

## **Sandra Mello**

GDF, Urban Development and Environment Secretariat, Brasília, Brazil  
sandramello21@gmail.com

## **Frederico Holanda**

UnB, College of Architecture and Urbanism, Brasília, Brazil  
fredholanda44@gmail.com

## **Keywords**

urban waterside spaces; environmental functions; urban functions; space syntax; urbanity; waterbodies valorization

## **Abstract**

*Waterfront planning is one of the great contemporary challenges concerning urban-environmental management. The approach to the theme implies facing dichotomic relations involved. On the one hand, waterside ecosystems play essential environmental functions. On the other, water bodies' margin spaces perform multiple urban functions, structuring cities development along history. These spaces are classified as "Permanent Preservation Areas" (APP, by the Brazilian Forest Code). The APP concept implies what we call intangibility principle: prohibition of any form of land use and occupation. Disregard for urban specificities is one of the reasons for the legal statute disrespect in Brazilian cities. Nowadays, we witness a strong international movement towards rescuing the relations between cities and their rivers or lakes. In general, waterfront interventions are characterized by configurations with attributes of urbanity, promoting interaction among people and between people and environment. Nevertheless, the grate majority of them adopt artificial materials and techniques that hinder environmental functions performance. Our proposal is based on an integrated approach to environmental and urban functions of waterside spaces, considering the natural and sociocultural dynamics involved. By proposing a correlation between shore spaces' degree of urbanity and water bodies' valorization degree, we establish a link between spatial configurational attributes and the protection of environmental resources. We assume that urbanity occurs in shore spaces that have public domain, high physical and visual accessibility, clear destination and that are constituted by surrounding building entrances. Water bodies' valorization degree by the people is evaluated considering parameters of familiarity, practical and expressive relations, and identity.*

*A field research was held in two cities situated in central-west Brazilian region. The research brought together Space Syntax techniques (to examine the urbanity degree of waterside spaces) and a social survey (to evaluate the valorization degree of water-bodies by the population).*

*In the city of Pirenópolis, state of Goiás, river frontages with urbanity attributes are predominant. On the contrary, in the city of Núcleo Bandeirante, Federal District, water courses' margin spaces present low urbanity degree. Interviewees of Pirenópolis demonstrated to assign much more value to their river than the ones of Núcleo Bandeirante did. Results thus obtained confirm, therefore, the initial hypothesis.*

*The conclusions of this research aim at contributing to urban-environmental management, under the perspective that the balance of the whole urban system depends on the adequate approach to the important part that is constituted by the contact between land and water.*

## 1. The different views on waterside spaces

The analysis of the history of cities under the viewpoint of their relations with waterbodies – brooks, streams, rivers, lagoons, lakes, sea – reveals fundamental aspects to the comprehension of urban logic and of the contradictory forces along time.

We identify two basic trends of relations between cities and rivers or lakes:

- 1) the waterbody is valorized, considered as an element of urban design, and incorporated to the urban landscape;
- 2) waterbody is disregarded, neighboring buildings give their back to it; the shore become degraded spaces, garbage disposal areas or are invaded in different ways.

In general, interventions of the first trend – waterbodies valorization – are characterized by promoting urbanity, that is to say, interaction among people and between people and environment. Nevertheless, the great majority of them adopt artificial materials and techniques that hinder natural dynamics performed by the water body and its margins.

The central focus of this work is directed to physical space, in a relational perspective that takes into account configuration and interferences on environmental and urban dynamics. If, on the one hand, social values can produce certain types of spatial configurations, on the other, spatial configuration attributes may influence sociocultural values that characterize urbanity. This is, after all, a regard on relations between spatial configuration and the protection of environmental resources.

## 2. Facing challenges

Waterfront planning is one of the great contemporary challenges of the urban-environmental management agenda. The approach to the theme implies facing dichotomic relations involved. Waterside spaces perform multiple urban functions, structuring cities' development along history. At the same time, these zones are the most dynamic and sensible ones of the water basin, playing essential environmental functions.

This is one of the main paradoxes behind the theme. Aiming at environmental protection, water bodies' margin spaces are classified as "Permanent Preservation Areas" (APP), by the Brazilian Forest Code. APP strips vary from thirty to five hundred meters, in each side of the water course, depending on the stream bed width. The APP concept implies what we call intangibility principle: prohibition of any form of land use and occupation. Therefore, as criteria of sustainable utilization are not predicted, great part of informal occupations occurs precisely in these vulnerable areas.

