Analele Universităţii din Oradea, Seria Geografie
ISSN **1221-1273**, E-ISSN **2065-3409**

Year **XXII**, no. **1/2012** (June), pp. **48 - 53**
Article no. **221105-557**

BUILT-UP SPACE DYNAMICS COMPLICATES THE PRESENT-DAY URBAN LAND USE IN BUCHAREST

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Abstract: Transition from centralized to market economy has led to deep restructuring of urban land use. It is particularly important for the shift between the two trends: deindustrialization of the 1990s and economic tertiarization of the 2000s. Post-communist built-up space dynamics has manifested in two phases: a) before 2000, with industrial destructuring and insular appearance of commercial spaces within big residential zones; b) after 2000, with extending residential areas on city's periphery and in suburbs, as well as with logistic and commercial facilities in sub-and peri-urban areas. Dynamics of built-up space has been evaluated using spectral mixture analysis of remotely sensed data, extracted from two Landsat5TM images (acquired in 1988 and 2010). Comparative analysis of the results has led to identification of the areas with increasing and decreasing density of built-up spaces. This analysis was realized in order to verify the hypothesis, according to which peri-central areas are more preferable for new buildings, even when there is enough free space in central area. These results, reflecting the dynamics of built-up spaces in Bucharest city, are the effect of certain processes, frequently chaotic, reflected on the urban landscape.

Key words: transition period, deindustrialization, tertiarization, urban landscape, Bucharest

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INTRODUCTION

The present paper analyses the way, in which the dynamics of the built-up space within the city and around it induce basic structural changes of the urban land use. In fact, the references will be strictly related to the built-up space and its relationship to the urban space having different uses. The analyses concerning the dynamics of the built-up urban space have multiplied and emphasized numerous specificities for the Central and Eastern Europe in a continuous transition process

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(Enyedi, 1992; Stenning, 2004; Ianoş, 2004; Young & Kaczmarek, 2008; Marcińczak & Sagan, 2010). The transition from a centralized system to a democratic one, dominated by the market economy has imposed new conditions for the big post-socialist city, meaning the fast restructuring in order to become more competitive within the globalization process, to become a real engine of the transformations at national or regional level (Ianoş, 2004). The relationships between the economic restructuring and the new social order must be correlated in order to make sense and increase the efficiency of the governance. Urban and economic restructuring generates a growing complexity of the ecological and social problems of the big cities, which makes that urban governance to take into consideration the international experience of the transitional process from the post-industrial city to the complex one with high creative values (Hong & Chao-lin, 2002). The post socialist city starts this transition with a great handicap: it has not enough time to experience the classical stage of the post-industrial city or even if it does it is for a much contracted time interval.

The amplitude of changes of the former big socialist cities can be noticed in the speed of the transformations recorded in relation to the land uses within the urban and sub-urban areas (Wu & Silva, 2010). These changes have a direct physical consequence, expressed by the expansion of the built-up space in the surrounding areas of the city, as well as by a 'reduction' of the built-up areas inside it. This diminishing is determined by the physical dismantling of the big industrial zones as a follow up of the vast deindustrialization process.

Two processes have directly influenced the land use: the deindustrialization by its new supply of availability of space for other uses and the tertiarization. This latter one can be found either directly, by the new built-up spaces explicitly achieved for services, or indirectly by the chain effects they produced. Tertiarization and the appearance of the superior tertiary, as well as the location of big multinational companies, providing services for enterprises, have induced big social inequities. The employees of these companies, most of them young people, became due to their revenues, the main supporters of the conversion processes of the urban land, both in the sub-urban area and in the city itself (Kährik & Tammaru, 2008).

The development of a social middle income class has led to a global shift of this one from the big residential areas of collective houses to the suburban areas, but also to the most aristocratic areas of the inner city. Such processes had a direct effect on the land use transformation, which became more fragmented than before and increased the built-up density. The city of Bucharest, with a population of about 2 million inhabitants, has experienced a differentiated dynamics after 1990. Two main stages can be identified: one which is specific for the first transition decade, defined by the dismantling of the big industrial zones as well as of those which were isolated and spread all over the urban space and a second one, in the following decade, defined by the increase of the built-up spaces for residential purposes and services as well. Both stages can be found now in the present structure of urban fabric. The present changes in the structure of the built-up space of the city of Bucharest, represent an increased complexity of land uses. This complexity is generated by the chaotic expansion of urban fabric, without a predesigned plan for each area which was supposed to become a residential or a tertiary (for services) one. The issuing of numerous building permits frequently contested, have multiplied the problems concerning sustainable development. In other words, while lacking clear regulations, the buildings chaotically located within the urban fabric, the city of Bucharest must face now another problem, besides the one related to the conversion / reconversion of the collective blocks of flats built during the communist period.

