

# Distribution of Urban Green Spaces - an Indicator of Topophobia - Topophilia of Urban Residential Neighborhoods. Case Study of 5<sup>th</sup> District of Bucharest, Romania

Livia Adina CUCU<sup>1</sup>, Cristiana Maria CIOCĂNEA<sup>1</sup>, Diana Andreea ONOSE<sup>1</sup>

<sup>1</sup> Centre for Environmental Research and Impact Studies, University of Bucharest, 1 Blvd. Nicolae Bălcescu, sector 1, Bucharest, 010041, Romania, e-mail: adina\_zimn@yahoo.com

Received on <December 30, 2010>, revised on <February 28, 2011>, accepted on <May 29, 2011>

## Abstract

Given the lack of usable data in the correct assessment of housing quality in an urban ecosystem, it is necessary to establish a system of environmental indices that can be used to evaluate and compare the attractiveness of urban neighborhoods.

Oxygen generating surfaces fulfill multiple functions and give a certain quality to urban environment and housing, especially through the green spaces. Green spaces have an unequal distribution in the area of Bucharest. The structure, functions, adding availability and/or attractiveness of green areas define the neighborhoods in which they are located, and whether they are *topophile* or *topophobe* ones.

In the present study, based on field observations, processing of cartographic materials and using the green spaces as most relevant index, topophile and topophobe neighborhoods have been identified in Bucharest. The tendency of residential areas development was also evaluated and it was found that it depends on the attractiveness of existing urban parks or neighborhood gardens.

**Keywords:** *attractiveness, topophile and topophobe neighborhoods, green spaces, parks, cemeteries, accessibility, housing quality, residential areas, Bucharest municipality, Romania*

## Rezumat. Distribuția spațiilor verzi urbane – indicator al topofobiei-topofiliei cartierelor rezidențiale urbane. Studiu de caz: Sectorul 5, București, România

Pe fondul lipsei de date utilizabile în aprecierea corectă a calității locuirii într-un ecosistem urban se impune stabilirea unui sistem de indicatori de mediu care, prin ierarhizarea valorilor, să permită evaluarea atractivității unui cartier urban în raport cu altul.

Suprafețele oxigenante, prin componenta lor spații verzi, îndeplinesc funcții multiple și conferă o anumită calitate mediului urban, deci locuirii. Spațiile verzi sunt distribuite heterogen în arealul Municipiului București. Prin structură și funcții, la care se adaugă accesibilitatea și/sau atractivitatea, ele definesc cartierele în care sunt localizate, dar și apartenența lor la areale *topofile* sau *topofobe*.

În studiul nostru, pe baza observațiilor de teren și prelucrării materialelor cartografice s-au identificat în Municipiul București cartiere topofobe și topofile, pornind de la indicatorul spațiu verde. De asemenea, s-a evaluat tendința de densificare a rezidențialului în funcție de atractivitatea generată de existența parcurilor urbane sau a grădinilor de cartier.

**Cuvinte-cheie:** *atractivitate, cartiere topofobe și topofile, spații verzi, parcuri, cimitire, accesibilitate, calitatea locuirii, spații rezidențiale, Municipiul București, România*

## INTRODUCTION

An urban ecosystem can suffer a range of environmental changes over time due to human intervention, changes that can let their mark on and become characteristic for a space.

Considering the continuous increase in the amount of resources, energy and information required by human ecosystems, it's necessary to properly assess the carrying capacity of natural ecosystems in order to be able to quantify the incidence of environmental degradation in social

phenomena and processes, living standards and living conditions of the population (Ioja, 2008).

Urban dwelling has now become an important research area concerning the quality of life, including all spatial and social differences, recent phenomena of segregation that may affect the overall quality of the built area (Nae, 2006), that is reflected in the urban image.

The effects of urban image can be very different, contributing to the occurrence of feelings of appreciation, repulsion or indifference (Tuan, 1996 in Ianoș, 2004) within a population.

area, town or district, is characterized by certain *strengths* and *weaknesses*.

Based on this theory, *repulsive*, *attractive* or *indifferent* towns or districts can be differentiated (Fig. 1).

A *repulsive neighborhood (topophobia)* is based on a negative image caused by many factors and elements of an urban area: the level of criminality, the percentage of socially marginalized population, the poor state of technical infrastructure or problems related to pollution or environmental degradation that generate reactions of rejection called **urban topophobia**.

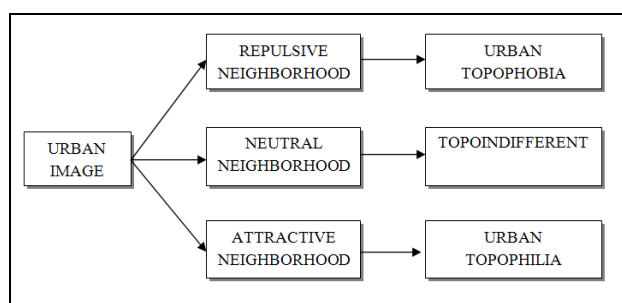


Fig. 1. Genesis of the perception of urban space (Ianoș, 2004)

*Attractive neighborhoods (topophilia)* are characterized by a positive image mainly induced by high standards of housing quality: proximity to green spaces, increased accessibility to services, which create a good image of the area characterized by **urban topophilia**.

Other factors that can influence the attractiveness of a neighborhood are: proximity to industrial, health or educational units. Green spaces are either attractive or not, based on the quality of their services. Some parks have some problems concerning noise pollution, criminality, insecurity or facilities and equipment, which reduce the attractiveness of that area.

As a rule, *topophile spaces* are easily identified due to high prices of land and housing. This fact restricts access to these areas for the low-income population.

