of neighbourhood units, these nuclei were limited to provide housing and other basic facilities on local level, aiming on a prosperous and healthy community life. The next – medium – level of urbanity established by Costa can be found on the two planned centralities of Barra and Sernambetiba. Positioned at both ends of the main east-west axis, these centralities comprised, besides residential unities and other basic daily life urban functions, also office buildings, commercial, cultural and entertainment facilities (Costa, 1969). In this case, the area of influence of these mixed use nuclei would encompass the whole district. The last and most prominent level in the functional structure of Barra da Tijuca was represented by a new Centre Business District to be situated on the northern part of the north-south main axis of the plan. Though not detailed by the planner, this new CBD was intended to represent the core of the neighbourhood as well as the whole metropolitan region of Rio de Janeiro. Between the CBD and the intersection of the plan’s two main axes, special functions of educational, touristic, administrative and political character were planned in order to highlight the significance of the new district within the city and metropolitan region.

**Transportation system**

Regarding the transport network system, although originally some types of public transport structures were mentioned, the plan is noticeably structured by roads and highways, designed especially for the automobile, a global trend at that moment, strongly supported by the government and the automotive industry.

The scheme on the right illustrates the elements described above.
Author's own diagram against Costa's plan on the background.
• Harmony between the built environment and the nature

From the beginning, it was a major concern of Costa to conciliate, in a harmonious way, the existing local natural features of Barra da Tijuca and his urbanization plan, an attempt to prevent the area from the same negative results found in other parts of the city, where an intense and predatory occupation disregarded the pre-existing landscape. To achieve this goal, some decisions in terms of design concepts were applied by the planner. The first one relates to the proposal of a low density model of land occupation. Another resolution was to concentrate and to 'verticalize' some buildings in order to liberate the ground level and give space to the nature. In this sense, some agglomerations of skyscrapers were placed in some locations of specific interest. According to Costa (1969), those skyscrapers would have the extra function of giving some direction and rhythm to the composition and offering the residents a privileged view of the surroundings. In addition, the proposed construction of some of the buildings over stilts and other compositional elements, such as roofs coloured in green or white, and natural fences instead of walls dividing the housing estates plots, had also the same objective of highlighting the local landscape (see figures on the right). A great preoccupation of Costa was to keep the neighbourhood's coastal area as much untouched as possible, so that its original 'wild' environment could be preserved. Only in few spots some recreational functions could be added.

Top / Costa’s croquis on the relation between the (planned) built and natural environment of Barra da Tijuca region. Source: Costa, 1969

Bottom / Project for a residential nuclei with towers in Barra da Tijuca designed by Oscar Niemeyer. Source: www.rioquepassou.com.br
The Plan of Lucio Costa, as it was realized

In 1969, right after its public announcement, the Master Plan of Barra da Tijuca was transformed into a law and a special committee was appointed for working out its detailing and implementation. However, the first parameters for the area occupation were only established in 1976 (Resende & Leitão, 2006). Apart from small changes, mostly discussed by a selected committee – in which Costa took part as a special consultant – the content of the plan was significantly altered only in 1981. Having the global economic crisis of 1973 and its following recession years as a justification, the capital representatives, supported by the local government and planning technicians, proposed to adjust the plan to the latest national socio-economic circumstances (Leitão, 1999). After long discussions among all different involved parties – including Costa – a new set of regulations was established. As expected, the capital prevailed after all, disregarding the parameters and restrictions set up in Barra da Tijuca’s original plan, particularly in relation to the buildings’ morphology and to the area’s land use. From this moment on, the real estate sector, supported by other parties with similar economic and political interests, orientated the directions of the neighbourhood urban development mostly based on the latest international capitalist trends of that time.

Starting from the densification parameters proposed by Costa, the idea of a low density model occupation was immediately refused by the real estate sector. The high profitability that was implied in the land value was an obvious reason for that. Thus, the result of this structural change in the spatial configuration of Barra da Tijuca was the indiscriminate emergence of a great number of skyscrapers and other kinds of building typologies everywhere in the neighbourhood. In relation to the initially established zoning delimitations, also the original rules were not followed, especially along the coast area where Costa strongly insisted on keeping as much untouched as possible. There, for the same free market oriented reason, many functions were arbitrarily added, which together with the broadening of the existing costal road did mischaracterize Costa’s plan the most.
In relation to the rational organization of the space, the only thing that was actually accomplished as proposed in the original plan, was the definition of the two main north-south/east-west axes as elements of the spatial structuring. However, if in one hand these elements were responsible for organizing the different functions newly settled in the neighbourhood in a systematic way, on the other hand, due to their unrealistic dimensions, they also contributed to the processes of uncontrolled urban sprawl and spatial fragmentation (see picture on next page, top left). Furthermore, the initiative of promoting a transport system based exclusively on the automobile at the expense of the other planned possibilities enhanced substantially the problems mentioned above.

Regarding the hierarchical centralities proposed by Costa, due to some facts that occurred in the national political and economic context, the configuration of these elements would drastically change. As a result of the economic crisis experienced in the country during the 1970s and the incapability of the local government to further coordinate the development of the area, other actors took over the task. Also dates from this time the growth of criminality and violence within the city borders, another consequence of the 1970s crisis. Because of these circumstances, a new phenomenon – also verified in other western countries – distorted completely the character of some urban relations: by reason of security and economic profits, many spaces that formerly belonged to the public domain were transformed into private enterprises. In this sense, following the 80's international capitalist tendency, most of the services and commerce, combined with entertainment facilities, were dispersed through the neighbourhood in a new typological structure: the shopping malls (picture on next page, middle left). However, more controversial and criticized are the results of the implementation of the residential autonomous nuclei imagined by Costa, indeed, a modern version of the neighbourhood unity concept presented in his original plan. Composed by a cluster of housing unities – mostly housing estates – and several facilities, the so called ‘gated communities’ dominated the urban landscape of Barra da Tijuca and became the most popular living typology among its residents. Isolated by walls and fences and exclusive in its social composition, these structures are appointed as main responsible for the existing local social and spatial segregation, but yet a model exported to other parts of the city, as label of a certain desired lifestyle (picture on next page, bottom left).