The National Environmental Council (Conama) Resolution nº 369, of March, 2006, offers alternatives for sustainable utilization on the Permanent Preservation Areas, attenuating the intangibility principle. In spite of a series of questionable rules embedded in this, the new resolution represents an important improvement to Brazilian urban environmental management.

The approach to the subject implies the consideration of both the environmental (biophysical) and the urban (sociocultural) aspects involved. With regard to the first set of factors – the environmental aspects – there is, nowadays, scientific knowledge enough justifying the protection of waterside areas. We identify six basic environmental functions performed by riparian zones: sediments contention, water retention on the hydrographic basin, seasonal flood accommodation, the viability of natural lateral migration of riverbed, banks stability and genetic chains development (Mello, 2005).

The main subject of this work is related to the second set of factors: the urban aspects. The central hypothesis proposed is that shore spaces with urbanity attributes promote water bodies' valorization by the population (Mello, 2008). The investigation is based on the space syntax theoretical framework, developed by Bill Hillier & Julienne Hanson (1984) and their colleagues at University College London.

### **3. Spatial attributes of urbanity**

Urbanity transcends city physical circumstances, as it includes the “courteous and affable qualities, related to continuous negotiation of interests” (Holanda, 2002, p. 126). In this work, urbanity is seen as something that qualifies urban life, in the sense of promoting social encounter and harmonic interaction between people and the waterbody.

The focus here is on the spatial circumstances that characterize our conception of urbanity. To investigate the performance of waterside spaces as far as urbanity is concerned, we consider the global and local urban analytical dimensions. On the global level, the analysis is oriented to the relations between the river and the city in which it is located. On the local dimension, we examine attributes of each place along the river shore.

Two of the analytical categories adopted here stand out for their influence on the local and global dimensions: physical accessibility and visual accessibility. Both of them are related to the integration measure, one of the most important space syntax parameters.

For the analysis of the global integration, we have adopted space syntax techniques. By computer modeling, urban spatial layout is represented as systems of linked geometrical elements – lines, when studying physical integration (movement), space cells, or fields of view, when examining visual integration (visibility) (Hillier, 2002). By electronic processing, the relations between all public spaces of the urban system are analyzed.

Physical accessibility refers to how easy it is for people to arrive at riverside places, what is made possible by the number of vehicular and pedestrian routes that establish this integration. On the global level, it is considered the degree of integration of river’s margin spaces in relation to all streets in the system. On the local level, margin spaces have easy access when they are connected by perpendicular, longitudinal and transverse streets (including their bridges). Visual accessibility, on the global level, refers to the extend to which riverside places are visible from all parts of the city. On the local realm, it is related to how much the water is visible from the riverside space, depending on the existence of visual barriers, like buildings or vegetation.

On the global dimension, the most relevant attribute of urbanity is the urban centrality degree of the river location. Water frontage situated near the urban center (or sub-centers, in the case of larger cities) provides better urbanity performance. The degree of urban centrality is related to the global integration measure. The most integrated public spaces – which have better physical and visual accessibility – are those with higher degree of centrality.

On the local dimension, five analytical categories characterize the urbanity performance of riverside spaces. Four of them refer to configurational aspects (physical attributes): domain of space, physical accessibility, visual accessibility and constitutiveness. The last one is a semantic category, referring to utilization rules, signification and symbols: space destination.

When space has public domain it is called open space and when it has private domain, enclosed space. Constitutiveness refers to transitions (entrances: doors, gates) between open space and enclosed spaces. River frontage is constituted if surrounding premises’ entrances open onto it. Space destination can be legally defined, by urban project and legal precept, or by the effective appropriation by population.

Urbanity is manifested in shore spaces that have public domain, easy physical accessibility, which allow the visibility of water, that are constituted (syntactic aspects) and that have clear destination (semantic aspect).

### **4. Waterbody valorization**

The concept of a given element or place value may be related to various dimensions, like the economic and environmental ones. In the scope of this work, the value attributed to the waterbody by the population is approached by a dimension composed of a triad of analytical categories:

familiarity, practical and expressive relations, and identity. This is a subjective dimension, so it is necessary to register the limitations of the approach, emphasizing that the three categories are closely inter-related, being isolated only for analytical purpose.

The first category of analysis refers to the degree of familiarity with the river by the population. We want to know whether people

- 1) are aware of its existence;
- 2) know where it is;
- 3) have been to waterside spaces;
- 4) usually go to the area.