Along with the two opposite types of perception of urban spaces, *topoindifferent* areas also exist. **Topoindifferent** neighborhoods are the ones characterized by limited accessibility to services and those which don't suffer from the effects of land uses. In other words, they have topophobic elements that are not aggressive enough to cause discomfort, contrary to the case of topophobe neighborhoods.

It is necessary to define such areas in the context in which current costs no longer reflect the housing quality (Suditu, 2005). Although from a socio-economic point of view some areas are not suitable for the development of new residential spaces, the increased housing demand forced their development, and consequently the dysfunctions must be analyzed in these areas, recorded by the indices that can reflect the housing quality in certain areas.

## STUDY AREA

Bucharest is situated in the South-East of Romania, in Bucharest-Ilfov development region, which is equivalent to European Union's NUTS-III regions. It is subdivided into six districts (Fig. 2).

In terms of territorial evolution, Bucharest presents the characteristics of cities suffering an uncontrolled urban development: changes in the industrial areas situated inside the city or at its periphery, represented by the replacement of the industrial activities with large shopping centers and/or residential spaces; increase of the built space density on the expense of open fields, increase of the differences concerning facilities and services between luxurious and peripheral areas (Ioja et al, 2008).

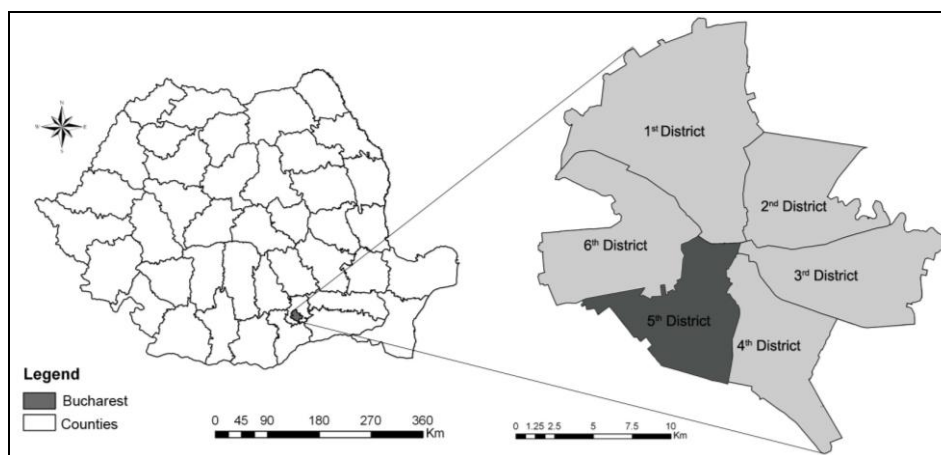


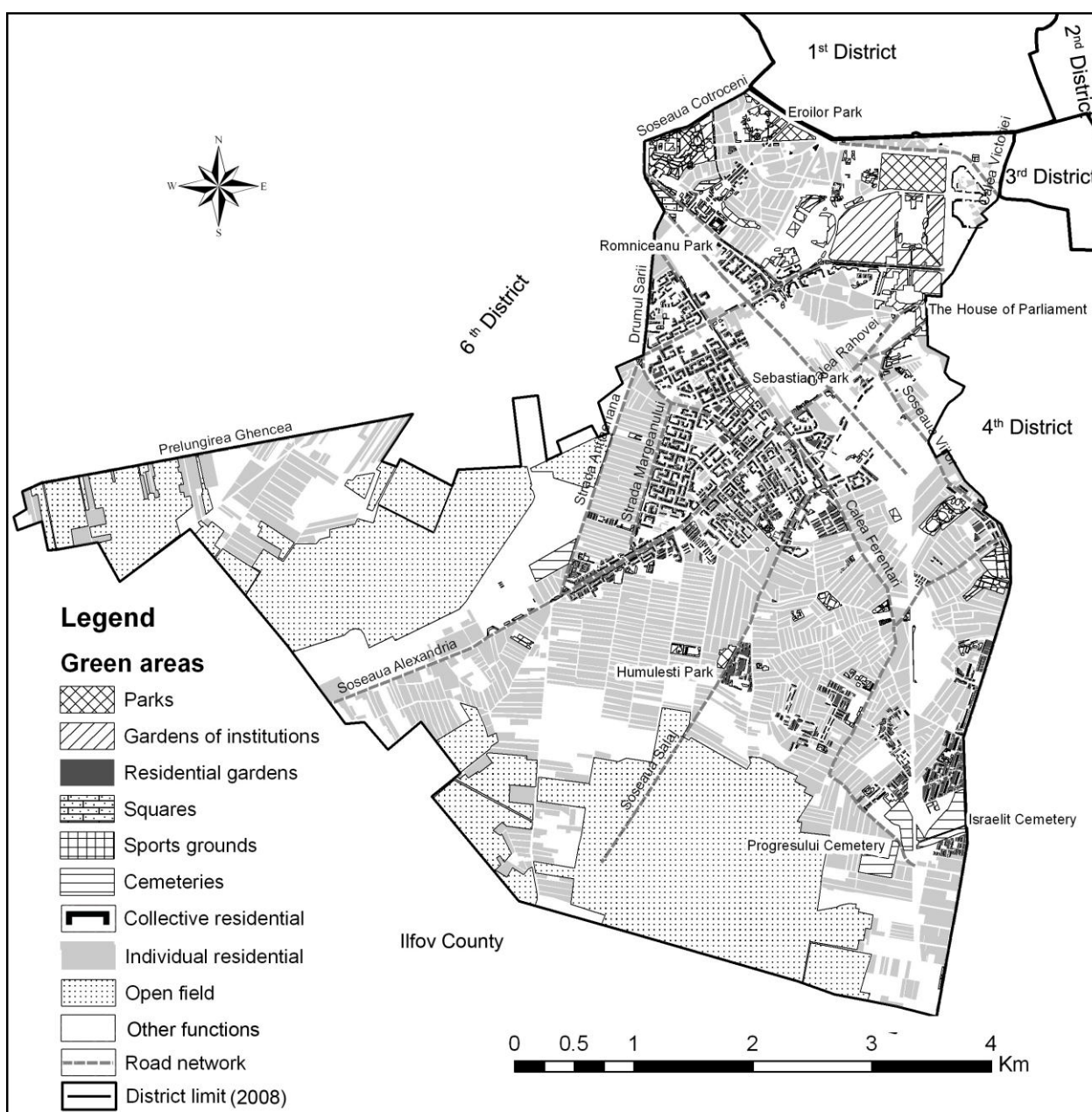
Fig. 2. Location of the study area

Urban parks in Bucharest have suffered significant changes regarding surface structure and functionality (Sandric et. al, 2007). Between 1990 and 2007 the area of green spaces in Bucharest fell by **42.8%**, meanwhile the surface of parks decreased by about **20%**. The most significant decrease (60%) occurred in Southern Bucharest (4<sup>th</sup> and 5<sup>th</sup> District), where there is a massive deficit of green spaces (Iojă, 2008).

The share of green spaces has great importance, functionally and socially, as well as for ensuring the comfort and hygiene standards required by law, being an important component of urban environment quality which contributes to setting the standard of housing quality (Loures, 2007).

From an ecological perspective, urban green spaces moderate the impact of human activities on the environment meanwhile the vegetation has a great aesthetic importance and vital role in moderating urban climate. As public spaces, green areas (Marinescu, 2006) also contribute to the increase in social inclusion.

In order to calculate green space per capita for the 5<sup>th</sup> District of Bucharest, according to Law No. 313/2009 an amendment and supplement of Law No. 24/2007 regarding the regulation and management of urban green spaces, green spaces have been identified as it follows: parks, gardens of institutions, residential gardens (belonging only to collective residential spaces), squares, sports grounds and cemeteries (Fig. 3).



**Fig. 3. Typology of green spaces in the 5<sup>th</sup> District of Bucharest**

## DATA AND METHODS

The analysis of attractiveness towards an urban ecosystem must begin with the perception of this space as a life support system and human activities, as a receptor system of environmental dysfunctions, and as provider of services and resources (Ioja, 2008).

In the analysis of the distribution of green spaces, in order to establish the *topophobe/topophile/topoindifferent* character of 5<sup>th</sup> District of Bucharest the next steps were followed:

