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UNCONTROLLED VERTICAL GROWING COASTAL CITIES IN BRAZIL: CASE STUDY ABOUT ACCELERATED RESIDENTIAL VERTICALISATION OF BRAZILIAN COASTAL CITIES FROM SOUTH TO NORTH, WITH FOCUS ON SOCIAL-SPATIAL SEGREGATION IN THE CONSTRUCTION OF URBAN SPACE, FORCING THE MIGRATION OF THE FORMER LOCAL COMMUNITIES OF THESE AREAS - AN ARTISTIC APPROACH

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ABSTRACT: *During our travels along the coast from South to North to visit the main capital cities of the different states, we could confirm an accelerated vertical residential expansion of neighbourhoods in these urban zones, seemingly uncontrolled and supposedly unplanned, with heights of skyscrapers varying from twelve to forty floors built next to each other, surrounded by areas with the dominant presence of houses. In this article, we investigate the whereabouts of the local population that lived in houses in these areas before the verticalisation of the neighbourhoods and search for answers for the question if verticalisation of the city is contradictory to equal urban rights, quality of life and access for everybody living in the city. A special approach was taken, as the production of architecture photography of the skyscraper in theses neighbourhoods allowed us to observe the urban areas very closely. For the consecution of the aim of the research, we used data obtained from the Brazilian Institute of Geography and Statistics (IBGE), based on the 2000 and 2010 censuses, to identify the increase in number of apartments in the urban zones of the investigated cities in this period of time to proof social-spatial segregation, causing the migration of the former local population, also confirmed by in loco observations and interviews conducted with residents of the area during the artwork production from 1997 to 2016. We concluded that the former local population in these areas were forced to migrate to less expansive neighbourhoods in the cities or even left the urban zones to live in peripheral zones close to the city. The accelerated and widely "uncontrolled and unplanned" verticalisation processes resulted in social-spatial segregation of the city. In the urban agglomeration, a division has been taken place between privileged and unprivileged zones. In the privileged zones, the construction of huge walls around the condominiums and the lack of people in the streets are provoking increasing security issues and offer limited access only for a privileged portion of the population, whereas, in the unprivileged zones, due to the physical distant to the central working neighbourhoods of the city, people depend on cars. This creates a densification of the rich and an acceleration of the sprawling tendency of poverty. As a result of the process of verticalisation of neighbourhoods in capital cities on the coast of Brazil from North to South, we could identify several problems related to the process, based on our in loco observations and interviews carried out with residents during our field study, such as waterproofing coverings that are causing inundations of streets in the neighbourhoods, increase of temperature, wind funnelling, traffic jams, air pollution and security concerns, as well as large volumes of urban runoff, deficient water supply,*

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wastewater and solid waste collection. One scenario in the future is that the neighbourhoods of the investigated coastal cities will suffer even more spatial segregation due to continued valorisation of its urban land, as areas receiving infrastructure elements. In consequence, the taxation increases and real estate pressure intensifies. The low-income population, known as local communities, are going to be driven out to more distant locations. Where they lived before, their houses are going to be replaced to built skyscraper. The accelerated verticalisation process, as observed in loco in coastal cities from the South to the North of Brazil, has produced increasingly segregated cities, rather than bring together and mix their citizen. As the results of our research show, the continuing and accelerated vertical expansion process in neighbourhoods of the main coastal cities in Brazil is full of contradictions and does not reflect on equal rights and access to the city for all its citizens, but rather reflects on social-spatial segregation. Future research needs to be carried out to accompany closely the urban development processes of the neighbourhoods in the main coastal cities included in this study.

KEYWORDS: Architecture, Fine-art photography, Skyscraper, Verticalisation of coastal state capital cities, Social-spatial segregation, Brazil, Recife, Natal, Fortaleza, Rio de Janeiro

INTRODUCTION

Overview

This is the second article of a series of three that we are currently finishing writing concerning our latest long-term art projects in Brazil: loss of cultural identities in Brazilians North and North-East, vertical growing of neighbourhoods along the Brazilian coast from South to North and the creation of an exceptional natural phenomenon of chains of dunes and lagoons through a rare balance of five key elements in the National Park Lençóis Maranhenses: sand, rain, wind, river and vegetation.

In this article, we discuss our research and in loco observations undertaken between 1997 and 2016 in main coastal cities of Brazil from South to North where we witnessed an accelerated vertical residential expansion of neighbourhoods. During our travel along the coast from South to North with the aim to produce architecture photography of the redundant material used on the facial surfaces of skyscrapers[1] in state capital cities, we could confirm in loco the variety in heights and increasing density of the ongoing verticalisation of neighbourhoods in these urban zones. This imposes questions to search for answers. Why are the heights of the buildings varying so much? Where are the local population now who lived in houses in these areas before the vertical residential expansion? Is verticalisation of the city contradictory to equal urban rights and access for everybody living in the city?

This work is part of a PHD thesis in Visual Arts to be concluded.

[1] The artistic project *Sui Generis .:: Line and Light* focuses on the investigation of the border zone between the redundant facial texture of the construction and the air. The sky is seen as the defining element, as the natural border of the construction. The resulting artworks were shown during itinerant exhibitions travelling throughout the country and abroad from 1997 to 2016 (see photos of the artworks 1-10 in the annex of this work).

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Background

In theory, the configuration of urban space is based on multiple factors: the form and type of occupation, use of urban land and spontaneous occupancy, influenced by the real estate market, the implementation of road systems and transportation, topography, hydrography, the availability of infrastructure, equipment and services. The legislation that refers to the construction of the "legal" city, created in the last 30 years, has undergone several changes and specifications given by demands of the real estate market and the residents of the neighbourhoods. The need to guide growth and manage the city, focusing on environment, housing, road and infrastructure implementations, in an integrated and more flexible way, is increasingly urgent, in order to improve the quality of life in the urban centre. The federal (City Statute) and municipal urban legislations (Master Plan providing a policy for the Citys land use laws, among other laws) offer options for urban intervention, aiming at the inclusion of less-favoured social classes.

In practice, this is not at all what we observed in loco during the execution of the architecture art photography production *SUI GENERIS - Line and Light*[2] between 1997 and 2016, travelling the coast from the South to the North of Brazil and taking photographs of the vertical redundant materials of facial skyscrapers surfaces in neighbourhoods of coastal capital cities with the aim to register the accelerated and ongoing vertical residential expansion of urban zones (see Figure 1 showing the geographic situations of the Brazilian coastal cities and states).

