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**BELVEDERE III – AN ANALYSIS OF AN URBAN OCCUPATION IN AN ENVIRONMENTAL PRESERVATION AREA AND ITS CONSEQUENCES ON THE LANDSCAPE**

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**ABSTRACT**

The proposal of this study is to analyze the urban occupation model applied to the Belvedere III neighborhood in *Belo Horizonte*, *Minas Gerais* and its consequences on the landscape environment. The neighborhood is located inside the boundaries of *Serra do Curral*, a natural landmark of *Belo Horizonte* region, included in several historical and environmental preservation codes, such as: a) Cultural Heritage Act (n° 3.802/84); b) Environmental Heritage Protection Act (n° 4.253/85); c) Municipal Constitutive Law (dated 1990); d) Urbanistic Regulamentation Code in the Director Plan (dated 1996) and in the Land Use and Occupation Law (n° 7166/96) and its revision (n° 8.137/00).

The initial urban settlement, as occurred before the implementation of *Minas Gerais* state capital was a little village called *Curral Del Rey*. When *Aarão Reis* planned *Belo Horizonte* he assigned this area for water supply reservation for the city, because of its rich natural environment and exuberant landscape.

However the city's expansion surpassed the limits assigned for the plan and the occupation spread over the *Serra do Curral* direction with a high income residential use concentration, following a southern vector of spatial growth, characterized by intensive urban infrastructure and social segregation. In 1970, the creation of the Mangabeiras neighborhood, on a preserved area on *Serra do Curral* boundaries, was initiated. Since then, other neighborhoods have been implemented, and this process culminated with the Belvedere III sector construction in 1994, located between *Nova Lima* and *Belo Horizonte* districts.

This paper points out this last occupation phase, characterized by vertical constructions of high and very high-income housing patterns, which has resulted in negative impacts over the landscape.

Key Words: Environment, Preservation Area, Landscape, Urban Occupation, Urban Plan.

## 1. INTRODUCTION

This work presents an analysis of the environmental and landscape impacts caused by the Belvedere III occupation, a new district of *Belo Horizonte* county in *Minas Gerais* State in Brazil. It is located inside *Serra do Curral* boundaries, a natural city landmark, and on the rain water recharge area, with direct influence on the region's hydrological system. The settlement process was characterized by the disrespect of the historical and environmental preservation codes along with changes in the urbanistic regulation.

The city of *Belo Horizonte* was resulted from an urbanistic plan, developed in 1898 by Aarão Reis, which intended to make the new capital a symbol of the country's new economical policy related to the republican government. The economical changes, associated with the technological developments and to the new social codes, led to new building models, diverse from the ones produced on the colonial period.

The new building models followed a concept which aimed to create a "healthier and more organized" city with large avenues and many green spaces. The road system followed an orthogonal design setting inside the urban expansion limit, corresponding to *Sete de Setembro* Avenue, presently *Contorno* Avenue, consisting on a ring that originally skirted the city building area. Today this region belongs to the South-Center Regional Administrative Sector, composed by the downtown district and some of the southern zone neighborhoods.

According to Flavio Villaça, since the beginning, the urban growth planning was set to privilege the south center neighborhoods. This was the first region to receive infrastructure and the land value was unaffordable to the low income population, banished to the northern region. The south direction urban expansion was aimed to high income residents, and has grown with better infrastructure and stronger social segregation. (Villaça, 2001)

The downtown commercial district was abandoned by the higher income dwellers who sought for other retail alternatives, in the commercial center known as *Savassi*. When the *BR-040* highway was created to connect *Belo Horizonte* to *Rio de Janeiro*, this district became more valuable and enhanced the south expansion. In 1980 with the *BH-Shopping Mall* construction, the urban sprawl extended over the *Serra do Curral*, helping consolidate expansion over originally assigned limits.