- data collection – consulting specific literature, mapping some representative areas of the study area, field observation;
- database creation – by digitization of the cartographic material;
- information processing – using GIS models and techniques completed by statistical analysis;
- interpretation of the results – obtaining graphs and cartographic materials using GIS techniques – e.g. *the map of topophobe / topophile / topoindifferent neighborhoods* in the 5<sup>th</sup> District of Bucharest.

The following indices have been used for the assessment of the distribution of green spaces:

- green space per capita (sqm) (in the case of the 5<sup>th</sup> District of Bucharest: *parks, gardens of institutions, residential gardens* (belonging only to collective residential spaces), *squares, sports grounds and cemeteries* were taken into account, according to Law No. 313 / 2009;
- accessibility to green spaces, measured by the percentage of the total population of the district living in less than 15 minutes walking distance from urban green areas.

Data collection campaigns were conducted during July-August 2009 and February-April 2010.

The case studies were focused on examples based on available documentation, but also on field research carried out in the studied areas.

As a basis for the maps the updated Plans from 1995 and an orthophoto map of Bucharest from 2005, with 0.5 m resolution were used. The ArcGIS 9.3 software package was used for the spatial analysis of the cartographic data while the information was validated and updated using the data provided by Google Earth, Google Map and Bing Map online applications.

The indices were chosen to highlight:

- relations between residential areas and socio-economic systems in close proximity;
- regional disparities in the quality and distribution of green spaces.

Thus, major differences were found in the study area between the main factors influencing housing quality and also in the relations between these factors and future spatial development trends.

The results can be used for elaborating realistic policies and strategies to improve housing quality and therefore the quality of life, particularly in areas classified as critical in this regard.

## RESULTS

The urban parks in Bucharest generate various services for the urban ecosystem. They are very attractive to visitors thanks to their facilities, location within residential areas and easy access to public transport.

Parks are the most important urban green spaces, due to their surface, available facilities and the functions they fulfill:

- ecological function;
- improving the environmental quality by limiting the impact of sedimentary particles (Muja, 1994), reducing noise pollution, moderating urban climate (Chiesura, 2004) by reducing the air temperature (CCMESI, 2009), increasing the air humidity (Wang et al., 2004) and decreasing the wind velocity (Kumar et al., 2008);
- aesthetic function (Kowarik and Korner, 2005);
- recreational function (Pătroescu and Ioja, 2004).

Unlike in other European countries, in Romania the average area of green space per capita is relatively reduced, given that the standard of World Health Organization is 50 sqm per capita, and the European Union standard is 26 sqm per capita. In Romania, the ratio of urban green spaces is far below European standards, averaging just 18 sqm per capita (Local Environmental Action Plan Bucharest, 2005).

As shown in Table 1, taking into account all categories of green spaces fixed in the legislation, each inhabitant has 18.14 sqm of green space in 5<sup>th</sup> District of Bucharest.