[2] The production of the architecture art photography between 1997 and 2016 started in the South Zone neighbourhoods of Rio de Janeiro (Copacabana, Ipanema, Leblon) and was extended to integrate downtown areas of Rio de Janeiro and rural areas near Magé in the project. After a decade working in Rio de Janeiro neighbourhoods, the project went to São Paulo and then travelled down the coast to include verticalisation processes in Florianópolis and Porto Alegre. From there, we explored the vertical expansion of neighbourhoods of other Brazilian cities, by focusing on the main coastal capital cities travelling North: Vitória, in Espirito Santos State, Salvador in Bahia State, Aracajú in Sergipe State, Maceió in Alagoas State, Recife in Pernambuco State, João Pessoa in Paraíba State, Natal in Rio Grande do Norte State, Fortaleza in Ceará State, Parnaíba in Piauí State, São Luís in Maranhão State, Belém in Pará State and Macapá in Amapá State.

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Figure 1: Geographic situation of the state capital cities in expansion on the coast of Brazil from North to South (Source: IBGE 2017, 2005; adapted by Andreas Hornung, 2017)

Questions were raised first in Rio de Janeiro, in the neighbourhood of Copacabana, where we witnessed recent accelerated verticalisation of top loft floors of existing skyscrapers, located principally on Atlántica Avenue, on the Copacabana beachfront.[3] In another example in the same city, questions for the research emerged. How does it happen, still in 2017, that a newly built skyscraper with its destination of becoming a hotel, in its final state of completion, located in the Street Bolivar with access from the Avenue Nossa Senhora de Copacabana, is eight floors higher than its construction environment, "clewed" together with zero distance to the other buildings, therefore, in the middle of an urban zone that, for a long time and still not

[3]Between 2008 and 2012, we observed new vertical growing of loft apartments on the top of these highrise buildings, which added two more floors to become triplex, three floor high loft apartments on top of the buildings. Once more we asked the question about determination of the limit of heights and maximum number of floors for buildings permitted to construct in these areas. Through further investigation, we found that in the case of future hotel use of the buildings, constructor were able to get permissions for demolition even of remaining traditional two floor "palacete" constructions built in the 1950s, for instant, on Atlántica Avenue, corner Santa Clara street, seemingly due to lack of hotel bedrooms for the upcoming events in 2014 and 2016 at this stage of time.

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solved, is suffering from negative consequences of its heavy verticalisation process on multiple levels. A new construction that shades the one in front, and physically suffocating it, and the top of a hotel with leisure infrastructure such as swimming pool and bar just next to it (see photo 1-2 in the annex of this work).[4]

In Rio de Janeiro, in the last decade, we observed the verticalisation of the main favelas, for instant, in the South Zone, where wooden or brick huts and houses become multiple-floor buildings[5]. Moreover, in Rio de Janeiro, migration processes accelerated in 2007 and once more in 2010[6], when traditional local populations left their neighbourhoods where they lived for a decade or more to move to other, less expensive neighbourhoods nearby or to neighbourhoods located on the outer skirts of the city. In Rio de Janeiro, where we are based, in all South Zone neighbourhoods, a great proportion of the local population in search for less expensive living conditions moved to neighbourhoods in downtown Rio, such as, for example, Lapa and Bairro de Fátima.[7]

This research aims to give answers to the questions where, how, when and why occurred verticalisation and physical-territorial expansion processes in neighbourhoods of the main capital cities along the Brazilian coast from South to North during the investigated period from 1997 to 2017, with focus on social-spatial segregation in the construction of urban space, forcing the migration of the former local communities of these areas. We emphasised in this analysis in particular the case studies of the cities of Rio de Janeiro, Recife and Natal among the investigated urban areas.

Furthermore, in the research, a special attention were given to analyse the social-spatial segregation processes related to the verticalisation processes and the inclusion or exclusion of the less favourite social classes who lived in these areas due to these processes, as well as the analysis of environmental and infrastructure problems related or caused by verticalisation and expansion processes in the city.

Vertical expansion observations in loco in the neighbourhoods of coastal cities

During our travels for architecture photography productions along the coast, from the South to the North, we witnessed high density of verticalisation in most capital cities of the states, often in areas close to the beach, endowed with exceptional views and amazing landscapes, where the heights of the buildings vary from 11 floors to 40 floors built next to each other and surrounded by houses. This can be especially impressive approaching the neighbourhoods from the waterline, in particular, beach neighbourhoods of cities such as São Luís and Recife, skylines of cities such as Belém and Aracajú, as well as smaller verticalised neighbourhoods, with the presence of houses surrounding these areas. On one hand, Iracema in Fortaleza gave us wonderful photographic production results, and, on the other hand,

[4] The coefficient or index of utilisation in this case, which allows to construct x times the surface square meters of the lots in means of floors on top has to be 20, as the occupancy rate (the percentage of area of the ground surface that is not constructed) is 100%, none area is left unconstructed. In consequence, the index of impermeability is 0% in an area where rain events of twenty minutes cause inundations of the streets for about one hour while the accumulated rainwater reach depths of up to 50 cm (based on in loco observations).
[5] Favelas of Pavão Pavizinho, Cantagalo and Vidigal. The first favela is located at the end of Copacabana, beginning of Ipanema, the last one between Leblon neighbourhood and São Conrado neighbourhood at Niemeyer Avenue.
[6] In 2007 and 2010, on the real estate market in Rio de Janeiro, the prices for real estate property increased by 50 to 100 percent. Consequently, on the rental market, the rent accompanied these increases. Moreover, living costs increased 20 to 30 percent, while the official inflation rates were only eight or nine percent, respectively, at this time.
[7] Based on real estate market analysis through the review of newspapers and observed in loco in the neighbourhoods in question.

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immediate feelings of insecurity in the streets and the presence of skyscraper that function as wind barrier in a corridor where the wind does not reach anymore the centre of the city, where, in consequence, heat accumulation occurs.

MATERIAL AND METHODS

Data collection

Bibliographical research

Included analysis of theses, dissertations, articles, documentaries, technical reports and legislation to support the issues and broaden the knowledge of the investigated verticalisation of coastal neighbourhood of state capital cities from South to North of Brazil.

Compatibility of data

from the 2000 and 2010 Censuses, provided by the Brazilian Institute of Geography and Statistics (IBGE), to identify the increase of number of people in the city transferred to live in apartments. The increase of number of apartments functions as index of verticalisation.

In loco activities

Interviews

The work is based on field studies in the neighbourhoods of main capital cities of states along the coast during different periods from 1997 to 2016, while conducting interviews with residents and realizing artistic productions of architecture photography and itinerant exhibitions[8] to accompany the process of residential verticalisation of these urban zones.

Aesthetic approach

Through our aesthetic approach by producing architecture photography, we were able to gain knowledge of the environment and urban development processes at place, as well as recognition of social, spatial and environmental dynamics in the neighbourhoods of the investigated cities.