The original plan for the area in the south of the *Contorno* Avenue was water supply reservation for the city. The *Serra do Curral* was considered by the population as a city landmark and had its environmental asset legally established in 1960, when it received a formal recognition code by the National Institute of Historical and Artistic Preservation-IPHAN. For Maura Ferreira, this was the first step to consolidate the importance of this area for the city (Ferreira, 2003).



FIGURE 1: Original Plan for the City of Belo Horizonte by Araão Reis.  
Source: PBH, 1995. Map made by Flavia Amorim, 2007.

The first settlement approved inside the preservation area limits occurred in 1973, with the *Mangabeiras* quarter project. In the same period the *Belvedere I* was also approved. This high income occupation type grew constantly, spreading over *Serra do Curral*.

The 1970 decade was also characterized by the beginning of the *Nova Lima* occupation, planned for high income one and multi-family housing condominiums, built as a second residence neighborhood. *Nova Lima* is a city located on the South of *Belo Horizonte* County and the *Serra do Curral* limits divides both cities. The condominiums consisted of one/two store houses that presently composes sophisticated housing complexes, with complete leisure and service centers.

The natural environment is, according to Villaça (2001), a strong residential location reason: in the coastal cities, the beaches and, in the inner sectors, the forests act as attraction factor. In these areas of high scenic environmental quality, the land values are extremely high, creating segregated neighborhoods.

The *Belvedere III* district was initially settled in 1998, after a long legal dispute over some irregular decisions taken on the land parcelling process. The project was licensed by the mayor, Sergio Ferrara, without approval by the deliberative commissions. The mayor authorized a change on the urban and building codes, which originally restricted the occupation to one-family housing residences, allowing both commerce and residence towers as well as underground parking on the lots full extension .

## 2. NATURAL SITE CHARACTERISTICS AND THE ENVIRONMENTAL PROTECTION

The central question involved in the creation of Belvedere III is the location on *Serra do Curral*, which concentrates the largest metropolitan region underground water reserves. According to City Hall information (PBH, 1995), the soil presents a porous constitution that can reach until 50 meters of depth, ranging normally between 20 and 30 meters<sup>1</sup>, what means that the underground water levels are superficial and very sensible to pollution.

The local river system belongs to *Córrego Cercadinho* sub-basin, that feeds the *Ribeirão Arrudas*, a brook that contributes to *Rio das Velhas*, the river which integrates one of the most important hydrological systems of *Minas Gerais* State<sup>2</sup>. Ferreira (2003) points out that *Córrego Cercadinho* is the one of stronger outflow of the region and *Serra do Curral* composes the water recharge of this sub-basin.

Maura Ferreira still adds that, in 1997, the *Minas Gerais State Environmental Policy Commission* (COPAM) approved the establishment of a special category to *Córrego Cercadinho*, due to its water quality condition, recommended to domestic supply.

In this condition, launchings of wasted waters, both domestic and industrial, and solid garbage disposal are not tolerated. Ferreira points out that this regulation were supposed to keep the region from being urbanized.

The *Serra do Curral* region is protected by several historical and environmental preservation codes. Analysing these laws, we can highlight:

1) The Municipal Constitutive Law (n° 3.802/84) created the Cultural Heritage Deliberative Commission, which deliberated on the *Serra do Curral* region, defining its protection perimeter. In accordance to this law, the region was assigned with legal instruments to guarantee its protection.

2) The 1990 Municipal Constitutive Law determined that the urban development should occur in accordance to the environmental, historical, artistic and archaeological protection, preservation and recovery standards (art. 186). To make this possible some urban legal tools were designed. The Constitutive Law determined the *full protection status* of some natural, landscape, artistic or historical sites, including, among them, the *Serra do Curral* region.