At last, in relation to the proposed Central Business District, the new ‘Metropolitan Centre’ of Rio de Janeiro in Costa’s vision, due to the lack of political effort in acquiring the land from its private owners in the beginning of the urbanization process and to constant real estate speculation in the area (Eppinghaus, 2004), the new centre – and key project of Costa’s master plan – remains up to the present moment almost untouched (picture on next page, top right).
Top left / Urban sprawl of Barra da Tijuca. Source: www.panoramio.com
Middle left / Shoppingcenter in Barra da Tijuca. Source: www.rionoticiasagora.blogspot.com
Bottom left / Entrance of gated community. Source: Google Images
Top right / The unfinished CBD of Barra da Tijuca. Source: GoogleEarth
2.2 Barra da Tijuca typomorphological analysis

The following analysis on the existing morphologies and typologies of Barra da Tijuca aims on defining elements of the neighbourhood’s urban form that have direct impact in the socio-spatial dynamics of the district and that can be used (or avoided) in my design intervention.

My analysis is divided in three scales, here classified from large till small as: (1) district, (2) community and (3) street, lot and building. Community here means parcels of the district with similar spatial characteristics.

Already in the analysis on the scale of the district, it becomes apparent that Barra da Tijuca can be generally divided in two different parts. One part relates to the area that was planned and partly developed before Costa’s plan of 1969. This part has many similarities with other high income neighbourhoods of the city that were built during the 1940s/50s and 60s. The other part relates to the area developed after the 1970s, partly following the planner’s guidelines.

(A) Street Patterns

Streets are generally the first spatial elements introduced when a new area is being developed, forming the basic structure in which new functions are organized. Besides that, streets are also responsible for connecting or disconnecting these functions, providing or blocking one’s accessibility to specific areas of the territory whenever needed or wanted. The way streets are laid down also determine what people observe and interact with along the way, influencing their perception about the surrounding environment. In this way, street patterns ‘significantly shape a community’s self image and sense of place’ (Southworth & Owens 2007, p.273).

According to Southworth & Owens’ (2007) classification, the street pattern of Barra da Tijuca district is in fact a combination of three kinds of street patterns, they are: the ‘speculative gridiron’, the ‘interrupted parallels’ and the ‘cul-de-sacs’. On the map on the next page, these patterns are highlighted.
Spatial Analysis

Source: map by author
The speculative gridiron was the first street pattern planned and implemented in the area. Its origin precedes Costa’s 1969 master plan and though not fully developed before the 1970s, it was kept by the urbanist as it was originally designed. This pattern ‘uses existing rural roads as starting points’ and develops most of the times in ‘chunks of fully interconnected large gridded subdivisions’ (Southworth & Owens 2007, pp.273). These chunks do not usually follow a general plan and can start up in different points of the area being developed. The grid is only broken when difficult-to-cross elements such as railroads, rivers and steep slopes are on the way. The speculative term relates to the idea of maximizing the number of street frontages to be sold to developers.

The interrupted parallels as well as the cul-de-sacs are the predominant street patterns in Barra da Tijuca today. Their origin can be traced back in some of the design guidelines defined by Costa in 1969, such as the housing nuclei distancing one kilometre for each other. The one and only similarity between these two street patterns and the speculative gridiron is the role of rural roads, which are responsible for structuring them. Within the interrupted parallels and cul-de-sacs patterns, the subdivisions are internally focused as a result from the initiative of developers to stretch the urban blocks into long rectangles. This initiative has mainly to do with two facts: the wish to create a safer and quieter street environment and, in the specific case of Barra da Tijuca, to take over the costs with urban infrastructure implementation, which from the 1980s onwards could not be afforded by the government anymore. As the interconnection between individual developments hardly exists in these two cases, the result is an urban form composed by isolated islands directly connected to a limited number of arterial roads, with no coherent structure. Whereas the interrupted parallels pattern does still keep some residual elements of the gridiron, like for instance the main direction of the streets in its internal subdivision, the cul-de-sac pattern completely ignores this or other references. In this last pattern, the streets are almost all twisted and non-directional in the form of curving loops or simple cul-de-sacs (Southworth & Owens 2007, p.274-275).

Socio-spatial implications

Street patterns resulting from inward directed developments such as interrupted parallels and cul-de-sacs have very negative impact in the socio-spatial dynamics of urban spaces. Firstly, the lack of spatial connections among these developments, which in Barra da Tijuca are surrounded by walls and fences (the so called ‘gated communities’) generates an environment unfavourable to social contacts in the broader context of the district. As the accessibility to streets keeps restricted to a small number of people, their social function as a place of social interaction (or social confrontation) among different social groups becomes very limited. Furthermore, the fact that these big enclosed developments are bordering each other in an endless sequence, with no public streets between them, makes the chances of having a ‘walkable’, therefore human centred urban environment very scarce. Lastly, as interrupted parallels and cul-de-sacs street patterns have strict relation with main arterial roads only, they stimulate the use of automobiles, an unaffordable and anti-social means of transportation.
(B) Growth Patterns

Likewise street patterns, the way neighbourhoods grow throughout time does also influence the way people experience the space and interact with others. Southworth & Owens (2007, pp.277) classify three main generic types of urban growth patterns, they are:

The concentric growth is considered the classic pattern of urban expansion. In this development model, the centre is clearly defined and the growth occurs in concentric circles towards the outside. Though changing every time, the edge of such urban configuration is also recognizable.

The instant growth pattern reflects rapid urban development processes which ‘creates a sense of a single or all-in-once transformation’ (Southworth & Owens 2007, pp.277).

The scattered growth pattern has close relation with the increase of travel mobility experienced by many cities in the world from half twentieth century onwards. Technological advances such as the automobile shortened long distances and new developments were no longer necessarily built near urban cores. Due to their relative self-sufficiency, these developments could be dispersed indiscriminately throughout the landscape, beyond the urbanized perimeters of cities.

The map on the following page highlights the first developments realized in the district as well as the current configuration of its centralities, mainly represented by shopping centres.

In the large-scale context, it is possible to identify, at least in the last forty years, the scattered growth pattern in Barra da Tijuca’s urban development process. As the map in the previous page shows, the first developments carried out in the district were located isolated from each other, having main arterial roads as the only connective element among them. This initial urban configuration follows in reality Costa’s design scheme. In his plan, self contained housing and multi-functional nuclei were key elements to be found spread along the two - before rural - structural roads. However, as the time passed, the vast spaces between these nuclei were slowly being filled with similar developments, yet very weakly connected one to another. Today, as a result of this growth pattern, Barra da Tijuca lacks of an overall coherent urban structure.