Presence at place

Our frequent field studies in the investigated neighbourhoods and cities helped us to gain greater understanding and knowledge of the subject at this stage of the research.

RESULTS AND DISCUSSION

In Brazil, the process of urban growth intensified in the decade of 1960, when more then 50% of the Brazilian population became urban in accordance with the statistics of IBGE. In the

[8] See the artwork of architecture photography of the redundant surface material of skyscrapers in coastal neighbourhoods of capital cities from the South to the North of Brazil in the annex of this work, as well as photos of permanent exhibitions in Rio de Janeiro and throughout the country and photos of inaugurations and workshops of the itinerant exhibition SUI GENERIS - Line and Light, travelling throughout Brazil from 2012 to 2016.

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following decade, cities like Natal/RN and Recife/PE underwent major transformations in the urban space, since they became one of the locations of greater attraction for the population of their respective states Rio Grande do Norte (RN) and Pernambuco (PE) (see Queiroz, 2010 and Costa, 2008).

Figure 2 shows the verticalisation of the cities of Natal and Recife in Brazilians Northeast.

Figure 2: Verticalisation of the cities of Natal/RN and Recife/PE (Source: http://www.skyscrapercity.com, adapted by Andreas Hornung, 2017)

Based on data from the IBGE 2000 and 2010 Censuses, comparing capital cities and their respective Metropolitan Regions (MR), five agglomerations of the Northeast (São Luís, Aracaju, Natal, Maceió and João Pessoa) and two of the North (Manaus and Macapá) are among the ten that most transferred residents to apartments in the period in question[9].

Answering the principal research questions of the work:

[9] IBGE, Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística), *Censo Demográfico 2000 e 2010*. Cities of: Recife, in particular the neighbourhood of Boa Viagem, Natal, in particular the neighbourhood of Ponta Negra, Belém, São Luís, in particular the neighbourhood of Ponta d'Areia, Maceió, Salvador, Barra, Florianópolis, João Pessoa, Fortaleza, in particular the neighbourhood of Iracema, Rio de Janeiro, in particular the neighbourhood of Copacabana, Macapá, Aracajú and Vitória.

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WHERE, HOW, WHEN AND WHY OCCURRED THE PROCESS OF VERTICALISATION AND PHYSICAL-TERRITORIAL EXPANSION OF NEIGHBOURHOODS OF MAIN CAPITAL CITIES ALONG THE BRAZILIAN COAST FROM SOUTH TO NORTH

Examples of Rio de Janeiro, Copacabana neighbourhood, Recife, Boa Viagem beach neighbourhood and the city of Natal

Rio de Janeiro, Copacabana neighbourhood

As the example of Copacabana shows, hotels are often first to emerge in coastal neighbourhoods of state capital cities due to touristic demand, which show later real estate exploration and vertical expansion tendencies. Today, the Copacabana neighbourhood of Rio de Janeiro is a very dense urban area occupied by 13 to 15 floor highrise buildings, "clued together" with no minimum distance from the respective claim borders. Going back in time, after the construction of the Hotel Copacabana Palace in 1923, there has been a change in the urban structure of the neighbourhood and its configuration[10]. A few years after the establishment of the hotel, Copacabana faced the construction of large buildings that, somehow, obeyed an aesthetic of that time. In the 1940s and 1950s, the neighbourhood suffered a stream of local urban occupation, aimed at a greater status for those who resided in the neighbourhood, in consequence, the soil became more valorised and at the place of luxury residents (palacetes), large buildings with varied functions and uses emerged. Due to the real estate pressure, the Municipal Administration of Rio de Janeiro was virtually obliged in 1946 to increase the allowed heights of building in the area to 8, 10 or 13 floors, depending on the location (Abreu, 1987). In this sense, the neighbourhood had grown astronomically due to shortage and great demand, forcing the needy population with low income to move to buildings less valorised in the same neighbourhood, to humbler buildings located in tenements and streets away from the beachfront, forming the first favelas of the neighbourhood (Valente, 2014).

Recife, Boa Viagem beachfront neighbourhood

In Recife, the heights of the skyscrapers are reaching up to 44 floors (143 m) and are concentrated in the most privileged space with panoramic views: beachfront. The skyscrapers are located next to the beach or on the beachfront and occupy most part of this area. As the population grew and developed, the soil of the city became more valorised and social groups from other regions were forced to settle down within the limits of the coast and the mangroves. The verticalisation of the beachfront of Boa Viagem, and, thereafter, of the beach of Piedade, along with the subnormal settlements, were fast and uncontrolled processes. In this context, the first line of the coast and the interior of the neighbourhood were occupied by buildings with high real estate value.

Still in 1974, in the delimitated area, there were only houses, the vegetation was thick and on the stretch of sand were dunes with vegetation. The summerhouses and second residences were demolished in the 1960s and 1970 to gain space for the construction of new and modern buildings (see also Alves, 2009).

[10] At that time, the backsides of the buildings were oriented to the beach and the front to the first streets in the neighbourhood, in contrary to the current orientation where beachfront is the most valorised location.

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The problematic of the verticalisation of the Beira Mar Avenue of Boa Viagem is not only justified by its impact on the urban and dynamic network of the Boa Viagem neighbourhood or the city of Recife, but mainly due to the natural impact of the proximity to the beach, having its maximum heights for construction determined by the harming effects of shading, by hampering or preventing ventilation, as its location is part of the cause of the coastal erosion process (see Gonçalves, 2013).

City of Natal

In the city of Natal, capital of the Rio Grande do Norte (RN) state, the verticalisation process has intensified and occurred, mainly in the last decades, preferably in the best located areas of the city and of greater land value, sometimes equipped with a reasonable infrastructure, a fact that has contributed to the segregation of the city[11]. Ongoing verticalisation processes, especially in the South Zone of the city, have changed profoundly the urban environment of Natal. Until the end of the nineteenth century, it has not been a planning or an urban intervention in Natal, causing random growth of the city. Between 1935 and 1967, there has been no plan for the city, it grew spontaneously. In 1967, an Urban and Development Plan were created in Natal, which was a draft for the first Master Plan of the city, with few popular participation due to dictatorship that the country lived, which focused on the densification in some neighbourhoods of the city. It was the beginning of the verticalisation process (see also Queiroz, 2010).

Why are the heights of the buildings varying so much?

The symbology of the verticalisation processes establishes itself historically in the skyline of the cities. Linked to aspects such as monumentality, modernity, power, status and the suppression of the common determined heights of the buildings, the highrise building become in nowadays “totem of the real estate speculation” and “icon of the urban development of the capitalist city (Guimarães, 2002), often linked to progress of the city. Such a view is dominant in large urban centres, but also becomes noticeable in medium-sized cities that are configured as regional poles.