3) The 1996 Director Plan also established environmental laws which aimed to protect the natural heritage landmarks and the sights in a sustainable development. It defined the Zones of Environmental Protection (ZPAM) and Zones of Protection (ZP). Part of the *Serra do Curral* region, where Belvedere III is located, was determined as ZP-1: “regions, predominantly without urban occupation, because of the environment importance, are reserved for environmental protection and preservation of the cultural, archaeological, landscape and historic sites and/or with geologic risk, in which the occupation is allowed under conditions (...)”. For ZP1, the occupation codes are extremely restrictive, consisting of: a) lots with 10.000 m<sup>2</sup> minimum area; b) maximum number of 4 residential units per lot; c) maximum occupation percentage of 0,2; d) coefficient of equal exploitation of 0,3 and minimum permeability percentage of 70%.

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<sup>1</sup> <http://www.pbh.gov.br>, searched on May 20, 2006.

<sup>2</sup> <http://revista.fapemig.br/materia.phpid=68>, searched on June 4, 2006.

Part of the referring district up to *Lagoa Seca limits*, an intermittent lake, is determined as ZPAM “regions that, for its characteristics and the vegetation importance, are destined to preservation and to ecosystems recovery (...)”, where urban occupation is forbidden. In 2000, the Director Plan passed for revision, but the Belvedere III district kept the same zoning profile of 1996.

Its occupation approval has occurred in spite of all the protection legislation tools and have not followed the requirements of an environmental impact study, needed where the environmental interest is foreseen by the Federal Environmental Legislation (CONAMA Resolution N° 01/86).

In October, 1994, there was an Environment City Council (COMAM) commitment, in order to proceed the adequate environmental licensing to the enterprise. This commitment was ignored by the constructor firm and no measure was taken to evaluate the impacts or sue the environmental legislation infraction.

### **3. THE IMPACTS AND ITS RESULTS ON THE LANDSCAPE**

*“The urbanization is one of the most incisive interventions when we talk about erosion, mainly when badly planned, implanted and kept.” (Silva, 2002)*

According to Silvio Macedo, landscape functions as a system, where all action corresponds to a reaction (Macedo,1993). In *Belo Horizonte*, the urban landscape is a result from the permanent transformation, due to several actions of different actors. The urban occupation settlement is a great impact intervention and, as Humberto Silva stands out (2002), if it is not well planned the damages are huge.

To study the impacts of the Belvedere III occupation on the landscape, we will see the environmental outcome from it. We adopt as a definition of environmental impact the one described by CONAMA Resolution N°1 - 23/01/86 (apud Cortizo, 2002:26):

“environmental impact is considered as any alteration of the physical, chemical and biological properties of the environment, caused for any form of substance or resultant energy of the human activities which, directly or indirectly affects: a) the population health and welfare; b) the social and economical activities; c) the biota; d) the environment aesthetic and sanitary conditions; and e) the environmental resources quality”

We can present the environmental impacts caused by Belvedere III occupation as analysed under the following aspects: a) geologic and hydrological impacts, b) Influence in the soil stability, c) Alterations on the landscape.

#### *3.1. Geologic and hydrological impacts*

The urban occupation of an area usually requires the vegetation supression, the soil transformation and the decrease of natural ground water drainage capacity. The result usually is the natural environment transfomation, with both landscape and biological profiles changes.

The urban codes for the Belvedere district allows for 100% lot surface paving, and this occurs in most part of the cases, as it can be observed in Figure 2, causing serious damages to the local hydrological system and to the *Córrego Cercadinho* outflows.