An exception of this growth pattern can be found in the area planned previous to Costa’s master plan, the street pattern already indicates a concentric urban form. Though not developed by outward growing circles, the idea of a nucleus, in this case occupied by a rectangle square, is strong in the design.

Socio-spatial implications

Besides the high economic and environmental costs generated by scattered urban growth patterns, also the social consequences of such kind of development model can be extremely negative. Starting with the fact that this pattern depends essentially on private owned automobiles to function, the accessibility to areas planned according to this growth pattern is reduced to those few who can afford having a car. The lack of a coherent and interconnected urban structure in such a pattern interferes in the functioning of the public spaces as a place of social activities. Concentric growth patterns, in contrast, allow for a more intense use of these spaces as they tend to concentrate different functions in a same location, therefore attracting a greater variety of social groups.

Although the areas between the first scattered developments of Barra da Tijuca are being gradually filled in, as they keep themselves inward oriented and disconnected from each other, there are very few chances to improve the socio-spatial conditions of the district.
OLYMPICS LEGACY PLAN

KEY
- developed 2nd half 1970s
- developed from 1980 onwards

Source: map by author

Spatial Analysis 81
(C) Land Use Patterns

The separation of land uses is generally influenced by mobility patterns. As the period in which Barra da Tijuca was developed coincided with the expansion of the automobile industry in the country, the distribution of functions within the district’s territory was mainly spurred by this transportation mode. As it was mentioned in the previous section of this thesis, the division of functions of Barra da Tijuca was planned by Costa according to a hierarchy of urban nuclei strategically dispersed within the district’s territory. Nevertheless, as the plan developed and the influence of the Real Estate market became stronger in the region, this original organization of functions was changed. Today, Barra da Tijuca’s land use pattern can be defined mainly by two strips of commercial corridors combined with a continuous residential area. Another important characteristic of the area, still regarding its land use pattern is the absence of public spaces in the latest developed part of the neighbourhood. As gated communities and shopping centres became the main model of development in this area, they have incorporated all functions that are generally performed in public spaces, especially the ones related to leisure activities.

Socio-spatial implications
The main social implication of a segregated land use pattern is the restricted accessibility that this kind of development implies. Since the distance between the different functions in this model are generally big and sometimes not reachable by public transport systems, the accessibility to some functions become restricted to a group of people who has more mobility possibilities, namely the ones who own a car.

In the subject of the incorporation of some public functions by private developments (gated communities, shopping centres, etc.), the consequences of this kind of development can be seen as negative for the socio-spatial development of urban areas. As main functions related to the interaction of people such as leisure are restricted to a controlled territory and to a small group of inhabitants only, the possibilities for social interaction of different groups of the society is low.
Map of land use.
Source: website municipality of Rio de Janeiro
In this scale the street pattern of the two different parts of Barra da Tijuca is the only morphological element analysed. Within this pattern, the configuration (form) of streets is considered for its impact on the social dynamics of the neighbourhood. Also the issue of spatial privatization is explored here.

The social consequences of the two main types of urban forms developed in Barra da Tijuca were already discussed previously. As streets are considered the primary element influencing the level of social interaction among inhabitants and of them with the surrounding environment, the way this element is organized, dimensioned and detailed has direct impact on the social dynamics of an urban space. Since the way streets are laid down generally determines the size of urban blocks, they also influence the way people move through the space. It seems obvious that in ‘walkable’ environments the level of social interaction among people is much higher than in automobile-oriented ones. Regarding the physical barriers (wall and fences) that are constantly built around blocks in Barra da Tijuca there is also evidence that these elements have extremely negative social impact to the neighbourhood and to the city as a whole.

(2) Community Scale

In this scale the street pattern of the two different parts of Barra da Tijuca is the only morphological element analysed. Within this pattern, the configuration (form) of streets is considered for its impact on the social dynamics of the neighbourhood. Also the issue of spatial privatization is explored here.

The table on the following page summarises the aspects that were taken into consideration in this part of the district’s urban analysis.

Radial gridiron (planned before 1969)
Within this urban form, the streets are organized under a clear hierarchy regarding the local traffic system: radial streets are directly connected to arterial roads. At the same time they are linked to each other through smaller streets, emphasizing the radial structure of the area. Because of this geometrical form the urban blocks do not have the same dimensions (like in a gridiron structure), however they do follow some criteria in terms of total size. This urban form also allows a relatively high number of street intersections providing good connectivity among streets by a wide variety of possible routes and access points.

Fragmented parallels and cul-de-sacs (planned after 1969)
This urban form results from a series of nonrelated, inward directed developments that has become a model for the neighbourhood from the 1970s onwards. The hierarchical organization of its streets is quite extreme since local streets are directly connected to arterial roads, with no other types of streets in between. The lack of connection among different developments is another characteristic of such areas, a fact that generates an incoherent overall urban structure of isolated islands. This connectivity issue can be also verified in the type of street intersections existing there, mostly ‘T’ shaped. With this shape, the number of possible routes and access points in the area are reduced. The urban blocks in this part of the neighbourhood are much bigger then in the radial gridiron one and in the case of Barra da Tijuca are mostly surrounded by walls and fences. This means that the accessibility to these areas is restricted to a certain number of people. Elements such as cul-de-sacs are common in this urban development model, being regarded as a spatial strategy to achieve higher degrees of security and quietness as well, to maximize the size of housing plots. Within this spatial configuration, the use of the automobile is stimulated and fundamental urban elements such as sidewalks have low priority in the design of street profiles.

In general, the amount of land devoted to streets have direct relation with the costs of infrastructure (Southworth & Owens 1993, pp.279).