In the case of Copacabana neighbourhood development, the Municipal Administration suffered pressure from the real estate investors to increase the allowed heights of buildings in the area to 8, 10 or 13 floors, depending on the location. Recently, the loft apartments on the top of the buildings, located mostly on the beachfront Atlántica Avenue, increased up to two floors. The finishing of the hotel building, located at Bolivar Street, mentioned in the beginning of this article, 8 floors higher than its constructed environment next to it, is currently not advancing. Further research needs to be carried out to give answers concerning the reason for paralysation.

[11] We realize that the comfort is very high in certain areas of Natal. These areas have a good location, mild climate and offer a good urban infrastructure, therefore, becoming spatially segregated. One of these privileged areas corresponds to the top of the dunes at Getúlio Vargas avenue, in Petrópolis. The great appreciation of the soil in this area has resulted in the construction of vertical buildings. This is an area of beautiful landscape, overlooking the sea, at an altitude of more than 100 meters. According to the residents of buildings who were interviewed, the positive factors that made them live in apartments are linked mainly to climate amenities, good location, comfort and safety. As for the amenities, considered by the residents of the apartments as a major factor in the choice to reside in this type of housing is justified, because the vertical buildings in Natal are usually located in favourable areas for greater air circulation, especially close to the sea and the green environmental preservation areas such as the Parque das Dunas (see Costa, 2000).

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In the case of the city of Natal, as Queiroz 2010 emphasises, its master plan has foreseen zones of basic density, denser zones and environmental protection zones. But the plan is contradictory in this item, since, there, the master plan provides a development exception, in Portuguese the so-called *Outorga Onerosa*, which allows the ventures to build area beyond what is permitted by law, in such a case paying a fine for non-compliance with the law that will be destined to the Urbanisation Fund, thus, causing the increasing verticalisation of already denser areas in the city.

In the case of Recife, particular in the Boa Viagem neighbourhood, mainly due to the natural impact of the proximity to the beach, the maximum heights have been determined by the harming effects of shading, by hampering or preventing ventilation, whereas existing highrise building constructions near this area prove a large variety (from 11 to 40 floors and up to 143m) in heights and increasing density of the ongoing verticalisation of neighbourhoods in these urban zones.

Where are the local population now who lived in houses in these areas before the vertical residential expansion?

City of Rio de Janeiro, South Zone, Copacabana neighbourhood

The South Zone neighbourhoods of Rio de Janeiro lost local population due to the increased apartment rents and living cost in general, those were not accompanied by increase of salary. They migrated to less-expensive downtown Rio de Janeiro neighbourhoods like Lapa and Bairro de Fátima[12].

City of Natal

In the city of Natal, capital of the Rio Grande do Norte (RN) state, it can be observed a visible spatial segregation, in which areas of the city are dominated by the low-income population, for instant the North and West zones, and the southern and eastern areas are dominated by the high-income population. The existing social-spatial segregation in Natal, as the verticalisation is localized in privileged areas, resulted in the worsening of other problems, at the same time social and environmental, and affected the quality of life in the city. Thus, the residents with low-incomes are being excluded from the neighbourhoods with greater offer of infrastructure services (see also Queiroz, 2010).

City of Recife

The verticalisation of Recife, instead of approaching and mixing its citizen, has produced an increasingly segregated and sectorised city, where one depends on the car, without people in the streets and accessible only for a more privileged portion of the population. The ongoing

[12] Inclusion or exclusion of the less favourite social classes in the development processes of neighbourhoods in Rio de Janeiro: the partial or complete relocation of people living in Favelas in Rio de Janeiro, using the area of the project Porto Rio Maravilha to offer them, for instant the population of Vidigal Favela, to migrate to apartments where they would live closed to their work environments in a central location in downtown Rio. This scenario is far from reality regarding local policy of urban space occupation on various levels. Furthermore, the relocation of people living in favelas is not supported at the universities, on the contrary. Proposing this scenario as a project for conducting master dissertations or doctorate theses, it will not be accepted (based on own experiences by applying at urbanism departments at various public universities in Rio de Janeiro, as, for instant, the Federal and State Universities of Rio de Janeiro, UFRJ and UERJ. On the City and State level, this area was used for heavy real estate speculations, implementing hotels and designated for international business and art venues. As the present involvement of constructors and City and State politicians in corruption scandals demonstrates, it was far from being an option.

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valorisation puts speculative pressure on the houses that still resists in a determined area, and areas that are occupied by low-income communities become targets of real estate capital speculation. The side effect of the verticalisation is the gradual expulsion of this local population, violently or by increasing cost-of-living in central areas and close to "nobler" neighbourhoods. They are forced to move to distant neighbourhoods on the outer skirts of the urban zone. This creates a densification of the rich people and a spreading of poverty, which, in addition to the obvious segregation between classes, creates greater mobility problems especially for the less privileged part of the population who live at distance to their working environments.

Is verticalisation of the city contradictory to equal urban rights and access for everybody living in the city?

The nature of the attributes of the different locations in the city is determined by the interrelations of the elements: accessibility and infrastructure. The city is mixer of people, that is why it exists, that is how it has its maximum strength. An urban agglomeration that segregates and isolates its habitants, as it says, can be anything but a city.

City of Rio de Janeiro

The real estate speculation and valorisation forced part of the local communities in the South Zone of Rio de Janeiro to leave their neighbourhoods to migrate to less expensive neighbourhoods in downtown Rio. Some chances in the public bus transport system hindered the access to the South Zone during the international events from 2014 to 2016, the population living in the North Zones of Rio de Janeiro was not able to reach the beaches located in the South Zone of the city. With the implementation of the Port Project "Porto Maravilha" in downtown Rio de Janeiro, these areas suffered an immediate very high valorisation, consequently expulsing the local communities to migrate to live on the periphery of the city.

City of Natal

In Natal, in recent years, were made several investments in urban infrastructure, which have nourished the dichotomy of the inclusion and exclusion of the population in Natal, since not everyone has access to these urban environments. The verticalisation of Natal has always been focused towards the more affluent segments of the population, considering the elitist characteristics of its buildings, not constituting, therefore, a choice of housing for the low-income population. This process does not take place in a concentrated way in the periphery-centre sense and is developed both in areas with infrastructure services and in those lacking them. In accordance to Queiroz, 2010, the current master plan could make the "right to the city" a right for all population of the city on Natal, which could contribute to improve the quality of life of all its residents. Nevertheless, the verticalisation constitutes the element of the social-spatial segregation in Natal, since, related to the growing density of buildings in certain areas of the city, the segregation becomes increasingly present, therefore, associated with this "new" way of living, collective services, infrastructure, provision of services – clinics, services, etc. – shopping malls are being implemented, to the disadvantage of the peripheral areas of the city. The current master plan of the city, thus, is a plan full of contradictions that does not reflect on the right to the city for everybody, but rather on a social-spatial segregation.