The second category arises from the first ones, for it aims at explaining why the river is familiar to citizens or otherwise. To this analysis, the following aspects of spatial performance are considered (Holanda, 2007): functional (conditions for carrying out activities), economic (implementation and maintenance costs), sociological (the promotion of encounters and avoidances), bioclimatic (environmental comfort), topoceptive (people identification and orientation; Kohlsdorf, 1996), symbolic (significations, memories), aesthetic (scenic beauty) and affective (how it affects the emotion state). The first four aspects are seen as practical relations of people with space; the later four involve expressive relations. The third analytical category – identity – is presented as a reflex of practical and expressive relations. It represents a synthesis attribute, closing the analytical cycle about the waterbody valorization by the population, regarding the sense of belonging and the desire for protection.

## **5. Urbanity and watercourses valorization**

In order to test the hypothesis, a field research was held in two Brazilian cities. Since the central focus of the investigation refers to the urban aspects, the chosen cities have similar conditions in what regards environmental aspects and distinct circumstances in what regards urban waterfront configurational aspects.

The cities of Núcleo Bandeirante, on the Federal District, and of Pirenópolis, in Goiás State, respond to these characteristics. With a distance of approximately 150 kilometers between them, the two cities are situated in the central-west Brazilian region, in the same biome (cerrado, a kind of tropical savannah), high altitudes, with similar climate conditions, crossed by narrow watercourses and located near the water sources.

On the other hand, these cities present different relations with their water streams. Núcleo Bandeirante is a typical example of what occurs in other Federal District's cities, where watercourses are not considered as elements of urban design, becoming urban by-products, configuring what we call the waterbodies devalorization trend. Pirenópolis is characterized by riverside spaces incorporated to urban life, being an example of the waterbodies valorization trend. The field research was divided in two moments: 1. margin spaces' configuration reading, to examine the urbanity performance of waterside spaces; 2. a social survey, to evaluate the valorization degree of waterbodies by the population.

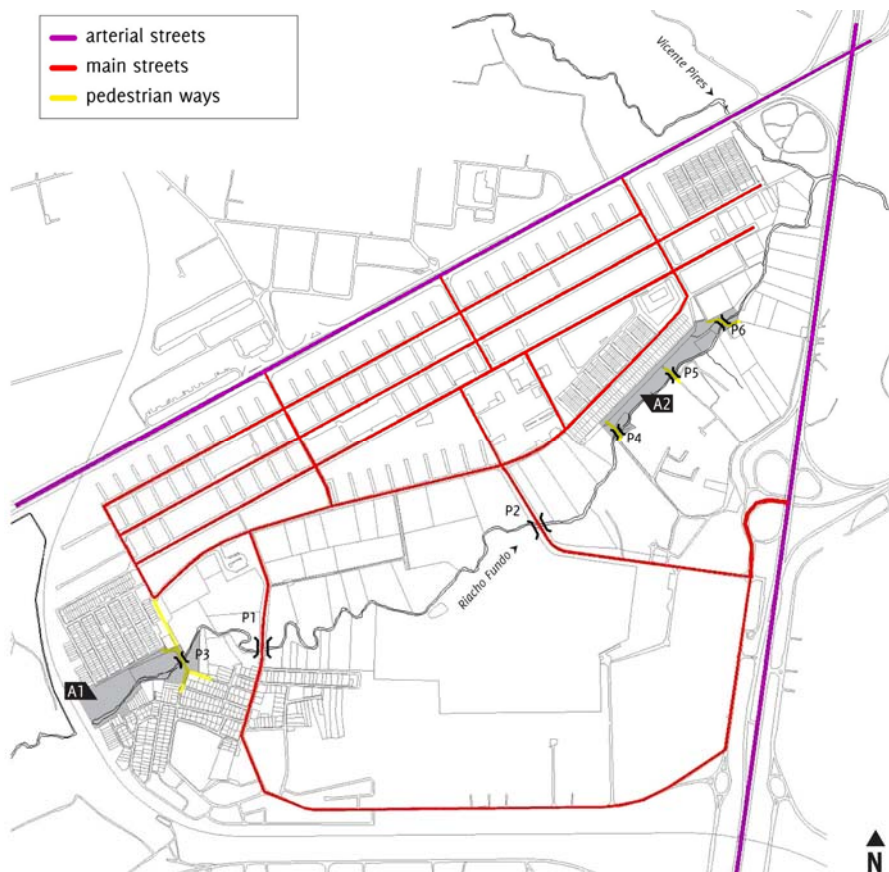
### **5.1. Riverside spaces and the degree of urbanity**

#### **a) Núcleo Bandeirante**

Núcleo Bandeirante was the first of the "pioneer settlements" created to shelter the workers who came to build the new Brazilian Capital, Brasília. As a result of the community struggle for the settlement fixation, it was formalized as a satellite-city in 1961. It occupies a total of 80.43 Km<sup>2</sup> and the urban area is of approximately 3.2 km<sup>2</sup>. From a total of 36,400 inhabitants, 61.5% (22,400) live in the urban area (GDF, 2001).