Social implications

The social consequences of the two main types of urban forms developed in Barra da Tijuca were already discussed previously. As streets are considered the primary element influencing the level of social interaction among inhabitants and of them with the surrounding environment, the way this element is organized, dimensioned and detailed has direct impact on the social dynamics of an urban space. Since the way streets are laid down generally determines the size of urban blocks, they also influence the way people move through the space. It seems obvious that in ‘walkable’ environments the level of social interaction among people is much higher than in automobile-oriented ones. Regarding the physical barriers (wall and fences) that are constantly built around blocks in Barra da Tijuca there is also evidence that these elements have extremely negative social impact to the neighbourhood and to the city as a whole.
<table>
<thead>
<tr>
<th>Part A</th>
<th>Part B</th>
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<tbody>
<tr>
<td>street crossings</td>
<td>dead-end streets</td>
</tr>
<tr>
<td><img src="image1" alt="street crossings" /></td>
<td><img src="image2" alt="dead-end streets" /></td>
</tr>
</tbody>
</table>

**KEY**
- streets
- neighbourhood’s limits

**before 1969**

**after 1969**

Source: schemes and map by author
(3) Street, lot and building scale

(A) Street scale

On this scale, the profile of the main roads of the two selected fragments of the neighbourhood is analysed. In the part planned previously to Costa’s plan, the street profile is more human oriented. The relation between the roads and sidewalks are balanced and the dimension and material of the roads influence the low speed of the motorized traffic. In the part designed by Costa these characteristics change completely. The priority given to the automobile, disregarding the pedestrian can be verified through the wide dimension of the roads when compared to the sidewalks, sometimes even inexistent along the way. Also the material of the roads influences higher speeds of the traffic. As in this last part inward developments are common, there is not a clear defined street facade.

Social implications

The impacts on the socio-spatial structure of Barra da Tijuca of each of the two kinds of street profiles analysed, is mainly related to the importance given to the pedestrian in each case. The more streets are able to attract people, more are the possibilities for social contact. Today, only a small part of the neighbourhood, the one planned previous to Costa’s design, is human oriented. In the other part, almost any effort is made to attract pedestrians.

Source: sections and map by author, photos from GoogleMaps
(B) Plot ensemble (plot size/shape and building typology)

This scale of analysis considers the combination of plots (their size and shape) and the buildings that are inside their borders (building typologies). As it was previously analysed, in the part developed before 1969 the plots are smaller and more permeable, and the buildings have a close relation to the street. On the other hand, on the other bigger part of the neighbourhood, the plots are much bigger with almost any street between them. In this area, the relation of the building with the street is almost inexistent and the entrances of the plots are few and extremely controlled by security guards.

Social implications
For the same reason of the street profiles, the configuration of plots and building has similar impacts on the socio-spatial dynamics of urban areas. When the plots are big, attached to each other, the circulation of pedestrians is discouraged. Also the lack of contact between the building facades and the streets (sidewalks) creates an environment that is not attractive for pedestrians in general.

See schemes on the following page.

This spatial analysis was mainly based on the work of Southworth & Owens (1993).
Source: schemes by author, photos from GoogleMaps
Source: schemes by author, photos from GoogleMaps
Conclusions
(design concepts)

- **street pattern**
  - limited accessibility and meeting points
  - multiple accessibility and meeting points

- **street profile**
  - car oriented street profile
  - human oriented street profile

- **block ensemble**
  - big blocks attached
  - permeable small (walkable) blocks

- **buildings ensemble**
  - free standing object (l)
  - vila park (r)

- **building access**
  - limited number of accesses
  - multiple number of accesses

- **social functions**
  - inward-directed and private
  - outward-directed and public

Source: schemes by author
Part E

Vision, Strategy & Design
1. General goals of the proposal

The choice of Rio’s government in allocating most part of the Olympic related infrastructure in Barra da Tijuca is a clear recognition of the district’s current central role in the city and region’s urban development. According to the previous analysis made of Rio’s 2016 Olympics plan for this specific area (see previous chapter), although some considerable spatial transformations are planned there, these are restricted to the improvement of its mobility, urban water management & sanitation, and natural environment. As it was concluded, besides the lack of connection among these interventions, their relation with the Olympic plan’s goal of social inclusion was not explored in its full potential.

Taking therefore Rio 2016 UELP for Barra da Tijuca district and region as a starting point, the general goal of my proposal is to achieve higher levels of social inclusion in the area by complementing the government’s plan with additional spatial elements and functions that can help with this objective. In other words, following the concept of socio-spatial inclusiveness defined previously in my thesis, my proposal aims on securing basic spatial conditions so that a greater number of people, from different social backgrounds, can benefit from investments that will be applied in Barra da Tijuca in the coming years. Furthermore, following the concept of sustainable development, my proposal also aims on developing an integral approach towards the problem of social spatial segregation by linking the economic input resulting from hosting the 2016 Olympic Games with possible social and environmental benefits in the project’s area.

2. Scales of intervention

Although my graduation project focuses mainly on the district of Barra da Tijuca, for its exclusionary socio-spatial character and for its prominent position within the 2016 Olympic master plan, the interventions that compose my vision for the area go beyond the district’s borders. As some elements of Barra da Tijuca such as its natural environment, urban water and road system are part of a greater structure delimited by geographic boundaries (formed by the two main massifs of the city and the watershed originated from them), it is impossible to treat them in the scale of the neighbourhood only. Thus, the largest scale of intervention that my graduation project encompasses is the whole region defined by the government as Planning Area 4 (Área de Planejamento 4, AP4). In this scale, a plan is proposed complementing Rio 2016 UELP with strategic spatial interventions aiming on the upgrade of the area’s socio-spatial structure. On a local scale, a design for a small part of the district is further detailed so that the spatial elements which can influence the socio-spatial dynamics of the area that were previously identified in my thesis can be explored.
3. Vision

Content
My vision for Barra da Tijuca, which reflects my goal of transforming the area into a more socially inclusive part of the city, is a combination of two main systems. One is the Green-Blue system, which binds together existing and new recreational natural areas with the purpose of upgrading and protecting the region’s ecosystem and at the same time providing Barra da Tijuca’s inhabitants and visitors with more large scale open/public spaces for social activities. With this new infrastructure, the region’s level of resilience, meaning its capacity to protect itself from and respond to possible hazards caused by the global’s climate change phenomenon is also enhanced by some specific design measures. The other system consists of a Red-Gray system that combines the upgraded transportation and road infrastructure with a number of existing and new centralities where social inclusion is stimulated though the introduction of new social functions such as affordable housing and small scale public spaces.