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City of Recife

If the architectural pattern of the city of Recife does not privilege diversity, the urban model seeks to segregate the public from the private. As if the privileged access to such landscapes is not enough, several mechanisms of isolation, segregation and privatization are been implemented: medial walls that surround the condominiums and leave the vulnerable pedestrian in the streets without anybody to offer security; public spaces that scare away anyone who wants to enjoy the landscape, since they are not designed for permanence, but for contemplation of the residents of the condominiums themselves or by those who pass by car. In addition, by hiding behind their high walls, these ventures block the view, block the sun on the beach, block the wind, the mobility, life. As our in loco observations confirmed, the lack of kindness, cordiality of one towards the other is revealing the stress of the people due to the condition of life in the city.

Common related problems in the investigated areas of the cities

With the verticalisation of coastal neighbourhoods in state capital cities from South to North of Brazil, the investigated urban areas face numerous and, nevertheless, similar problems, as observed in loco during frequent visits of the coastal cities in the period from 1997 to 2016 and described as follows, with particular emphasis for similar phenomena.

Heat islands

Vertical growth has its direct impact on the climate. Among other cities in the process of verticalisation, in Aracaju, for instant, capital city of Sergipe State, areas of the city became much hotter due to the barrier of buildings on the beachfront, which hinders the circulation of air. Heat differences can be experimented in Boa Viagem neighbourhood in Recife, between the densely urbanised areas and the green areas. There, we noticed the lack of green areas inside the neighbourhood such as squares and gardens that would help to reduce the urban heat.

Inundations

In addition, loss of vegetation also leads to greater soil waterproofing, impacting the drainage of rainwater and leading to the usual inundations that, among others, the verticalised and dense neighbourhoods of Recife suffers at certain times.

Insufficient or total lack of sewage systems with risk of groundwater pollution

In Natal, the deficiency of sewage service in most part of the city contributes, with the intensification of the vertical integration, to the emergency of other environmental problems, such as the pollution of the Potengi River and the commitment of the surface water sources that supply the city of Natal. Many neighbourhoods of the city that do not posses basic sewage systems, as for instant the lagoon Lagoa Nova, Alto da Candelária and Capim Macio, suffer from accentuated verticalisation. In this context, we question how far this fact can contribute or have contributed to the pollution of the groundwater from these areas of the city, since, due to the lack of such sewage systems, the buildings use the subsoil for the storage of the effluents produced by the population of these buildings. Same situation can be identified in the Metropolitan Region of Recife, where the lack of resources for sewage effluents and the fast expansion of the real estate market contribute heavily to the pollution of rivers and the ocean.

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Shading

The partially shading of the beach of Leblon due to the skyscrapers located on the beachfront can be observed in some periods of the year, particularly in the area of the Hotel Marina Palace Leblon on Delfim Moreira Avenue, corner General Urquiza avenue. In Boa Viagem neighbourhood, in the city of Recife, the shadow caused by highrise buildings located on the beachfront after 2 p.m. leaves the beach without direct access to solar radiation, therefore turning impossible the proper use of these beach zones.

Security

Lack of security comes together with the verticalisation of the neighbourhoods of the city. Based on in loco observations during the production of the architecture art photography, we stopped producing after a short time in the neighbourhoods of Boa Viagem, in Recife, Iracema, in Fortaleza and Ponta d'Areia, in São Luís due to street youth-gangs surrounding us to hinder a possible escape from their attempted robbery. The lack of people in the streets and high walls surrounding the skyscraper condominiums leave the vulnerable pedestrian in the streets without eyes to offer security.

Erosion on the beach front caused by change of the sea current and **deficient water supply**, among others, effecting the neighbourhoods of the investigated cities in this research.

CONCLUSIONS AND IDENTIFYING PERSPECTIVE FOR FUTURE RESEARCH

We concluded that the former local population in these areas were forced to migrate to less expansive neighbourhoods in the cities or even left the urban zones to live in peripheral zones close to the city. The accelerated and widely "uncontrolled and unplanned" verticalisation processes resulted in social-spatial segregation of the city. In the urban agglomerations, a division has been taken place between privileged and unprivileged zones. In the privileged zones, the construction of huge walls around the condominium and the lack of people in the streets are provoking increasing security issues and offer limited access only for a privileged portion of the population, whereas, in the unprivileged zones, due to the physical distant to the central working neighbourhoods of the city, people depend on cars. This creates a densification of the rich and an acceleration of the sprawling tendency of poverty. Moreover, as a result of the process of verticalisation of neighbourhoods in capital cities on the coast of Brazil from North to South, we could identify several problems related to the process, based on our in loco observations and interviews carried out with residents during our field study, such as waterproofing coverings that are causing inundations of streets in the neighbourhoods, increase of temperature, wind funnelling, traffic jams, air pollution and security concerns, as well as large volumes of urban runoff, deficient water supply, wastewater and solid waste collection.

One scenario in the future is that the neighbourhoods of the investigated coastal cities will suffer even more spatial segregation due to continued valorisation of its urban land, as areas receiving infrastructure elements. In consequence, the taxation increases and real estate pressure intensifies. The low-income population, known as local communities, are going to be driven out to more distant locations. Where they lived before, their houses are going to be replaced to implement skyscraper. The accelerated verticalisation process, as observed in

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loco in coastal cities from South to North of Brazil, has produced increasingly segregated cities, rather than bring together and mix their citizen.

As the results of our research show, the continuing and accelerated vertical expansion process in neighbourhoods of the main coastal cities in Brazil is full of contradictions and does not reflect on equal rights and access to the city for all its citizens, but rather reflects on social-spatial segregation. There is a long history of lack in transparency in dealing with public space, being the constructors always the first to know of the public investments, thus, they arrive at place before the infrastructure implementation and benefit from the valorisation of the land around.

In this context, it does not exist acceptable logic and coherent relation between the quality of the buildings and the quantity of people who live in them with the capacity of the streets to receive cars, quantity of wastewater, water supply, wastewater and solid wastes collection in the investigated cities. The verticalisation process in the neighbourhoods is being responsible for profound changes in the internal structure of the cities, highlighting the changes in the social structure, value and use of urban land. Therefore, what you see in several cities is real estate expansion without control, causing excessive densification in the most demanded areas and saturation of the urban infrastructure. Besides the obvious segregation between social classes, the expulsion of local communities, migrating to distant neighbourhoods at the periphery of the city or to zones located at the outer skirts of the city, increases mobility problems. This interference on disorderly soil occupation can cause thermal stress in the population, which directly affects the daily activities of the people.