Though the urban framework has been developed along Riacho Fundo River, this was not a result of a global planning of the margins' spaces. Riverside places, leftovers of consecutive urban

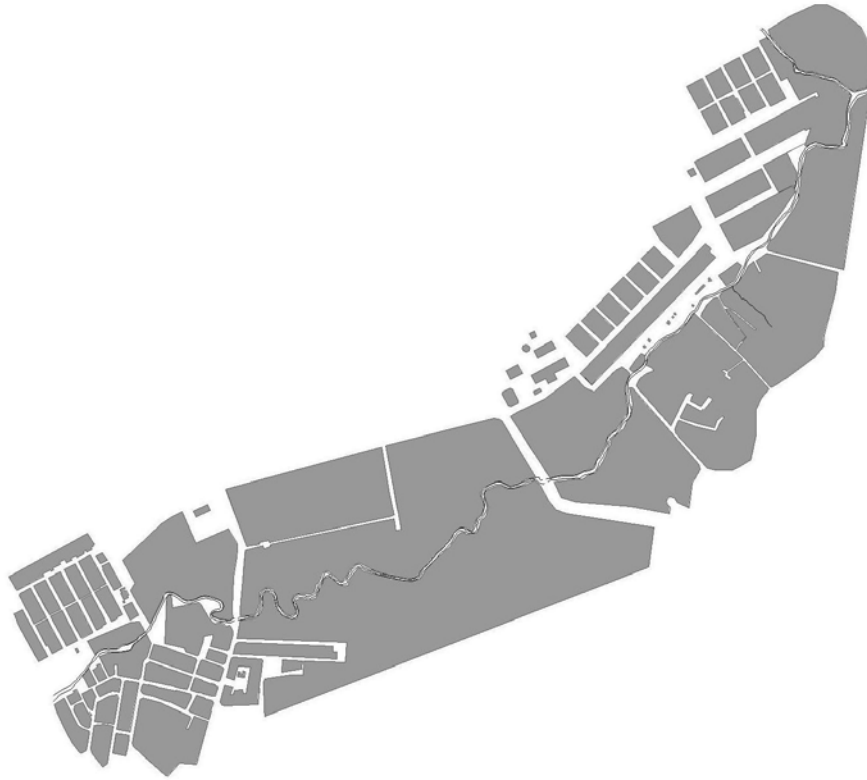
parceling, at the back of plots, at the back of the city, were progressively occupied by private premises.



**Figure 1**  
*Núcleo Bandeirante: General Plan*

Nowadays there are only two open spaces by Riacho Fundo River's margins, as indicated in figure 1: area 1 (A1), on the west part of the city, and area 2 (A2), on the eastern side. The Domain Map of the river's surrounding strip (figure 2) represents the open areas (in white) and the enclosed ones (in gray), demonstrating that the majority of river shore spaces have private domain, which includes formal and informal occupations.

The main urban streets are represented by red lines in figure 1. It shows that the two only public riverside spaces (A1 and A2) are not directly connected to the main system of routes. These areas are served by short local streets, parallel to the watercourse. Area 2 is a little more integrated, since the access to it occurs by local streets that link to two of the perpendicular streets (NB1 and NB2). Access to area 1 is made possible only by local streets situated inside de surrounding quarter. There is not a longer street along the river (a waterfront avenue), nor a continuous pedestrian way, which are prevented by the margins privatization. The low degree of riverside spaces' physical accessibility is shown in the Axial Map (FIGURE 3), that represents all the vehicular streets and the pedestrian ways near the watercourse (including the ones over bridges). Only one of the most integrated streets in the system (represented by warm color lines) crosses the Riacho Fundo River, over P2 bridge: the orange axis, at the middle of the map. Nevertheless, this street does not lead to any open riverside space. The two public spaces (A1 and A2, represented in gray) are accessed only by streets with low degree of integration (cool colors). In area 1, the existence of a pedestrian way linking the two sides of the river (over P3 bridge) and connecting the area to important avenues, makes it a bit more integrated (in what refers to pedestrian flow).