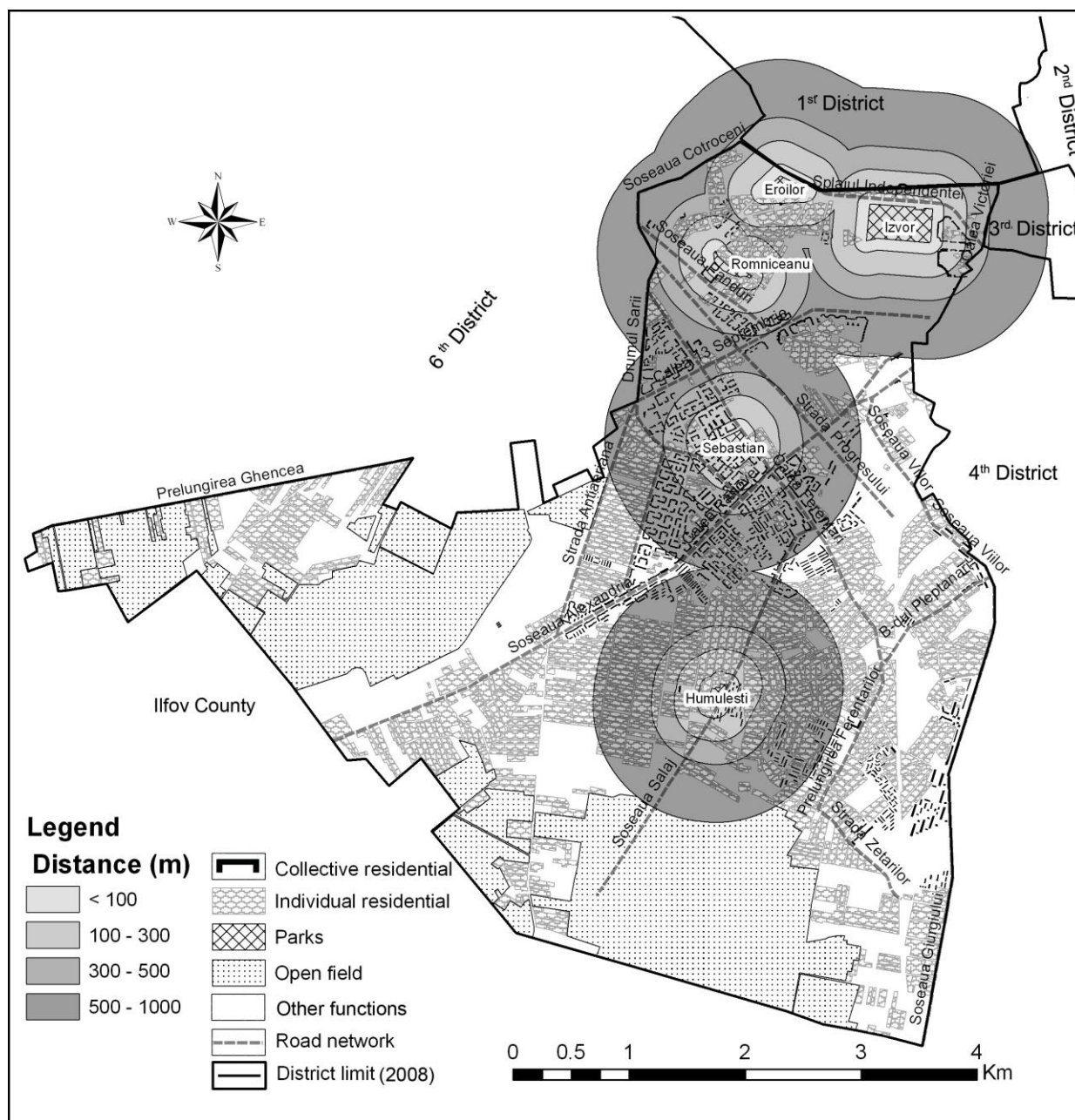
**Table 1. Surface of green space per capita in the 5<sup>th</sup> District by category stipulated in Law No. 313/2009**

Type	Types of green spaces	Surface (sqm)	Green space per capita (sqm)
Public	Parks, residential gardens, squares	379679.88	1.35
Private	Gardens of institutions, cemeteries, sports grounds	4712650.12	16.8
Total		<b>5092330</b>	<b>18.14</b>

Accessibility of parks proved to be very different in the study area. It is estimated that more than 60% of the residents have to walk more than 15 minutes

to the nearest park. The parks Izvor, Romniceanu and Eroilor are located in the Northern and Western parts of the district, serving the residents of 6<sup>th</sup> and 1<sup>st</sup> Districts at the same time. Sebastian and

Humulești parks, located in residential neighborhoods, bear the highest pressure of the residents of the 5<sup>th</sup> District (Fig. 4).



**Fig. 4. The accesibility of parks in the 5<sup>th</sup> District of Bucharest**

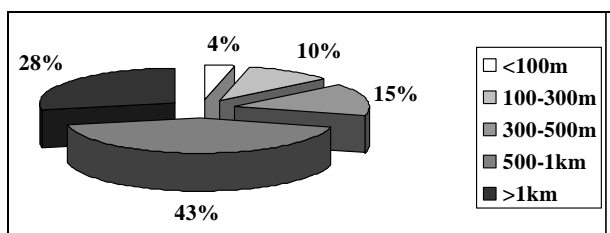
This pressure increases with education level, accessibility, game and sport facilities (e.g. sports grounds, playgrounds), facilities for dogs or technical facilities (e.g. banks, public lighting, garbage cans).

The pressure on a park can be quantified by the size of the flow of visitors. The main impacts of inappropriate behavior of visitors are the rise of uncontrolled waste landfills, destruction or vandalism of vegetation or infrastructure.

Through a more detailed analysis of the accessibility of parks based on the categories of residential spaces (individual and collective residential housing) a distinction can be made between areas with high accessibility to parks, situated in a distance of less than 100m of them and areas with low accessibility, located at a distance greater than 1 km, which means more than 15 minutes walking.