We are questioning the determinations of the allowed heights of the buildings as one measure to avoid uncontrolled verticalisation of neighbourhoods. Future research needs to be carried out to accompany closely the urban development processes of the neighbourhoods in the main coastal cities included in this study.

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ANNEX

Itinerant Exhibitions
Line and Light

Photography exhibition Andreas Hornung 03-04 l 2013
Centro Cultural Cândido Mendes, Rio de Janeiro. Rua da Assembléia 10, basement, downtown.

From March, 20 to April, 30, 2013

Monday to Friday from 12 to 19h
www.artinrioandreashornung.com

Where Construction and Mountain meet Air – Rio de Janeiro

Sky, light, colour. Building, apartment, bathroom. Balcony, pool, street. Bridge. Mountain, trees. Rio de Janeiro. The city of nature. The nature of the city. Meeting and missing. The sky defines the architecture. The mountain defines the sky and the sky defines the buildings. Day and night. Years. Inside and outside of the apartments with windows to the nature. The intense blue of the ocean, pool and sky. Rio de Janeiro with its peculiarity. The force of light with intense and vivid colours.

Description

In three series and in three different neighbourhoods of the city – Copacabana and Arpoador in the South Zone and in Downtown Rio de Janeiro – the camera goes up the construction embedded in the sky, looking for the line between the texture of the faces of the buildings and the air. The sky as defining background, as natural border of the construction. In the work between 2000 and 2012, the sun was used as source of natural light, taking advantage of the colours of the intense dark blue sky without clouds in the afternoon on the Beach Avenue of Rio de Janeiro. Sequential panels still show the darkening of the blue in a few minutes. Day and night the same scenario over 365 days. The sky of the eleventh floor of a building in Copacabana builds the same defining line with top floors of buildings on the other side of the main street of the neighbourhood, although the colour of the sky and the formation of the clouds never appear equal. Two other series show the border between sky and mountain at three locations, in the urban area of Copacabana, in a park area of Largo de Machado and in Magé, located in the countryside of Rio de Janeiro. The photo tour in search of the line between air and construction invades the apartments with windows to the nature, to the air, penetrates the rooms inside the apartment to finally go back outside. The series Bathrooms with 54 photos accompany the series Balconies with 96 photos in the meeting of air-construction inside and outside of the apartments. Another series Deep Blue on the beachfront with 38 photos shows the special light through the blue colour of pools, sky and ocean. A brief fashion series with 8 photos on the rocks of Arpoador completes the search for the line between mountain and the blue air of ocean and sky.

With more than 880 photos in 15 thematic sequential blocks from 2000 to 2012.

There were used the digital cameras Nikon, Sony and Olympus. The exhibition counts on records on screen and paper and the presentation of a DVD, Audio-CD and book.

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Line and Light – Rio de Janeiro

PHOTOGRAPHIES

"Where Construction and Mountain meet Air"

http://artinrioandreashornung.com/

Andreas Hornung - The artist shows in the Small Gallery of the Cultural Center Cândido Mendes in downtown Rio de Janeiro 13 photographic works. During tours in different neighbourhoods of the city, the camera goes up the construction surface in the search for the line between the air and the structure of the highrise buildings surrounded by the sky. The sky as a defining element, the natural border of the construction.

During the exhibition, a video with more than 880 photos from 2002 to 2013 is shown.

First part of a photographic trilogy along the boundary line between the elements.

The exhibition in the Small Gallery of the Cultural Center Cândido Mendes in downtown Rio de Janeiro (Street Rua da Assembléia 10, subsolo, Square Praça XV) takes place until April 30, 2013.

http://artinrioandreashornung.com/

Line and Light – Rio de Janeiro

The search for the defining element between the elements.

The line giving access – due to a peculiar perspective – to the beauty and poetry of the object that become mere instrument for discovery of a geometric surface, usually little perceived and experimented.

Light as a source of natural lighting, taking advantage of the colours of the sky, the intense dark blue in the late afternoons.

The camera penetrating the borderline of the areas, looking for the line between the elements – sky, construction, light, mountain.

The city meets human.

An end of the beginning of a beginning.

An end that started in 2002 with a line between the elements in oil paintings to find its full voice in photographic language – the results of photo tours that started in Copacabana, Ipanema and Arpoador, which were extended to other neighbourhoods, like Urca and downtown Rio, leaving the urban zone to explore the rural district (specifically the Bay of Guanabara close to Magé).

An end that started with a digital camera of 2mpx, to use one with 6 and 12 mpx, respectively, increasing the resolution and resulting in more open angles not always desired.

"You just can't redo the photos with different cameras. With apertures of different lenses, you create different perspectives, thus preventing the shooting of same photos.

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Which results in unique photos without using any image editing tool"

A beginning – the second parte of the trilogy of Line and Light – outside the cities changing concrete with sand, air and water – which is in the final stages to be exhibit in 2014. Date and location will be informed.

Andreas Hornung, Photography exhibition in the Small Gallery of *Cândido Mendes, Rua da Assembléia 10, basement, downtown, Rio de Janeiro, from March, 20 to April, 30, 2013, 12 to 19 o' clock.*

Andreas Hornung

artist and curator, uses various techniques of artistic expressions.

Previous exhibitions and publications:

Books

2005 Publication of the books Nine and 365

2004 Publication of the books Seven and Five

2001 Publication of the books Cyberrio and Copa, written in German

1999 Publication of a collection of poems with the title Brazil, written in German

1998 Publication of the Book of Poems, written in German

1997 Publication of the books Poems I, Poems II and Prose, written in German

Photography

2005 Publication of photos (on CD-Rom) I-movie and I-movie 2

2004 Publication of photos (on CD-Rom) Nature and People of Rio de Janeiro and Urban Images

Paintings

2003 Exhibition of 5 paintings, Rio de Janeiro

1998 "Laisse pisser les moutons". Exposition of paintings and installations, Hamburg, Germany.
Together with the publication of the books Poems I, Poems II and Prose

Sculptures

1998 Exposition of the Sculpture by the lake, Hamburg, Germany

Performance

1985 - 1987 Three-year-course in art history together with Performance

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and Exhibitions of paintings, sculptures and installations, Fulda, Germany

BODY OF WORK

Permanent exhibitions on the islands and abroad

SUI GENERIS – art exhibition in movement, extended with new work of art
Maranhão, Ilha de Lençóis, Escola da ilha e Memorial da ilha, permanent

September 2, 2014 – September 30, 2014, permanent, from mon to fri, from 10 AM - 5 PM
Maranhão, Ilha de Guajerutíua, Escola da Ilha e Posto de Sáude da ilha, permament