---

**Figure 2.**  
*Núcleo Bandeirante: Domain Map*

---



---

**Figure 3**  
*Núcleo Bandeirante: Axial Map*

The Visibility Map (figure 4) is a graphic representation of the global visual integration of all the city's open spaces (the colored ones). The map makes evident the low visual relevance of the two riverside open areas (A1 and A2), where cells with cooler colors occur. Once again, the street that

crosses the Riacho Fundo River (over P2 bridge), on the central part of the map, is the only more integrated area (orange line) with some kind of interference with the water course; nevertheless, it does not connect onto the river edges.



**Figure 4**  
*Núcleo Bandeirante: Visibility Map*

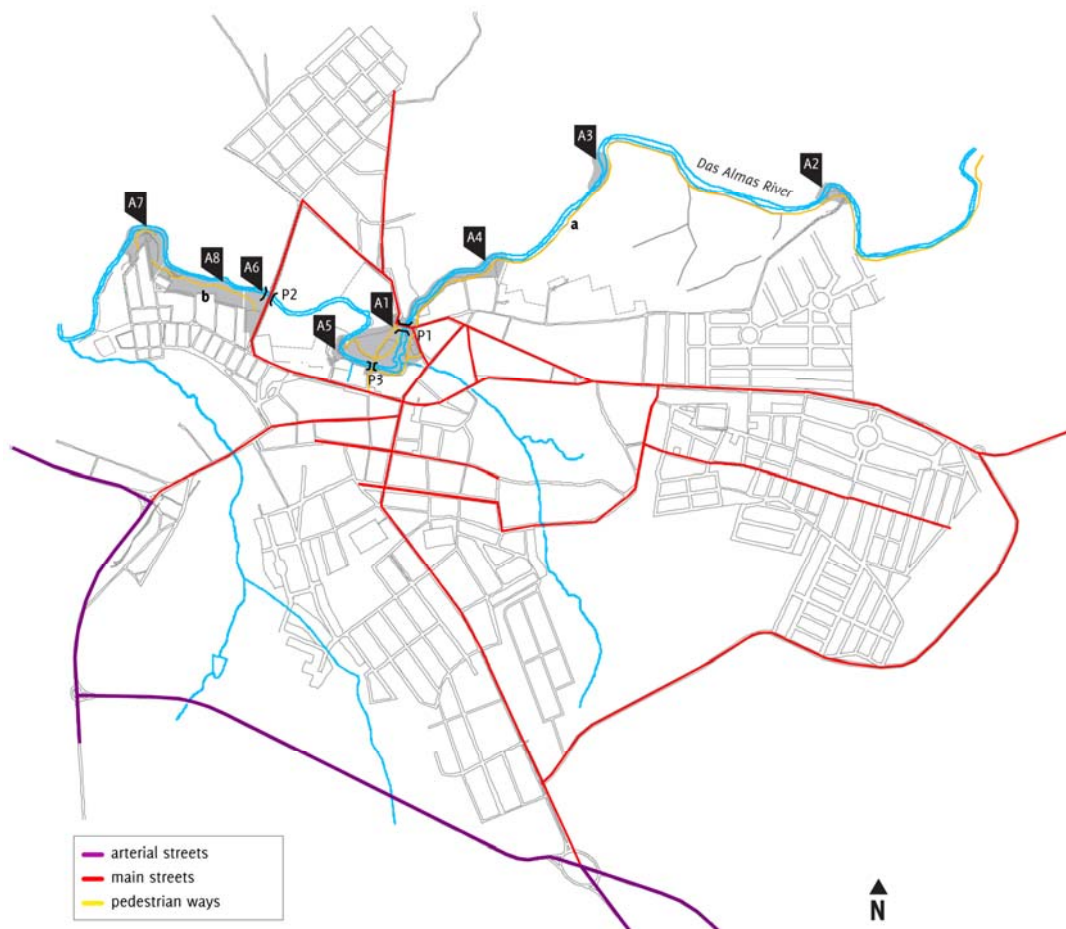
On the local level, riverside configuration in Núcleo Bandeirante is characterized by the lack of wide fields of view to the water course. Urban river frontage is composed by two basic types of space, referring to water body visibility: blocked views and partially blocked views. The first type is predominant, due to the existence of barriers – fences, walls, buildings, vegetation – that hinder water visibility.

River's margins in Núcleo Bandeirante are also characterized by the predominance of non-constituted spaces. The majority of the surrounding premises turn their back to the river. Area 2 is the only constituted space, since the buildings have their frontages turned to Riacho Fundo River. The land where Núcleo Bandeirante was located was expropriated by the Federal Government. Most of the public riverside areas, that originally have not a clear destination, were appropriated by individual dwellings, in many ways. On the other hand, the surrounding quarters of the two riverside open places (A1 and A2) are not bound for activities that promote people attractiveness and social meeting: area 1 is surrounded by exclusive residential quarters and area 2, by machine shops and small industries.