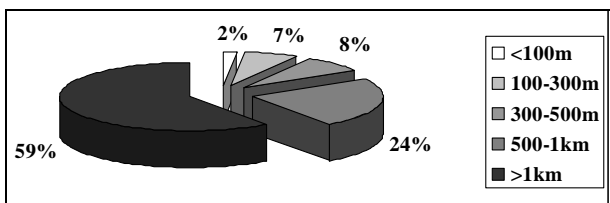
It can be seen in the chart showing the percentage of collective housing in relation to parks

that a very small percentage (4%) of them are located less than 100m away from the nearest park, while 28% are situated from the nearest park at a distance greater than 1 km (Fig. 5).



**Fig. 5. The percentage of collective residential areas by the accessibility to urban parks**

Similar to the collective residential areas, only a small percentage of the single family dwellings are situated at a distance less than 100m (2%) from a park. Instead, a relatively high proportion of residents (59% of single family dwellings) have to walk more than 1km to the nearest park (Fig. 6).

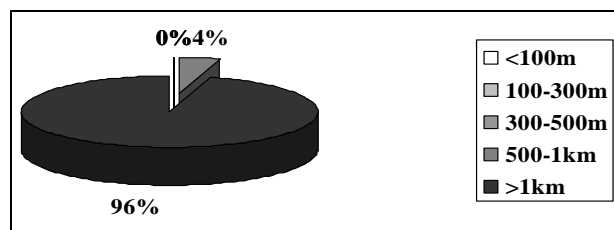


**Fig. 6. The percentage of individual residential areas by the accessibility to urban parks**

By comparing the two categories of residential areas by the accessibility to parks, it can be observed that collective residential areas generally have higher accessibility to parks than single-family homes. 72% of the former is situated at a distance less than 1 km from parks, compared to the only 41% of the latter, mostly concentrated in the area of Sebastian and Humulești Parks.

As for future urban evolution tendencies, the possibilities of residential development on the currently vacant land located in the South of the district should be taken into account. The vacant land represents 25% of its total area. It can be noticed that 96% of their surface is located at a distance greater than 1 km from the nearest park (Fig. 7). The extension of residential areas in the present vacant ones would increase the share of buildings with low accessibility to urban parks if it was not accompanied by proper development of urban infrastructure, which includes green spaces as well. This vacant land is currently an unattractive topophobe space, which can be favourable for the appearance of heat stress, stronger winds and the

presence of unwanted animals in the area compared with compact areas.



**Fig. 7. The percentage of open fields by the accessibility to urban parks**

The development of single-family homes on the vacant land in the outskirts of the 5<sup>th</sup> District can produce and exacerbate feelings of social exclusion through the lack of accessibility to some facilities and services, and the lack of continuity in the morphology of the urban tissue.

Although the homes built in the urban periphery may have more land for construction, those dysfunctions should be taken into account that can persist if nothing is done to diminish cumulative impacts.

The future urban planning projects should include the building of new urban parks designed especially for the benefit of the residents in the south of District 5.

The cemeteries were also taken into account in the analysis of how the distribution of green spaces influences the attractiveness of the neighborhoods in 5<sup>th</sup> District of Bucharest. Compared with rural areas, in the urban ones the cemeteries have a smaller impact. They can cause problems of criminality, insecurity and diminishing of the landscape value in urban ecosystems.

According to the Order No. 563/1997, the minimum recommended distance between residential areas and cemeteries is 50m for sanitary protection. Taking the provisions of this legislation into account, the distances chosen for the mapping of the influence area of the cemeteries were 25 m for demarcating areas most exposed to risk, 50 m distance was recommended by law, and 150 m distance for areas with minimum risk for the resident population (Fig. 8).

The location of the cemeteries – which in the 5<sup>th</sup> District are situated next to vacant lots or at their limits – and the current trend of the development of residential areas, which is generally chaotic, can explain the high percentage of both collective and individual residential buildings situated at less than 25 m from them, in an area that is highly exposed to risk.