May 20, 2015 – June 30, 2015 permanent, from mon to fri, from 10 AM - 5 PM

Maranhão, Baixada Maranhense, Ilha de Retiro, Conselho da Ilha, permanent

Opening March 11, 2016 - permanent, from 10 AM - 10 PM
Rio de Janeiro, Centro, Restaurante Crystal, downstairs, Rua Assembleia 11, permanent

29 July, 2015 – permanent, from mon to fri, from 11 AM - 4 PM
Rio de Janeiro, Ladeira dos Guararapes, Soccerfield, permanent

October 5, 2016 – November 30, 2016, permanent, from mon to fri, from 10 AM - 5 PM

Itinerant exhibitions throughout Brazil

SUI GENERIS – art exhibition in movement, extended with new work of art
Rio de Janeiro, Centro, Centro Cultural Cândido Mendes, downstairs, Rua da Assembleia 10

March 20 – April 30, 2013, from mon to fri, from 11 AM - 4 PM
Rio de Janeiro, Aterro do Flamengo, Espaço Cultural Monumento Estácio de Sá,

May 5, 2014 – June 30, 2014, from tue to sun, from 10 AM - 5 PM
Maranhão, Ilha de Lençóis, Escola da ilha e Memorial da ilha, permanent

September 2, 2014 – September 30, 2014, permanent, from mon to fri, from 10 AM - 5 PM
Rio de Janeiro, Jardim Botânico, Museu do Meio Ambiente, Rua Jardim Botânico, 1008

22 September 2014 – 11 January 2015, from tue to sun, from 10 AM - 5 PM

May 20, 2015 – June 30, 2015 permanent, from mon to fri, from 10 AM - 5 PM
Maranhão, Ilha de Guajerutíua, Escola da Ilha e Posto de Sáude da ilha, permament

Rio de Janeiro, Leblon, Clube Monte Líbano, Av. Borges de Medeiros, 701

July 2, 2015 – July 20, 2015, from mon to sun, from 10 AM - 5 PM
Rio de Janeiro, Centro, Restaurante Crystal, downstairs, Rua Assembleia 11, permanent

29 July – permanent, from mon to fri, from 11 AM - 4 PM
Rio de Janeiro, Alto Gávea, Sociedade Germania, Rua Antenor Rangel, 210

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August 9, 2015 – August 11, 2015, from tue to sun, from 10 AM - 5 PM
Janeiro, Rio de Janeiro, Centro, Colégio Cruzeiro, Rua Carlos de Carvalho, 76

August 29, 2015,- September 30, 2015, from mon to fri, from 11 AM - 4 PM Rio de

Três Rios, Centro, Estado de Rio de Janeiro, Gallery Sesc Três Rios, Rua Nelson Viana, 327

September 3, 2015- October 31, 2015, from tue to sun, from 9 AM -9 PM, Sat/Sun until 6 PM
Maranhão, Centro, Museu Histórico e Artístico do Maranhão, Rua do Sol, 202

September 18, 2015 - October 31, 2015, from tue to sun, from 9 AM - 9 PM,
Rio de Janeiro, Centro, Centro Cultural Light, Av. Marechal Floriano, 168

December 1, 2015 - January 15, 2016, from mon to fri, from 10 AM - 5 PM,
Maranhão, Ilha de Retiro, Escola da Ilha e Posto de Sáude da ilha, permanent

March 5, 2016 – March 31, 2016, permanent, from mon to fri, from 10 AM - 5 PM
Rio de Janeiro, Ladeira dos Guararapes, Soccerfield, permanent

October 5, 2016 – November 30, 2016, permanent, from mon to fri, from 10 AM - 5 PM

BIBLIOGRAPHY LAUNCHED DURING OPENINGS OF THE ITINERANT EXHIBITIONS SUI GENERIS FROM 2012 TO 2016

BOOK *SUI GENERIS – L'ESSENCE DE LA VIE .:: people and landscape*, published by Galerie Art in Rio, Andreas Hornung in 2016, premier edition, Rio de Janeiro. 152 pgs. ISBN 978-85-67475-00-4

BOOK *LE PETIT PRINCE IN THE DESERT OF MARANHÃO STATE – five days on the way to art*, published by Galerie Art in Rio, Andreas Hornung in 2013, second edition, Rio de Janeiro. 148 pgs. ISBN 978-85-67475-00-5

BOOK *MIRANTE DO AZUL .: Andreas Hornung*, published by Galerie Art in Rio, Andreas Hornung in 2009, second edition, Rio de Janeiro. 48 pgs. ISBN 978-85-67475-00-6

See portfolio exhibition SUI GENERIS Line and Light using this link: http://www.artinrioandreashornung

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artwork 1: Skyscraper Iracema, Fortaleza, 9/2012

artwork 2: Skyscraper Ponta d'Arreia, São Luís, 5/2012

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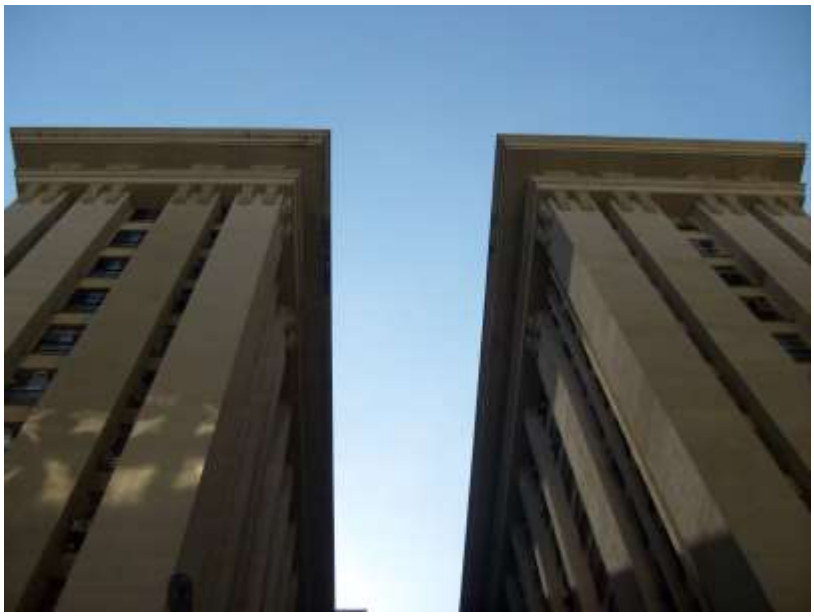

artwork 3: downtown, Rio de Janeiro 3/2008

artwork 4: downtown, Rio de Janeiro 5/2012

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artwork 5: downtown, Rio de Janeiro, 3/2008

artwork 6: Leblon, Rio de Janeiro 9/2013

artwork 7: downtown, Rio de Janeiro, 3/2008

artwork 8: downtown, Rio de Janeiro, 3/2008

artwork 9: downtown, Rio de Janeiro, 5/2008

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artwork 10: downtown, Rio de Janeiro, 3/2008

photo 1-2: Questioning the permitted limit of floor numbers of a future hotel skyscraper, located on the main street Nossa Senhora de Copacabana, corner Bolivar street in the Copacabana neighbourhood. Photos taken on June 15, 2016 and February 21, 2017, respectively.