Concept
The concept of my vision is the intersection of the two systems mentioned above. The idea is that taking the new/upgraded centralities as a starting point, the district of Barra da Tijuca can be experienced in two different ways: one fast and urban oriented and the other slow and nature oriented. In this way locals and outsiders can have the best of these two parallel, but still complementary worlds.
4. Strategic Plan

In order to have my vision for the region of Barra da Tijuca realized, a strategy is formulated indicating the spatial interventions that have potential to initiate this process. The scale of the interventions of this strategy is limited to the Planning Area 4 (AP4), although main focus is given to the area comprising the neighbourhood itself and its immediate surroundings.

The proposed strategic plan is divided in four themes, based on the themes of Rio 2016 Olympics UELP, they are: (A) Green Structure, (B) Blue Structure, (C) Gray Structure and (D) Red Structure. They relate respectively to the government's themes: Natural Environment, Urban Water Management/Sanitation, Transportation & Road System and Housing and Social Development. In this way, the connection between Rio 2016 UELP interventions and my further propositions are noticeable. In every of the four themes, the existing situation, meaning the existing problems related to these subjects in the region, and the interventions proposed by the government to solve (or at least to mitigate) them are briefly introduced. Following that, my proposal for the further elaboration of the official plan is described.
(A) Green System

• Existing Situation

Existing situation
Over the last years, the greatest loss of the city’s natural resources was verified in AP4, an area that not by coincidence had the biggest growth of population living in its formal (28%) as well as informal (53%) settlements in the last decade. It is also in AP4 that great part of the Rio’s protected natural landscape is concentrated (40%, approximately 9,500 hectares). Yet, even these protected areas are constantly threatened by the growth of slums and Real Estate projects. The intensive process of indiscriminate deforestation (in the case of forests) and land infill (in the case of mangroves and marshlands) experienced in AP4 has caused serious environmental problems and sometimes disasters to the area, such as landslides and flooding. In this context the most vulnerable ones are the poor, who live mostly close to these environmentally sensitive locations without any means to protect themselves against such disasters.

• Intervention of Rio 2016 Olympics UELP

The interventions planned by Rio 2016 Olympics UELP for AP4 are mainly related to the restoration of the region’s ecosystem. Besides the recovery and further protection of the main local lagoons, rivers and beaches including their riparian vegetation, the upgrade of the infrastructure of the region’s existing natural parks for recreational and touristic purposes is planned. More specifically in Barra da Tijuca district, a new ecological park is proposed near the Olympic Park.

• My proposal

Using the main upgraded green unities of Rio 2016 Olympics UELP as a starting point, a green system is proposed consisting of a recognizable structure created through the connection among these elements. Also part of the system, the new park planned by Rio 2016 UELP on the border of Jacarepaguá Lagoon is resized and extended to Tijuca Lagoon. The connectors of the system consist of a number of green corridors which at the same time provide the local inhabitants with extra open green spaces for recreation, upgrade the transportation infrastructure (through the addition of bicycle paths), support the area’s drainage system, and facilitate the gene flow of the local fauna & flora.

In order to transform this green system into a real social asset not only for the region of Barra da Tijuca but also for the city of Rio de Janeiro and its metropolitan region, the connection between the new high speed transport system (BRT) and the different parts of the green system is enhanced.
KEY
- upgraded recreational green *
- new/addition to existing recreational green
- entrance recreational green (existing)
- green corridor
- BRT corridor *
- BRT station *
- transport node (BRT-BRT/BRT-metro) *
- catchment area station (800m)
- upgraded/new connections between public transport and recreational green
- upgraded beach *
- informal settlement
- Planning Area (AP4)

* Interventions Rio 2016 Olympics UELP

Source: Map by author
(B) Blue System

• Existing situation

In the year 2000 the region of Barra da Tijuca (AP4) had the lowest percentage (82.43%) of households with adequate public services within the city of Rio de Janeiro (CELU 2009, pp.51). Besides having deficient sewage, water supply and garbage collection systems, the drainage of the area is a very difficult problem to be solved since a great part of the region is located on low lands. Furthermore, two main facts contribute to the overload and misbalance of the region’s drainage system: the discharge of waste (organic and not organic) on rivers and other water bodies by local communities and industries, and the indiscriminate landfill of waterfront areas for the construction of new local enterprises. As a result, the region suffers from constant floods, especially during periods of heavy rain fall or in cases of sea level raise. In this scenario, the low income communities living in informal settlements are the most affected ones since many of these occupy the region’s river borders without any protection against water overflows.

• Intervention Rio Olympics 2016 UELP

The completion of the sewage, water supply and garbage collection systems within the region of Barra da Tijuca is a measure planned by Rio 2016 UELP that aims on improving the living conditions of the local population. Besides that, works regarding the upgrade of the area’s drainage system is to be executed till 2016, which includes the cleaning up of the main local rivers and lagoons (removal of sediments), the reforestation of their riparian vegetation and the canalization of some rivers in very dense locations so that their water flow is improved (faster discharge).

• My proposal

Given that improvements of the sewage and garbage collection systems of Barra da Tijuca region are to be executed by Rio 2016 Olympics UELP, my proposal for the Blue System deals mainly with the management of the region’s rainwater. Complementary to government’s plan of upgrading the local drainage system by increasing the capacity of discharge and retention of the region’s water bodies (mainly river and lagoons), new floodable zones are designed within empty areas with high risk of inundation. In order to provide extra social value to these new floodable zones, new natural parks are proposed there. These new parks were mainly introduced in locations close to existing informal settlements so that these communities can use these areas for recreation.

Other measures aiming on improving the region’s drainage system are the design of rain gardens and permeable pavements along the new green corridors, and the capture and re-use of rain water by households (see sections of the green system further in this chapter).
Vision, Strategy and Design

KEY
- 50-100m
- 100-300m
- 300-500m
- 500-700m
- 700-900m
- >900m
- Water system
- Watershed
- Flooding zone (0-5m)
- High risk of flooding (0-1.5m)
- Slum outside flooding zone
- Slum inside flooding zone
- Large scale empty area

Source: Map by author based on Mendonça & Silva, 2008
upgraded main river (water and riparian vegetation)
upgraded beach
upgraded sewage system
garbage collection program
dam (collection of flooding waste)

Source: Map by author based on CELU, 2009
STRATEGY / BLUE SYSTEM / PROPOSAL

Vision, Strategy and Design

KEY
- floodable park
- upgraded river *
- green corridor
- flooding zone (0-5m)
- slum

* Intervention Rio 2016 Olympics UELP

Source: Map by author
urban water management strategy / large scale
general scheme

existing situation

government’s intervention
(Rio 2016 Olympics UELP)

my proposal


(C) Gray System

• Existing Situation

Partly isolated from the rest of the city by the range of mountains that surrounds it, the region of Barra da Tijuca (AP4) was never covered by any high density transportation system. Instead, its inhabitants (and also visitors) had always to rely on a road system which has privileged the automobile and other less efficient means of transportation. Today, one the main issues faced by the people that live, work or enjoy the district of Barra da Tijuca and its surrounding region is the intensive and constant traffic congestion along their roads.