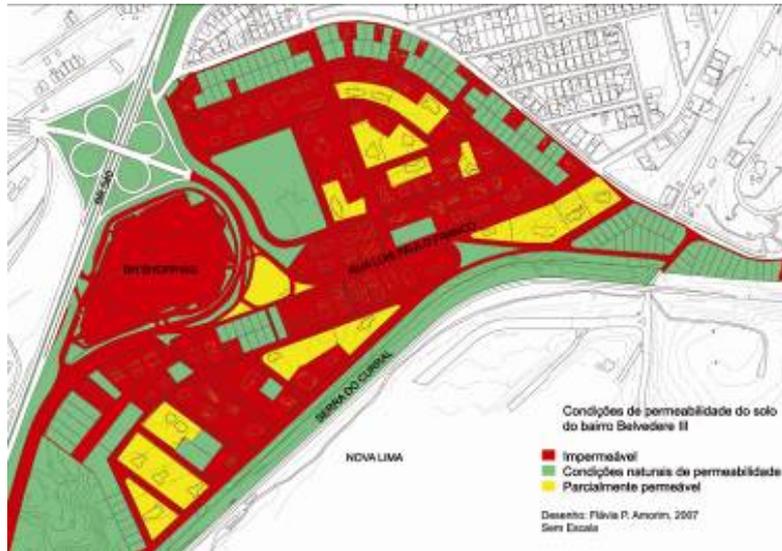


FIGURE 2: Ground Water drainage conditions of Belvedere III  
Map made by Flavia Amorim, 2007

According to Humberto Silva (2002), the absence of vegetation and the soil conditions lead to water retaining and supplying problems. One of the consequences is the erosion caused by the rain water absorption speed. Another problem is the lack of natural rugosity needed to reduce distances, adding to high volumes of water not absorbed by the soil, increasing the erosion process.

There is an existing square in Belvedere III, called *Lagoa Seca*, named after the water level intermittence characteristics (PBH, 1994, apud: Cortizo, 2002). The *Lagoa Seca* is currently the main area for rain water recharge of the district. This aspect is determined by the relief profile and by the underground components.(Ferreira, 2003).

This area plays important role in the water supply and reservation, preventing the flooding occurrences in the neighborhood. All the rain water is drained to that lake and from there, it goes to *Córrego Cercadinho*.



FIGURE 3: *Lagoa Seca* square  
Photo by Flavia Amorim, 2000



FIGURE 4: *Lagoa Seca* flooding  
Source: Belvedere's District Friends Association, 1999

Due to this water flow characteristic, the place is considered unbuildable area by the urban codes. It is inserted in the Director Plan (Law nº 7166/96) zoning as ZPAM- Zone of Environmental Protection. However, the area remains under private domain (Ferreira, 2003).

The occupation of the lake area could aggravate the critical situation of underground water levels and recharge flows of *Córrego Cercadinho*. The Belvedere urbanization was responsible for a significant reduction of the lake covered area, what resulted in a considerable decrease of the absorption capacity.

Other problem we can point out is the pollution which penetrates the ground and residuary water infiltration in the lake, as pointed by Ferreira (2003). The contamination of the rain water launched in the *Córrego Cercadinho* characterizes serious environmental infraction and has negative consequences on the water and soil quality.



FIGURE 5: Polluted water disposal in Lagoa Seca  
Picture made by Flavia Amorim, 2006

Maura Ferreira indicates that the main cause for the rain water pollution comes from the road system, as it receives oils, greases and other vehicle dirt, led to *Lagoa Seca* and *Córrego Cercadinho*. Another pollution source is the sanitary disposals, launched illegally in the lake (Ferreira, 2003).

Adding up to the local consequences, Humberto Silva states that “*the pollutant substances infiltrated in Serra do Curral can migrate long distances and contaminate water-bearing of other regions*”. The water-bearing pollution, therefore, is a problem that harms not only the surroundings, but the hole region. (Silva, 2002: 25)

### 3.2. Influence in the soil stability

Cortizo (2002) evaluates that the buildings foundation structures are deep, what modifies the conformation of the soil. According to author, the ground is composed of a superficial layer, where the buildings are supported, and a composed inferior layer. The structures are stable and supported under the first layer, but once the charge is transmitted to the inferior layers, they can not be compatible with the load capacity, and the results would be the suppression of the foundation and damage to the structure.

Humberto Silva (2002) also claims for the risk of ground unstability on the structures because of the lowering of the water levels, as a result of the reduced absorption.

### 3.3. Alterations on the landscape

One of the most visible impacts of the Belvedere occupation is the modification on the building types. The area was originally empty and the neighborhood blocks were composed essentially by one-family housing constructions. The Belvedere’s high towers present an aggressive modification on the original landscape.