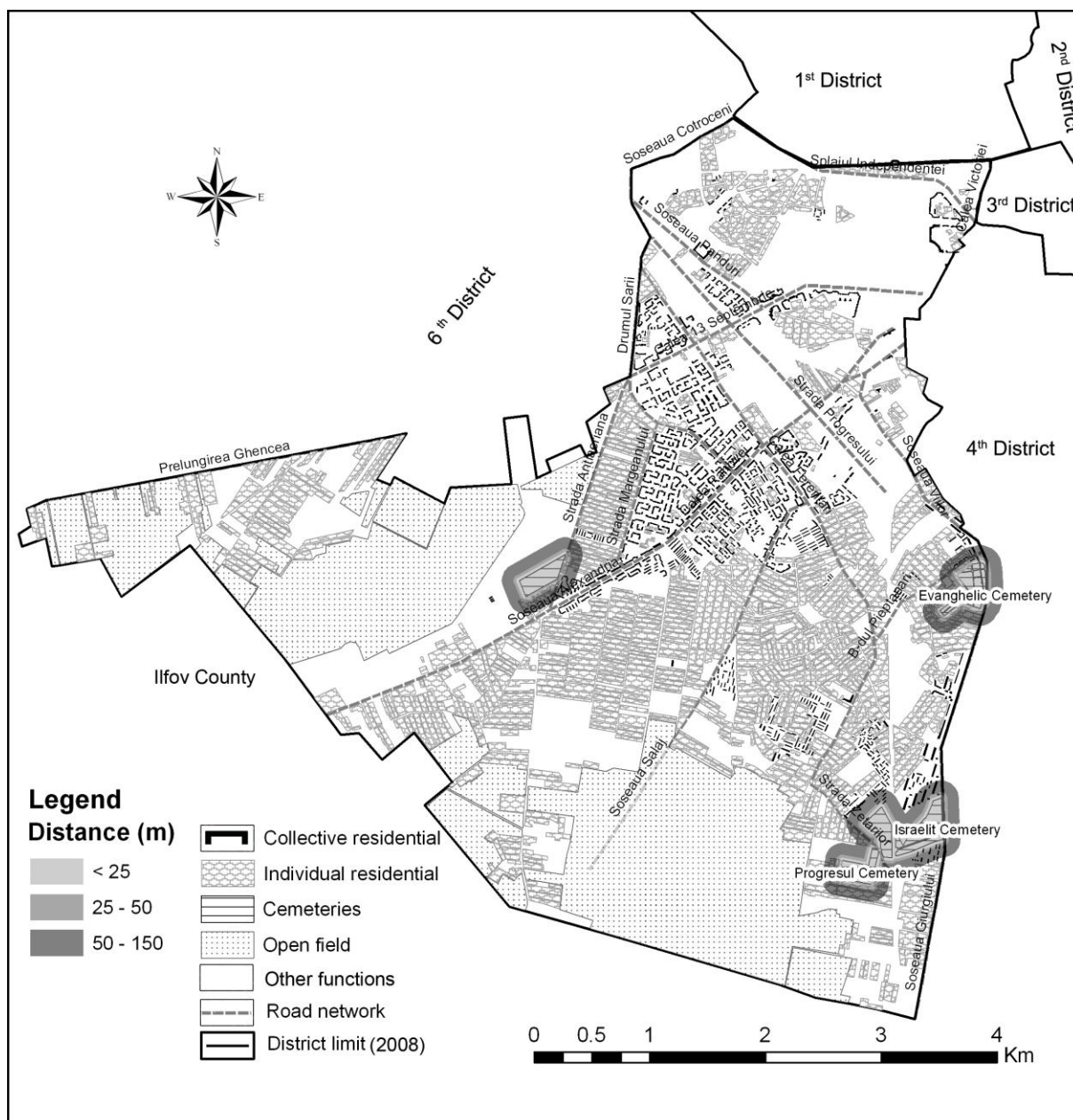


Fig. 8. The distance between residential areas and cemeteries

2% of the total collective residential area is situated at a distance of less than 25 m from a cemetery (Fig. 9), and 11% of the individual residential area is in the same situation (Fig. 10). Those residential areas which are located in a distance from the cemeteries not allowed by law could be exposed to the following risks:

- groundwater pollution if the cemetery is located at less than 30 m above underground water sources, and drinking water supplies. This could cause the appearance of water transmitted diseases;
- soil contamination with sewage, organic waste and viruses;

- risk of infection with different viruses for people who are situated in the area most exposed at risk.

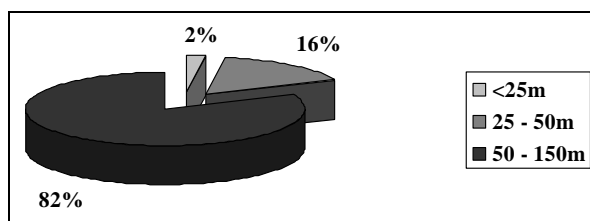


Fig. 9. The percentage of collective residential areas located under the influence of cemeteries

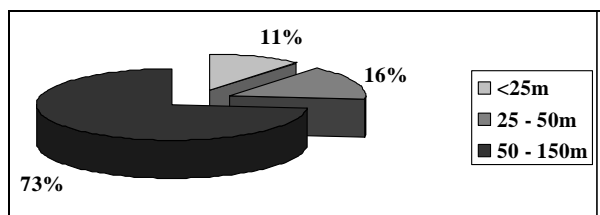


Fig. 10. The percentage of individual residential areas located under the influence of cemeteries

In addition to health risks, a neighborhood where a cemetery is located is not the most attractive place to live. In addition to low accessibility to some services, the location in the outskirts of neighborhoods and under the influence of other factors of environmental degradation (e.g. noise pollution, the influence of industrial areas) classifies these areas as **topophobe neighborhoods**.

## DISCUSSIONS

Using the map overlay method, *topophobe*, *topophile*, and *topoindifferent* areas have been identified in the 5<sup>th</sup> District of Bucharest, based on the indices of distribution of green areas.

Most topophobe neighborhoods are located in the central and southern part of the 5<sup>th</sup> District, completely overlapping with Sălaj and Ferentari neighborhoods and the most part of Rahova neighborhood. The urban tissue, delimited by 13 September Street in the North, Rahovei Street in the South-East and Mărgeanului Street in the West, is **topophile-topoindifferent** due to the high accessibility to parks: Izvor, Eroilor, Romniceanu and Sebastian but mainly to the urban morphology characterized by the presence of collective residential buildings, which maintains a certain symmetry in distribution and is distinguished by the presence of residential gardens (Fig. 11).

In contrast, the north of the district is represented by **topophile neighborhoods** with attractive housing, characterized by a high accessibility (100% of homes are located within a radius of 15 minutes walking distance) to 4 of the 5 parks in the district (Izvor, Eroilor, Sebastian and Romniceanu Parks).

Another area that falls into the topophile category is the Sebastian neighborhood bordered by 13 September Street, Mihail Sebastian Street, Petre Ispirescu Street and Rahovei Street. The area has been included in the topophile category because of its proximity to the city centre, the facilities available for its inhabitants, the high accessibility to Sebastian Park and the high percentage of green spaces in this area.