• Intervention Rio Olympics 2016 UELP

In order to improve the mobility pattern of AP4, a new metro station built from the extension of an existing metro line and a new BRT (Bus Rapid Transit) system will make the connection of the area with the rest of the city faster. Furthermore, these new/extended systems will be further integrated to the already existing high speed/high capacity systems of Rio (especially railways). Other interventions that aim on relieving the traffic congestions especially in Barra da Tijuca are the completion of a road parallel to the BRT corridors along the waterfront (Via Parque) and the construction of two bridges on strategic locations.

• My proposal

As the issues related to the mobility pattern of AP4 are explored in Rio 2016 Olympics UELP on the large scale, my proposal is restricted to the neighbourhood of Barra da Tijuca and its immediate surroundings. This decision has mainly to do with the fact that although improvements can be done in the whole region, such as the implementation of a coherent bicycle system along main transportation corridors, it is in the district of Barra da Tijuca that the mobility and street patterns are more problematic from a socio-spatial point of view.

In combination with the new high capacity transportation systems (BRT and metro) introduced by the government’s plan, other transport modes (bicycle and boats) and their necessary infrastructure are proposed in my plan. Besides providing the inhabitants and visitors with more options to move around, these two new means of transportation will enhance the contact with the local natural environment. On the specific case of the cycling infrastructure, the new cycle paths help also with the scaling down the existing and new street profiles to a more human oriented environment.

The design of a new road structure aims on changing the existing exclusionary character of the neighbourhood’s street pattern. By creating new connections and enhancing existing ones, it is expected that people can move more freely through Barra da Tijuca. The roads designed along the waterfront of the lagoons have both the function of creating a clear delimitation for existing and new developments and of offering a new way to experience the neighbourhood, in a closer contact with the nature.

By overlapping all transportation systems (low and high speed), new transportation nodes arise where these systems meet. Following the concept of TOD (Transit Oriented Development), my proposal is to take advantage of these nodes for developing new centralities of enhancing existing ones.

The working out of these centralities are explored in the next theme of my strategy: Housing and Social Development.
BRT corridor/Transoeste (UELP)
BRT corridor/Transcarioca (UELP)
BRT corridor/Transolímpica (UELP)
BRT station (integration BRT/BRT-metro)/catchment area 800m
other important BRT station/catchment area 800m
cycling system (cycle path)
main bicycle storage/bicycle rental station
water transportation system
water transportation station
(D) Red System

• Existing situation

From the map of Rio’s Social Development Index it is visible that the planning zone AP4 concentrates large but separated areas with high and low levels of socio-spatial development. Although today this region attracts most inhabitants in the city (both with high and low income), there is almost no project of social housing for the low income group planned. The ones that are planned are all outside the district of Barra da Tijuca and mainly not directed to the poorest part of this group.
• My proposal

In order to stimulate socio spatial inclusion in the district of Barra da Tijuca, and its immediate surroundings, my strategy on the theme of housing and social development explores the centralities (transportation nodes) defined in the previous pages by the overlap of the different transport modes. Following the concept of TOD (Transit Oriented Development), my proposal aims to stimulate a more dynamic and socially inclusive urban environment in the district of Barra da Tijuca and its surroundings, and at the same time, to counteract the process of urban sprawl experienced today in the region. In this way, new parameters for the development of these centralities are proposed. In the new scheme, the density of these areas is increased and multiple functions are added, including affordable housing and public spaces. The percentage and type of social housing to be developed in each centrality will depend on the existing surrounding built up area of each place.

• Intervention Rio Olympics 2016 UELP

The projects of Rio 2016 UELP regarding the improvement of Barra da Tijuca's region inhabitant's socio-spatial conditions can be considered limited when compared to the other regions of the city. Although two socio-cultural/educational/sportive equipments near low income communities and one slum upgrading project are planned, no further relevant intervention is proposed in the plan. As the government assumes that other more centrally located areas of the city have a more prepared infrastructure (empty buildings and consolidated transportation system), Rio 2016 UELP gives priority to these locations for the construction of new social housing projects. In addition, in Rio 2016 UELP existing informal settlements are planned to be relocated from Barra da Tijuca neighbourhood. The fact that there is no prevision for their resettling nearby their original spot, goes against the city master plan's goal of social inclusion.

In the plan for the post-use of the Olympic Park, which is located within the district of Barra da Tijuca, there is an indication of the transformation of some of the Olympic equipments into new socio-cultural/ educational/ sportive infrastructure, such as an university, a school and a sport museum. For the rest, the area will be transformed into a new mid-high income part of the neighbourhood with a mix of housing, services and commerce.
A. slum relocation
B. slum upgrading
C. social equipment
STRATEGY / RED SYSTEM / OLYMPIC PARK LEGACY 2030
source: Rio2016.com
Parameters for developing the centralities in Barra da Tijuca

Density

To take advantage of the new infrastructure that will be built in the area, especially the new high speed public transport system, and to counteract the process of spatial fragmentation through urban sprawl and the negative economic, social and environmental consequences, the new centralities of my plan should have a more compact urban configuration then the rest of the neighbourhood. To secure the accomplishment of this proposition, some parameters related to the density of the areas to be redeveloped are re-established, they are: the Floor Space Index (FSI), the Ground Space Index (GSI) and the number of stories of the new buildings (L).

Functions

With the aim of creating more socially inclusive spaces in the district of Barra da Tijuca, new functions are added to the proposed centralities. Acknowledging the fact that the mix of land uses (especially commerce/services with housing), the diversification of housing opportunities (for people of all income levels) and the promotion of public spaces and public functions have great potential in generating such urban environment, these functions are all included in my plan.