#### **b) Pirenópolis**

Pirenópolis is a colonial city, founded in 1853, during the gold exploitation cycle, along the right side of Das Almas River (River of the Souls). The municipality has a total area of 2,228 Km<sup>2</sup> and an urban area of approximately 6.4 km<sup>2</sup>. The total population is 22,475 inhabitants; 12,064 (58%) live in the urban area (Census IBGE, 2000).

As in the predominant urban pattern in Brazil (Teixeira, 2004), Pirenópolis grew around a “structuring street” that follows the river course, although located in a certain distance from it. Nevertheless, since the colonial period open spaces have been created around the first bridge built over the river, the Old Bridge. From this point, there has been a successive development of continuous open spaces at the river frontage.



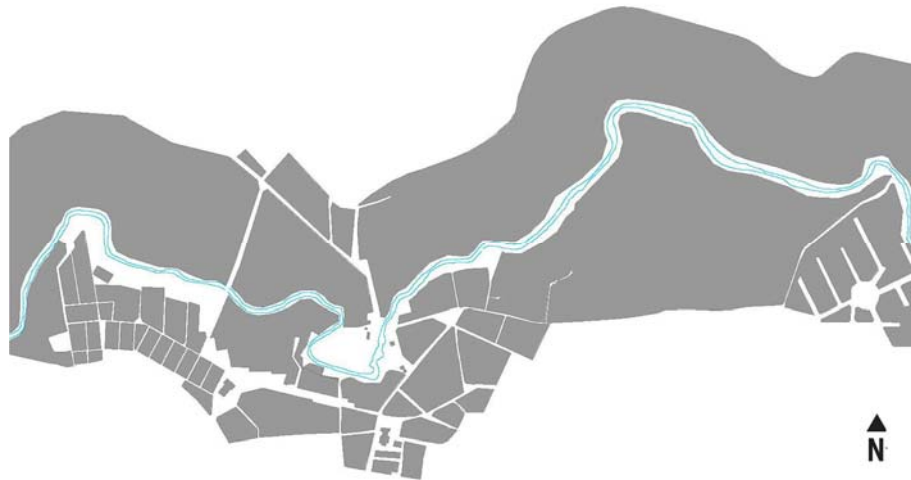
**Figure 5**  
*Pirenópolis: General Plan*

Nowadays, there are multiple waterside urban spaces, where it is possible for citizens to reach the water edges, as it is shown in figure 5. The most important of these spaces, area 1 (A1), is precisely the one developed besides the Old Bridge (P1). This area is composed by a series of linked places, with different characteristics, surrounding a meander of Das Almas River. The strategic location of area 1 – inserted in the Historical Center, connecting the two sides of the river – makes it an important spatial reference to the citizens and a social meeting point, assuming the role of the “river core”.

This wide open area is highlighted in the Domain Map of Pirenópolis (figure 6). On the right river’s margin, beyond the river core – that is of public domain –, there is a sequence of private premises where the original vegetation is preserved. On the left margin, public river shore spaces are predominant, presenting different dimensions and spatial characteristics.

When we arrive in Pirenópolis, it is easy to reach the river frontage. In figure 5, the main street system is represented by red lines. The city principal access (Benjamin Constant Avenue) leads to the main structuring axis of the urban centre (Rosário Street). As it occurs in Núcleo Bandeirante, there is not an avenue along the riverside. On the contrary, there is a sequence of pedestrian paths and trails (represented by orange lines) following almost the whole river course, on its left margin. On the river core there is a ring of pedestrian ways that interconnect the both sides of the river, by the two bridges that constitute the area, the Old Bridge (P1) and a suspension bridge (P3).





**Figure 6**  
*Pirenópolis: Domain Map*



**Figure 7**  
*Pirenópolis: Axial Map*

Pirenópolis' Axial Map (figure 7) shows that area 1 (A1) is connected to one of the most integrated axis of the system (represented by a red line), Rosário Street. The axial lines inside area 1 (warm color lines) correspond to the ring of pedestrian ways, improving its physical accessibility performance.

The Visibility Map (figure 8) makes evident the relevance of area 1 (A1) on global visual integration. The area is composed of warm color cells (red and orange) and the part of Rosário Street that leads to this open space is one of the most visual integrated space in the city (with warmer colors).