**Topoindifferent neighborhoods** are placed somewhere between topophile and topophobe

neighborhoods and can be defined as transitional areas between the two categories, where the elements of aggression don't leave a sufficiently strong impression. The residential areas situated Northwards from 13 September Street, Northern of Rahova neighborhood (between Mărgeanului Street, Rahovei Street, Sălaj Street, Ferentari Street and Petre Ispirescu Street, isolated between Ferentari Street and Progresului Street) are included in this category.

The area around Humulești Park is an isolated case of topoindifferent neighborhood. Although it is located in Ferentari neighborhood it's different from it due to its accessibility to green spaces, and can be considered as a starting point for future environmental action plans for the improvement of the quality of life in the critical areas.

Besides the three categories of attractiveness of neighborhoods, a fourth category can also be defined that includes the *vacant topophobe land* located mainly in the Southern part of 5<sup>th</sup> District, near Ferentari neighborhood and West of Alexandria Street. These areas have the lowest accessibility to social services, urban facilities (public spaces, green areas), services (education, health care) and transport connecting this area with the city centre.

For future development of these areas, not only their economic benefits but also their disadvantages have to be taken into consideration, and it should prime the solving of the existing problems not the generation of new ones (Pătroescu et al., 2009).

An important social aspect of the residential areas in the outskirts of large cities is the lack of identity of urban areas. These areas appeared much later than the historical centers and are characterized by lack of those elements that could make them more beautiful, more hospitable and less depressing. Marginality, as a characteristic of the periphery (not only in spatial sense), marks an area of disruption of meanings, because this is where mentalities collide and different meanings can interfere (Sârbu, 2005).

In these peripheral areas the newcomers establish and build their small houses in rural style, often in illegal places, lacking any infrastructure (Rufat, 2008).

Owing to these implications at a social level, developers of major residential complexes do not see any opportunity for investment in these areas. Unlike the North of Bucharest, which has seen rapid development in this direction due to high accessibility to a range of services, and especially to attractive urban landscape dominated by green spaces and lakes, these areas have numerous dysfunctionalities. This is why it is necessary to

prioritize these areas in future environmental action plans in order to improve the urban landscape and quality of life since at present these areas are

attractive only for gipsy communities from Ferentari neighborhood, for waste disposal and represent a habitat for stray dogs as well.

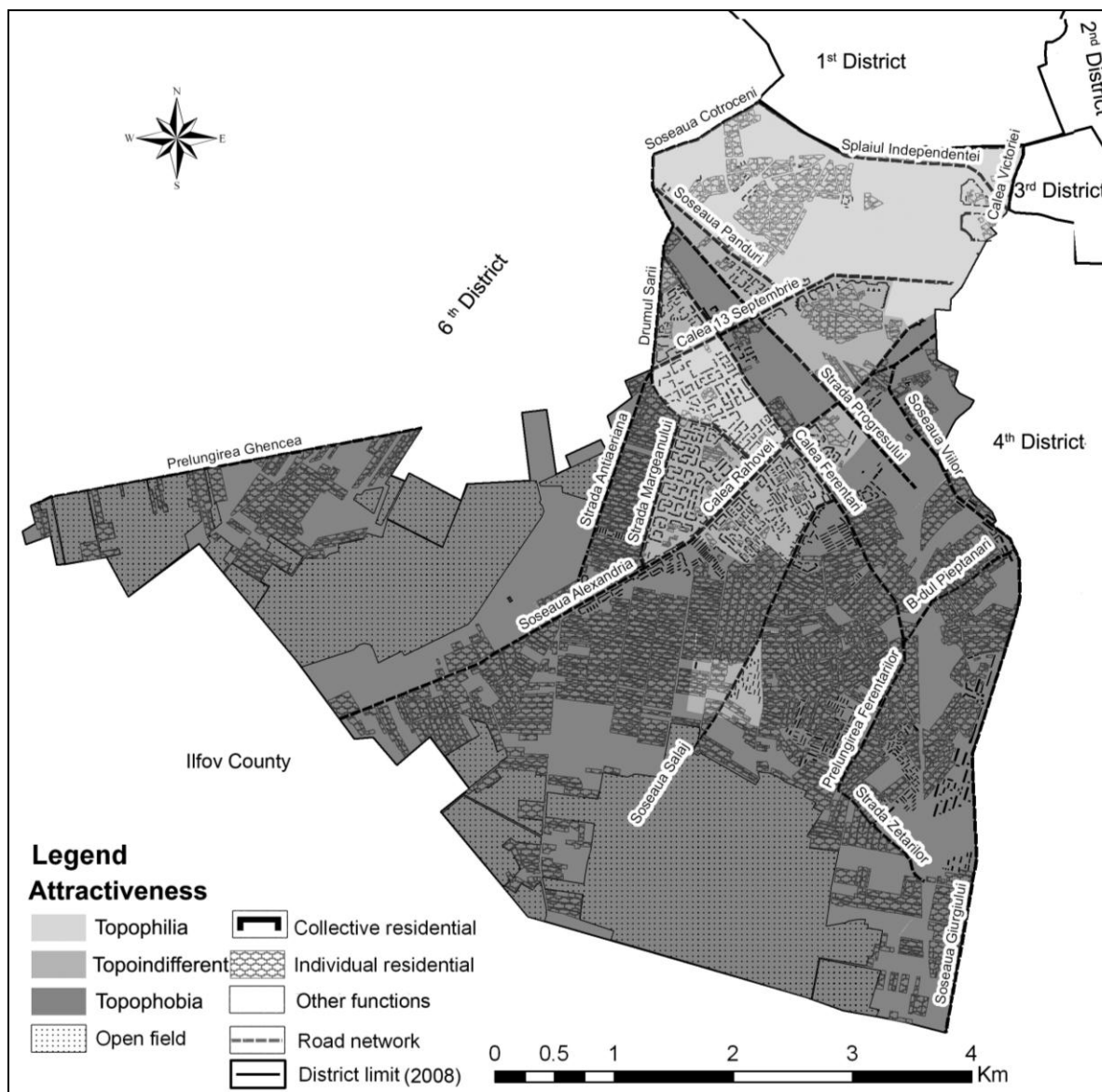


Figure. 11. The attractiveness of residential areas in the 5<sup>th</sup> District of Bucharest

Taking into account the research results it can be stated that a fairly high percentage of single family homes (87%) have been classified as **topophobe neighborhoods** and only 6% of the total was identified as **topophile neighborhoods** (Fig. 12).