Mixed Use

The mix of functions such as commerce & services with housing will primarily occur along the main roads of the new centralities once these are the streets with more transit of people and easier to access by public transport (critical mass). The shops/offices in these areas are located on the ground floor (sometimes occupying an extra pavement) and the housing unities on the levels above.
Housing stock
An essential component of a socially inclusive urban space is the diversity of housing opportunities and choices for every social group. Given that social/affordable housing projects are missing in the district of Barra da Tijuca as a whole, the new/upgraded centralities of my plan are the most suitable for the implementation of such developments. As in these centralities a great variety of job opportunities (employment) and transportation choices (mainly public transport system) are to be offered, they are the best locations for bringing this new group of dwellers in the neighbourhood. Thus, in my scheme, 30% of the housing stock in each of the centralities is reserved for social housing. Because in Brazil and in the city of Rio de Janeiro the distance between social groups is huge, and so is the prejudice about living too close to lower income inhabitants, a finer grain regarding the distribution of these social housing projects within the centralities is proposed. Following the subdivision established by the government, three subgroups of social housing are defined, according to the level of income of their future households (from very low to moderate). Taking the socio-economic level of the surrounding built up area (measured by the local average price of the square meter) as a main parameter, a different percentage of each subgroup is suggested for every centrality.

Public Space
As public spaces are essential elements in a socially inclusive urban environment, they should be part of or be connected to the proposed centralities. At the right side, a scheme is proposed which indicates three main scales of public spaces and how far they should be from each centrality.

Today, the main governmental program for social housing in Brazil covers the country’s population which earns in average, up to 10 m.w. (minimum wages) per month per family. Within this group, three subgroups are established: from 0 till 3, from 3 till 6 and from 6 till 10 m.w.
VISION FOR A SOCIAL-SPATIAL INCLUSIVE CENTRALITY

- diversity of job opportunities (employment)
- diversity of housing possibilities (including affordable housing)
- public space (human oriented)
- Olympic inheritance (post-use for social activities)
- diversity in transportation modes (high capacity / low cost / low environmental impact)
5. Design intervention

Selected location

For my design intervention, I have selected one of the six centralities I have defined as strategic locations for the socio-spatial restructuring of the region of Barra da Tijuca. The reason behind my choice has to do with three main aspects.

The first one relates to the fact that it is in this specific centrality that the main Olympic equipments will be built.

The second aspect relates to the presence in the area of a low income community that is planned to be relocated in order to give space to the 2016 Olympic master plan. Since this decision of the government was reported by local inhabitants and other organized groups (especially related to human rights) as purely based on social discrimination (UN, 2009; DPERJ, 2010; CPCORJ, 2013) and that such conflict is common during the organization of mega-events in general and more severe in less socio-economically developed cities such as Rio, this area becomes a good case study for developing a possible solution to the problem.

The third aspect which was decisive for my selection has to do with the local features of the chosen area. Because of its great proximity with large green as well as blue systems, it is possible to explore some design solutions that can enhance the use of these natural elements as social assets to local inhabitants (especially the most economically deprived ones) and visitors in general.

Top / Author’s proposal of centralities and how to link them with each other. Source: by author.
Bottom / Current situation with community and racing track. Source: GoogleEarth.
Existing plans for the area

The first plan for the area of Barra da Tijuca Olympic Cluster can be found in the documents elaborated for Rio’s Olympic bid in 2009 (COB 2009b, pp. 28). Although schematic, this plan focuses mainly in the organization of the Olympic related equipments (stadiums, training centres, accommodations for athletes, referees and media, etc.) within the area and the necessary infrastructure to access them (new mass transportation system, parking spaces, etc) (see picture top left). In combination with this basic master plan, Rio 2016 Olympics UELP (2009) indicates the post use of a small part of the area, on the edge of the Olympic Park. In the place of an existing low income community, an ecological park is planned for after the Games (see picture bottom left).

Later on, after winning the bid for hosting the 2016 Olympics, a more detailed master plan for the location had emerged as a result of an international competition held in 2011 (see pictures top+middle+bottom right). In this new plan, not only the scheme for the period of the Games is designed but also the post use of the site which will be partly transformed till 2030 into a new mixed use (residential/commercial) area. For this Post Games period, two schemes are proposed: one for the year 2018 with already some new buildings and temporary functions and another for the year 2030 where the whole area is fully developed. In all three, part of the community is kept.
Generating many social and political conflicts, the plan of the displacement of the low income community Vila Autódromo (V.A.) can be seen as a clear evidence of the exclusionary character of Rio’s urban planning. If in Rio 2016 Olympics UELP the community is simply erased giving space to a natural park, in the master plan of 2011 although part of the settlement is kept, its relation with the new area to be built after the Games is still poorly developed. Since this new area has a market oriented profile and is directed to mid/high income dwellers and users in general, the chances that V.A. will be indirectly displaced by processes of gentrification are extremely high.
The main critics to the latest government's plan for the post use of the Olympic site is that there is a clear clash between this new area and the slum. Besides the very different scale between the buildings of the two areas, also the difference between the groups that live in the slum and the dwellers of the new area (middle/high income) is too big.

Source:
Top left / Rio2016.com
Bottom left / GoogleEarth
Bottom right / www.tucavieira.com.br
Government's Legacy Plan (2030)

- New middle-high income gated housing development
- High income gated housing area
- New mixed use area (housing for middle-high income groups)
- Relocation of part of slum
- Olympic Inheritance
- New BRT system
- BRT station
- New park
- Upgraded water
- Upgraded green

Vision, Strategy and Design
My proposal

Olympic Inheritance

introduction of other income groups of inhabitants

slum upgrading

BRT system

BRT station

new transport node

redesign of transition zone

provide possibilities for in situ relocation

improve connectivity

Interventions

1. slum upgrading
2. transition zone
3. future extension areas
CONCEPTS FOR DEVELOPING THE TRANSITION ZONE