**Figure 8.**  
*Pirenópolis: Visibility Map*

On the local dimension of visibility, in Pirenópolis we find a third type of configuration (besides the two types found in Núcleo Bandeirante: blocked views and partially blocked views): unblocked views. This type occurs in the great part of area 1 (the river core). In the different places that compose this area (streets, squares, beaches trails), practically there are no visual barriers onto the river. The vegetation is composed by grass and tree species that do not represent a dense green obstacle. The second type – partially blocked views – is predominant at the strips of open riverside spaces where the remaining riparian wood allows the walkers to catch the sight of the water.

Originally, great part of the premises near the river had their back turned to the shore. As the years passed, this circumstance was progressively changed; today some of the riverside open spaces are constituted by surrounding buildings entrances.

Public riverside spaces in Pirenópolis are properly appropriated by the citizens, with different intensities of utilization. The high intensity of use of the river core is also due to the fact that the surrounding quarters are occupied by commercial premises – shops, bars, cafeterias, restaurants – and by other activities that promote the attraction of people, like a church and a cultural center.

## 5.2. The degree of watercourses valorization by the population

The analysis of the first questionnaire's answers demonstrates the difference between the familiarity of interviewees of the two studied cities with their watercourses. In Pirenópolis, 100% of the interviewees knew about Das Almas River's existence and almost all of them (96.4%) knew its name. In Núcleo Bandeirante, 7.1% of the interviewees were not even aware of the existence of watercourses and only one third of them knew Riacho Fundo River's name.

The people in Pirenópolis answered that they see the river with greater frequency than the ones of Núcleo Bandeirante. While in Pirenópolis almost all the interviewees (98.2%) said that they have been to the river edges, in Núcleo Bandeirante more than one third have never been there. The low familiarity of Núcleo Bandeirante's population with Riacho Fundo River is also demonstrated by the

small amount of people (13.7%) who actually go to its riverside places. In Pirenópolis this proportion is of 65.5%, corroborating the high degree of familiarity with Das Almas River.

In Pirenópolis, people also have more practical and expressive relations with the river than the ones of Núcleo Bandeirante. While in that city 87.9% of the interviewees have pointed out positive aspects related to the river – referring to all spatial performance aspects – in Núcleo Bandeirante only 38.7% have mentioned positive aspects, predominating attributes related to the natural environment, that specially interfere on bioclimatic aspects. It is amazing that 44.6% of the people in this city have answered that there is “nothing good” about the river.

Easy accessibility is an important attribute referring to the functional aspects of riverside spaces. While in Pirenópolis the majority of the interviewees have said that access to the river edges is easy or very easy (93.3%), in Núcleo Bandeirante, this ratio falls to less than a half of the interviewees (42.1%). When open shore spaces inspire a sense of safety, there exists greater probability that people will go there, promoting its animation. The enquiry reveals that this attribute is present in Pirenópolis, where the majority of the interviewees claimed to feel safe at the waterfront, while in Núcleo Bandeirante the majority of the people said the opposite.

In Núcleo Bandeirante only 13.7% of the interviewees declared to have some practical relation with the watercourses; a great part of the answers refer to functional or bioclimatic aspects. In Pirenópolis besides the fact that these aspects have been mentioned in more varied fashion – by the indication of many activities that were not mentioned in Núcleo Bandeirante – activities related to social aspects (river’s potential of attracting people and promoting social meeting) have been pointed out more frequently.

The results of the inquiry with Pirenópolis’ inhabitants also reveal better performances on the expressive relations. According to the interviewees of this city, Das Almas River plays special roles in terms of topoceptive, aesthetic, symbolic and affective aspects.

The desire to protect the river was highlighted by Pirenópolis’ interviewees on the answers about garbage management, manifesting not only furious reactions but also proactive ones. The key-question for demonstrating the degree of identity with the river was: “Would it make difference to you if the river did not exist?” In Pirenópolis the majority of the persons (85.9%) answered that it would make much difference. It is very significant that in Núcleo Bandeirante more than one quarter (28.1%) of the interviewees answered that it would make no difference at all.

In both the cities it was manifested the identity with watercourses in general and the recognition that their protection is related to life preservation. However, the reduced physical and visual contact with the river, due to the spatial configuration in Núcleo Bandeirante, is reflected on the interviewees’ remarks, like: “I did not even remember it”; “It is as if it does not exist”; “It does not take part of my life”. In Pirenópolis, we observe a specific identity with Das Almas River – seen by the majority as constituting people’s life, denoting a strong sense of belonging – with remarks as: “It is like a fellow”; “If the river disappeared, it would be like having a feet or hand broken, or even the whole body”.

The comparative analysis of the enquiry’s results – quantitative and qualitative – reveals, at last, that watercourses valorization by the population is significantly greater in Pirenópolis than it is in Núcleo Bandeirante.