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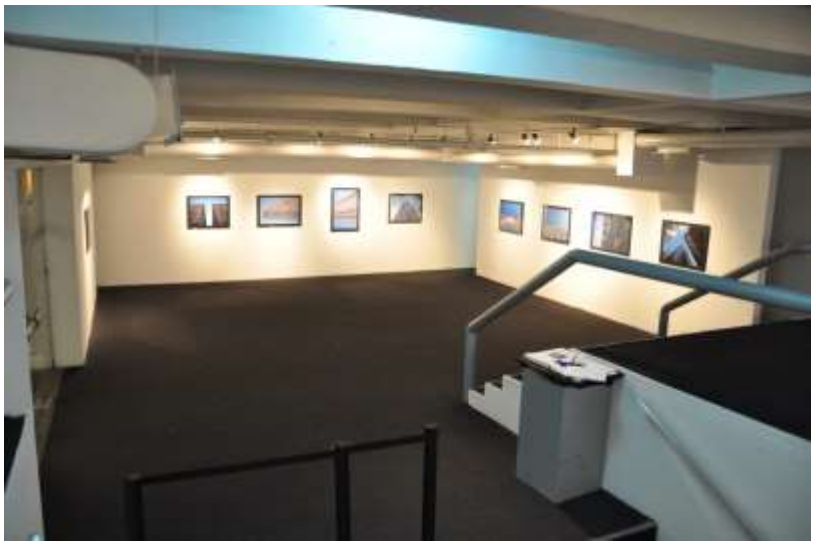

photo 3: Exhibition in downtown Rio de Janeiro 3/2013

photo 4: Exhibition downtown Rio de Janeiro 3/2013

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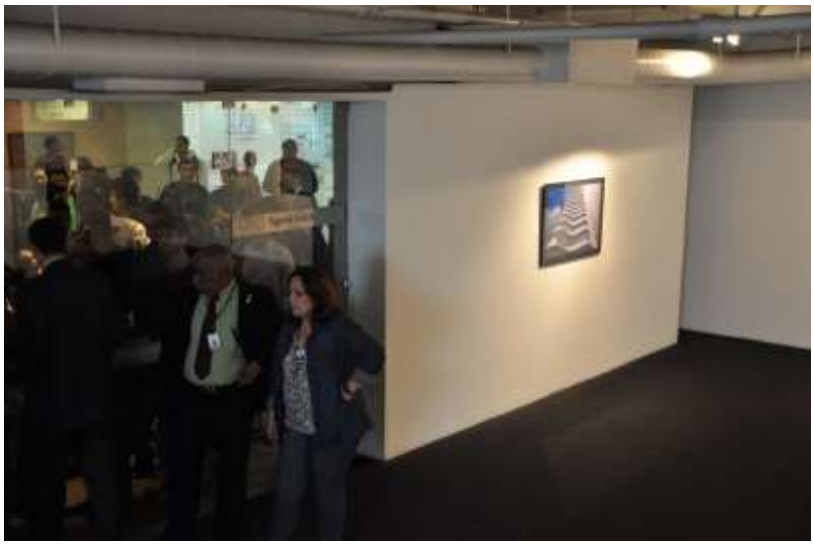

photo 5: Exhibition in downtown Rio de Janeiro 3/2013

photo 6: Exhibition in Alto Gávea, Rio de Janeiro 8/2015

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photo 7: Exhibition in Alto Gávea, Rio de Janeiro 8/2015

photo 8: Exhibition in Alto Gávea, Rio de Janeiro 8/2015

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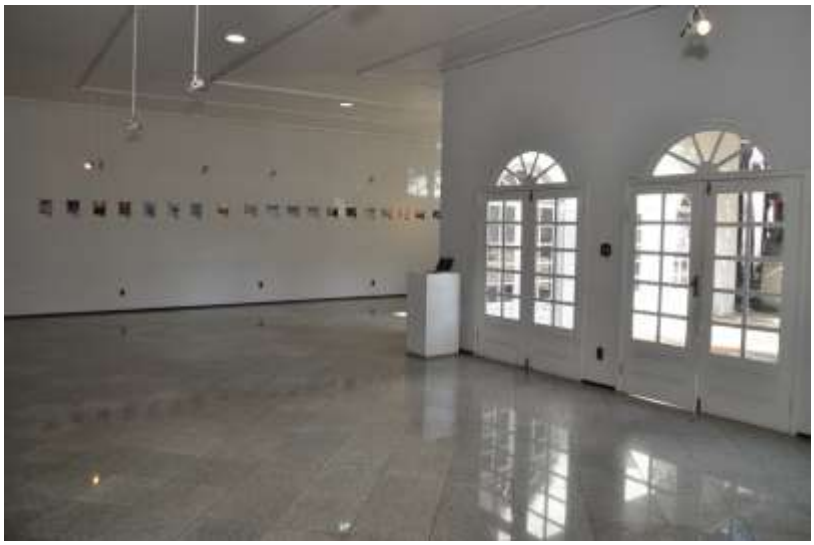

photo 9: Exhibition in Museum MHAM São Luís, 9/2015

photo 10: Exhibition in Museum MHAM São Luís, 9/2015

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photo 11: Exhibition in Museum MHAM São Luís 9/2015

photo 12: Exhibition in Gallery Light, 11/2015-1/2016

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photo 13: Exhibition in Gallery Light, 11/2015-1/2016

photo 14: Exhibition in Gallery Light, 11/2015-1/2016

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photo 15: Workshop in Gallery Três Rios, RJ, 10/2015

photo 16: Workshop in Gallery Três Rios, RJ, 10/2015

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photo 17: Workshop in Gallery Três Rios, RJ, 10/2015

photo 18: Workshop in Gallery Light, Rio de Janeiro, 1/2016

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photo 19: Workshop in Gallery Light, Rio de Janeiro, 1/2016

photo 20: Workshop Olympic Games, Rio de Janeiro, 8/2016

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photo 21: Workshop Olympic Games, Rio de Janeiro, 8/2016

photo 22: Workshop Olympic Games, Rio de Janeiro, 8/2016

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photo 23: Workshop Olympic Games, Rio de Janeiro, 8/2016

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