- Conflict zone
- Building typology
- Upgraded slum
- Social groups
- Attractive public spaces & public functions
01. new mixed use area (housing+commerce/services, the transition zone between old and new
02. upgraded slum
03. primary+secondary school, library
04. technical high school
05. day care centre and community centre
06. main square
07. community square
08. recreational green
09. BRT station (bus rapid transport)
10. boat dock public transport
11. boat dock local inhabitants
12. green corridors
13. area for future urban extensions
14. floodable green area
15. bike rental and repair
16. new car bridges
17. new pedestrian bridge
B: slum upgrading Vila Autódromo

public spaces
B: slum upgrading Vila Autódromo

functions

1 bar
1 snack bar
1 hair dresser
1 church

3 bars
1 bakery

2 spiritism centres
1 bar
1 internet cafe

10 fishermen
8 racing car mechanics
3 churches
3 spiritism centres
3 bars
2 hair dressers
1 snack bar
1 small market
1 window frame shop
1 surf board atelier
1 car painting shop
1 car repairing shop
1 kart dining school
1 furniture atelier
1 Club
1 Sport field
B: slum upgrading Vila Autódromo

Plot configuration and building typologies
B: slum upgrading Vila Autódromo

Accessibility
Slum upgrading guidelines

GOVERNMENT
- public services* upgrading
  (sewage/water supply/garbage collection/drainage systems, street lighting, etc.)
- public buildings & public spaces

LOCAL INHABITANTS
- plot & building upgrading
Basic parameters for developing plots/buildings in the slum

- plot size: 50-400 m²
- GSI (footprint of building): 50% plot
- no. floors: 3 floors - main street
  2 floors secondary streets
- functions: larger businesses - main street
  smaller business secondary streets

- housing
- business (commerce/service)
- public building
generic block in new transition zone

- housing
- business (commerce/service)
- collective space

- post Olympic development
- slum

- elevated inner court

floor plan

extension
SECTION A-A
Extension area - BRT station - Upgraded slum
SECTION B-B
Upgraded slum

- Rainwater storage
- Stormwater drainage

1,0m
0 10,0m
SECTION C-C

Main commercial axis
Upgraded slum - new mixed use area
SECTION D-D
New mixed use area

SECTION E-E
New social housing area
VISION FOR BARRA DA TIJUCA
Part F
Conclusions
Conclusions

Based on the literature review of the two main subjects of my graduation thesis - Socio-spatial inclusion/exclusion & Socio-spatial impacts of Mega-events in host cities - some conclusions can be drawn regarding the socio-spatial framework of Rio's 2016 Olympic urban plan.

Starting with the bidding phase of the plan for hosting the Olympics, reports on the lack of participation of Rio's inhabitants, especially the ones directly affected by the urban transformations planned for the city are an evidence that social exclusion is experienced in the political arena of the city. Still on subject of political representation, or stake in power, this disproportional level of representation among the three main groups of actors/stakeholders of the city (public sector, private sector and civil society) is also evident in some other aspects of the 2016 Olympic plan. The choice for allocating most Olympic related infrastructure in Barra da Tijuca, an area heavily influenced by the Real Estate market, indicates that the private sector has a more prominent position in decision making then the other two groups. In this context, as the local government proved to be subjugated to the interests of the private sector only, and to fail in securing the basic right of political representation of Rio's most socially vulnerable groups in the discussions regarding the Olympic urban plan, this public actor is losing the opportunity to improve its leading role in Rio's governance structure and to promote socio-spatial inclusion in the city.

If in the political arena the 2016 Olympics is not used as an engine to improve the social conditions of the city of Rio de Janeiro, in the economic arena this statement is, to some extent, also true. Looking from the perspective of wealth generation only, the significant growth of income among the city's inhabitants can be largely credited to the creation of new jobs directly or indirectly related to the Mega-event. While between 2000 and 2010 the average income of Brazil informal settlements' inhabitants grew 85%, in Rio this number reached 108% (O Globo, 2013). From a socio-spatial perspective however, although the provision of employment is considered a crucial factor for promoting social inclusion in every city (Madanipour 2011, pp.189), statisticians in Rio show that this element alone is insufficient to solve the city's socio-spatial issues. If in one decade (2000-2010) the purchasing of some goods such as mobile telephones, televisions, computers among others has grown considerably not only among the richest but especially among the poorest inhabitants of the city, this growth was not followed by the upgrade of the physical conditions of the areas where this last group resides in. Once many of these areas are informally developed and no land tenure is secured there, their public as well as private spaces have very poor qualities (O Globo, 2013).

Another issue regarding the impacts of the 2016 Olympics in the socio-economic structure of Rio de Janeiro relates to the raise of taxes and the living costs in general in the city. The latest risings of the city's public transport fares are an example of this problem. If in one hand the upgrade of the city's existing public transport system was a pre requisite for the logistic feasibility of the event, the costs of these improvements are now being shared with the population, reducing therefore the affordability of such services for Rio's low income groups.

Considering specifically the spatial interventions proposed for Rio 2016 Olympics, as it was analysed in Part D/1 of this thesis, although some large scale infrastructural projects such as the upgrade of Rio's transport and road system, natural environment and urban water management are expected to upgrade the quality of life of Rio's inhabitants in general, other projects on the contrary may accelerate the process of socio-spatial
As it was argued in the formulation of the problem addressed in this thesis (Part A/2), in places like Rio where levels of social development (economic, political and cultural) are low, it is common that global interests prevail over the city’s local demands. An evidence of this issue in Rio’s case is the eviction of a number of informal settlements from the areas of influence of the 2016 Games (CPCORJ, 2013; Faulhaber, 2012), a clear measure to improve Rio’s image internationally (Rolnik 2009, pp.6). Another evidence of this issue is that, despite the serious problem of housing deficit among the poorest inhabitants in the city today, any of the Olympic related large urban projects that will be later transformed into new housing areas (Olympic Park, Olympic, Referee and Media Villages) are directed to this vulnerable group. For these people, including the relocated ones, new affordable housing projects are being built mainly in peripheral neighbourhoods of the city (Faulhaber, 2012), another fact that enhances the socio-spatial exclusionary character of the Olympic plan.

As a final overall conclusion of my research on Rio 2016 Olympics’ socio-spatial framework, by placing this event in the context of the city and metropolitan region’s historical urban development, it can be argued that the government’s plan for preparing the city for hosting the Games is the last chapter in the city’s process of socio-spatial segregation. Like in other moments of Rio’s history, as the improvements on the city’s urban space are in great part concentrated in high/middle-high income neighbourhoods and not so much attention is paid the low income groups of the society, the issue of socio-spatial segregation is expected to grow in the city in the coming years.

In part E of this thesis, I believe to offer useful tools for a more inclusive city, a better future for all - Fair Play.
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