Along with the building disparity, the other problem is the visual barrier to *Serra do Curral* sight. The mountain is the city’s main landscape reference, considered by the population as the capital identity, and a national heritage, but is hidden by the Belvedere skyline buildings.

#### 4. FINAL CONSIDERATIONS

To understand the city, its dynamics, constitution and growth impacts, is a way of influencing the urban projects conception and its consequence on the landscape. Our analysis showed that there is an increasing search for natural environment scenic sites for residential use, which makes the real state enterprises look for preserved areas, without respect to the existing protection codes.

In a capitalist society the urban land is seen as valuable merchandise. As such, the area where Belvedere III is located was too valuable to remain unoccupied. The example of *Belo Horizonte* is not the only one in Brazil, where are many cases of high income residential districts were settled illegally.

The luxury housing standards present an intense trend to add consumption values, therefore they do not only respond to a basic need for home. In fact, they attempt to launch the market best product, the more sophisticated and complete one.

With the increase in demand, we see the homogeneity of the resulting architecture. The impact on the urban landscape reflects the real state market performance, building up a homogeneous landscape, without identity.



FIGURE 6: Building types characteristics  
Photo made by Flavia Amorim, 2005

The market influences on the architectural and urban models. And some elements are key sale products: comfort, leisure and safety. These perspectives create increasingly complex housing programs. In the case of condominiums, the urban projects are an important piece. In this cases, the homogeneity can be seem in the open spaces, with sophisticated landscape design and sports and leisure activities. Their administration and maintenance services are made by private companies and they do not depend on the city administration.

These areas form new cities, a new world inside the condominium walls that ignores what happens in the “real city”. And these spaces are considered “ideal cities”, because of the safe and calm atmospheres.

Considering that *Belo Horizonte* high income expansion areas are getting over and the environmental protected areas are the only ones that remain unoccupied, the growth of *Nova Lima*, following the *BR-040* road in direction to *Rio de Janeiro*, will be intensified.

Since 1970 the city of *Nova Lima* was settled with the construction of urban centers for high income population. 47% of *Nova Lima* surface belong to two mining companies which, with the exhaustion of the mineral activities, have been selling their land to real state developers to create new condominiums.

In *Nova Lima*, we can also find environmental reserves as *Tumbá* and the *Copasa's* reserve, which are menaced by land parcelling. These preserved sites are being used by the

real state market as factor of attraction for a new life style close to nature. The valuation and depreciation of the urban land follow up the market dynamics, which is able to create new housing and commercial centers and to promote a permanent move of attraction and repulsion. In this case, the focus is the profit and the environment quality, used to value the buildings, is destroyed at the same time.

## **BIBLIOGRAPHICAL REFERENCES**

Belo Horizonte-PBH (1995). Plano Diretor de Belo Horizonte. *Lei de uso e ocupação do solo: estudos básicos*. site: [www.pbh.gov.br](http://www.pbh.gov.br), june 28, 2006.

Cortizo, Eduardo Cabaleiro (2002). Mecanismo de avaliação ambiental: ensaio de perícia ambiental – estudo de caso Belvedere III, município de Belo Horizonte. (Belo Horizonte, PUC Minas).

Ferreira, Maura B. (2003). *A proteção do patrimônio natural urbano: estudo de caso sobre a Serra do Curral*. Master thesis. (IGC/UFMG, Belo Horizonte).

Macedo, Sílvio S. (1993). Paisagem, urbanização e litoral – do éden à cidade. (FAU-USP, São Paulo).

Silva, Humberto da. (2002). *Mapeamento geológico, avaliação geológica, geotécnica e proposta de reabilitação de áreas degradadas por movimentos de massa e erosão, com uso de técnicas de bioengenharia no bairros Belvedere e Olhos D'água*. (Belo Horizonte/MG. Instituto de Geociências/UFMG, Belo Horizonte).

Villaça, Flávio (1998). *Espaço Intra-Urbano no Brasil*. (Studio Nobel, São Paulo)