## **6. Conclusions**

Space syntax approach reveals the difference between the two studied cities in the degree of urbanity of riverside spaces. Núcleo Bandeirante is a typical example of a city in which the spaces of the water bodies’ margins have a low degree of urbanity or no degree at all. Pirenópolis, in general, presents configurations of the riverside with better performance. The main distinction is achieved by the spatial attributes of the “riverside core”. In the open spaces, which are constituted and animated by various activities, where physical and visual accessibility are guaranteed, the control by the municipality is easier and the people that go there do not allow their invasion by private activities.

In Núcleo Bandeirante, Riacho Fundo riverside's spaces, left as residual areas of the parcellings, were invaded along time, in various ways. The remaining two only open spaces at the shore are surrounded by streets with a low degree of global integration, what indicates that they are places of difficult physical accessibility, and that, therefore, they are areas of less centrality in the city.

The results of the application of questionnaires with the population of the two cities reveal a high degree of correlation between riverside spaces' configurational characteristics and the valorization of waterbodies. In general, the interviewees in Pirenópolis have demonstrated that they have greater familiarity, closer relations, and greater identification with their river, than the interviewees from Núcleo Bandeirante have with their river. As these are categories that characterize the concept of valorization, we can say that Pirenópolis – where urbanity configurations predominate – represents an example of the predominance of valorization of waterbodies, and that Núcleo Bandeirante – where the absence of urbanity predominates – is an example of devalorization of waterbodies by the people.

The findings of the research have demonstrated that configurations that promote the urbanity functions of riverside spaces – interpersonal relationships and the relation between people and the water body – contribute not only in quality of life and quality of the urbanscape, but also as strategies for the effective protection of the environmental resources.

As it has been presented in the beginning, the urbanistic trend of waterbodies valorization produces spaces with attributes of urbanity. According to this formulation, space configuration is seen as a dependent variable of meanings and sociocultural values. In the hypothesis worked here, spatial configuration is seen as an independent variable. The conclusions confirm the initial reasoning, i.e., spatial configuration with attributes of urbanity influences the construction of sociocultural meanings, as far as it is capable of promoting the valorization of waterbodies by the people.

## References

- GDF, Governo do Distrito Federal. Anuário estatístico do Distrito Federal. Brasília: Secretaria de Estado de Desenvolvimento Urbano e Habitação/ SEDUH, n. 22, 2001. Disp. in: <[http://www.districtofederal.df.gov.br/sites/000/56/menu\\_cidadao](http://www.districtofederal.df.gov.br/sites/000/56/menu_cidadao)> Access on: oct. 2007.
- IBGE, Instituto Brasileiro de Geografia e Estatística. Censo Demográfico 2000. *Rio de Janeiro: Ministério do Planejamento Orçamento e Gestão*, 2000. Disp. in: <<http://www.ibge.gov.br/população>>. Access on: nov. 2007.
- Kohlsdorf, Maria Elaine. 1996. *A apreensão da forma da cidade*. Brasília: Editora da Universidade de Brasília.
- Hillier, Bill, Hanson, Julienne. 1984. *The social logic of space*. Cambridge: Cambridge University Press, 281 p.
- Hillier, Bill. 2002. *Can streets be made safe?* London: University College London, 20 p. Disp. in: <[www.spacesyntax.com/housing/housing.html](http://www.spacesyntax.com/housing/housing.html)>. Access on: sep, 2007.
- Holanda, Frederico de. 2002. *O espaço de exceção*. Brasília: Editora Universidade de Brasília, 446
- Arquitetura sociológica. 2007. In: *Revista brasileira de estudos urbanos e regionais, Associação Nacional de Pós-Graduação e Pesquisa em Planejamento Urbano e Regional*, vol. 9, n. 1, 115-129.
- Mello, Sandra S. 2005. As funções ambientais e as funções de urbanidade em margens de cursos d'água. In: *Oculum Ensaios, Revista de Arquitetura e Urbanismo, Campinas*, v. 4, p. 49-61, dez.
- Na beira do rio tem uma cidade: urbanidade e valorização dos corpos d'água. 348 p. Tese (Doutorado em Arquitetura e Urbanismo) – Faculdade de Arquitetura e Urbanismo, Universidade de Brasília, Brasília, 2008.
- Teixeira, Manuel C. 2004. Os modelos urbanos portugueses da cidade brasileira. In: TEIXEIRA, Manuel. C. (org.). *A construção da cidade brasileira*. Lisboa: Horizonte, 23-46.