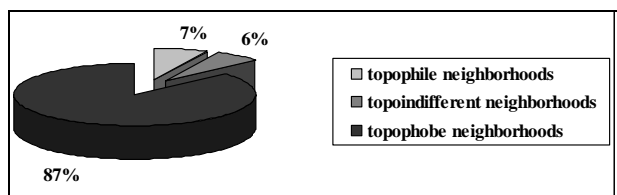


Fig. 12. The percentage of individual residential areas by attractiveness

In the case of collective residential areas, the highest percentage (46%) is represented by the **topoindifferent neighborhoods**. As a rule they tend to be located around topophile areas and can be characterized as *transitional areas* between topophobe and topophile neighborhoods (Fig. 13).

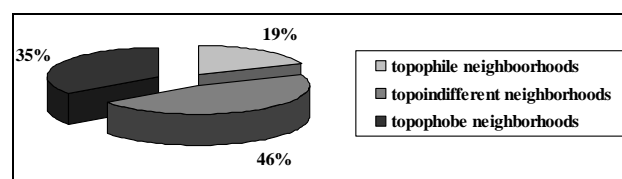


Fig. 13. The percentage of collective residential areas by attractiveness

The lack of effective and coherent policies can make the housing crisis, the collective habitat degradation, their transformation into popular neighborhoods with poor social housing status and the decline of living standards for the permanent resident population (Ioja, 2008).

Taking several measures regarding poverty and criminality by local authorities is particularly important. Formal recognition of vulnerable areas in terms of poverty and criminality, disadvantaged groups, concentrated areas of poverty and crime, is the first step of the formal recognition and estimation of the problem (Dincă, 2008).

## CONCLUSION

The purpose of our study was to demonstrate the individuality of the 5<sup>th</sup> District and its neighborhoods, compared to other districts of Bucharest.

In conclusion, the 5<sup>th</sup> District of Bucharest is characterized by the unequal distribution of green spaces which is also determined by the territorial distribution of individual and collective residential. Thereby collective residential has a higher percentage of public green space than the individual residential.

The inhabitants from the North of the 5<sup>th</sup> District have a better accessibility to parks and other types of green spaces. This accessibility decreases once the distance from the centre of the city grows. Although the surface of green space per capita is **18.14** sqm, it's unequally distributed in the analyzed area. As we move towards the South of the district, we can remark the diminution of the accessibility to a range of services implicitly generating a decrease in housing quality.

Housing quality can be measured by identifying neighborhoods as topophils, topoindiferents or topofobes. Thereby, **61%** of the analyzed residential spaces were identified as topophobes, **26%** as topoindiferents and only **13%** as topophils meaning that more than half of the 5<sup>th</sup> District of Bucharest is based on a negative urban image caused mainly by the low accessibility to green spaces or the location near an unattractive area such as a cemetery.

The city centre is seen as an attractive area, well-equipped, but as moving away from the centre the perception of urban areas is deteriorating and they are considered less and less valuable (Vânău, 2009). The phenomenon of property price decrease, once moving away from the city center or workplaces is one of the reasons for the development of neighborhoods in the outskirts for the lower-income population. Old cities with compact buildings and narrow streets have no open space to create green spaces (Muja, 1994).

Efforts are needed to establish a national urban policy with defined strategies approved by politicians, governments and local actors. It is also important to adjust the programs to local conditions in the housing market, based on medium- and long-term forecasts of demand and supply relations.

On the long term, urban development policies and programs should take these indices into consideration and try to seek the active involvement of all local stakeholders to shape a better image, having improvement of housing quality, urban development and increase of quality of life as main goals of improvement. Quality of life should take priority over economic development issues and the problems should be examined taking the aspects of social life and environment into account.

The lack of understanding of the social processes and unknowing (from the authorities) of the problems that the population is facing in the periphery, lead to dangerous distortions in the management of these areas (Sârbu, 2005). The low degree of accessibility to urban services, especially transport, which does not equally serve the centre and peripheral areas, may create social difficulties.

The economic development of the city and the investment in urban infrastructure have led to the rise in the standards of living and improvement of the housing quality for some residents, but also to the degradation of environmental conditions and living-standards of another segment of the population represented by socially disadvantaged categories with low income and limited access to urban services. The result increased differences both in local and regional level.

In this regard, there are significant socio-economic disparities between the city centre and the periphery, even in the 5<sup>th</sup> District, each of these areas having its own specific problems: the city centre is dominated by tertiary function against residential function which is being forced to expand to the periphery. Therefore the periphery becomes unattractive, facing acute shortage of infrastructure, poor habitat quality that may lead to increased insecurity and criminality.

Since the study of quality of life and thus the housing quality has become a topical issue highly publicized, complex studies are needed, whose results are to be submitted to local authorities who should take them into account and impose concrete measures to reduce disparities at regional level.

## ACKNOWLEDGEMENTS

Observations were conducted by the Center for Environmental Research and Impact Studies (CCMESI), University of Bucharest, in the framework

of PN II Parteneriate 92104/2008 ECOLOC - Environmental management in urban residential areas in the context of current climate change.

We would also like to thank the two anonymous reviewers whom suggestions helped us to improve this paper.

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