METHODOLOGY

The evaluation of the built-up space has been done by using the spectral analysis of the data provided by satellite imagery. In this sense, the comparative spectral mixture analysis (Small, 2001) of the satellite images provided by Landsat5TM (acquired on 07.07.1988 and 01.05.2010) covered a space which goes beyond the limits of the city of Bucharest, with additional materials

extracted from 1:50 000 topographic maps. Processing of raster images comprised georeferencing, radiometric calibration, geometric correction and digitization.

In order to make the outputs operational at the regional level (although we examine just Bucharest city, the study area amounts up to 1 thou. sq. km), the pixels were summarized by 210-m cells of a square grid. Further, shares of 'urban' areas in grid cells were interpolated using IDW method. The resulted surfaces show both degree of 'urbanness' (as defined by Weeks, 2010) in each year of reference and the difference between the two. This, approach allows overpassing minor deviations and highlighting the most important trends. These results were enhanced through cross-sectioning the surfaces along cardinal (north-south and east-west) and intermediate (northeast-southwest and northwest-southeast) directions, the approach useful for assessment of spatial variability in urban development (Phinn et al., 2002).

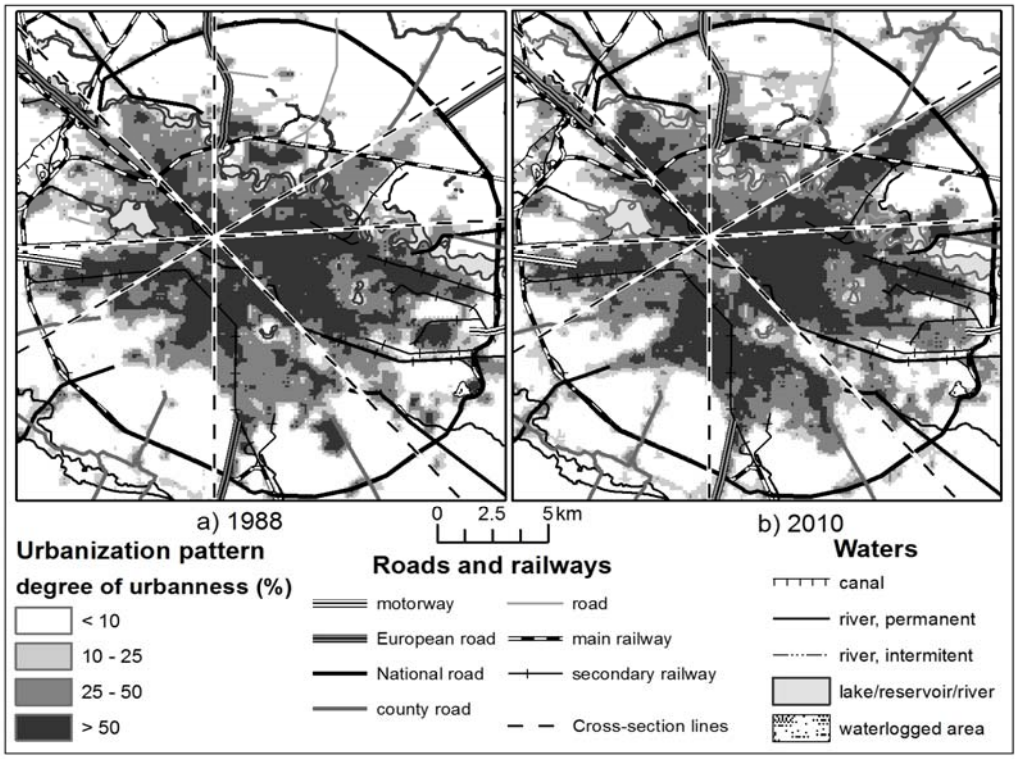

Figure 1. Urbanization patterns of Bucharest in 1988 (a) and 2010 (b)
(Source: models by authors)

RESULTS AND DISCUSSIONS

By using the above mentioned methodology, through comparative analysis, densification and rarefaction processes of the built space were identified. Our approach started from the hypothesis that the peri-central area of the city is more attractive for building development, than the central one. By spatial representation of the difference between the shares of the built-up space at the level of each cell, in the two analyzed years, the above mentioned hypothesis is confirmed (figure 1).

The cleavage between center and periphery is emphasized much better, by the expansion of the analysis over the peripheries and suburban areas of the Bucharest city. It comes out quite clear that the dynamics of changes is much stronger at the level of the peripheries and suburban areas rather than at the level of the central and peri-central ones (figure 2).

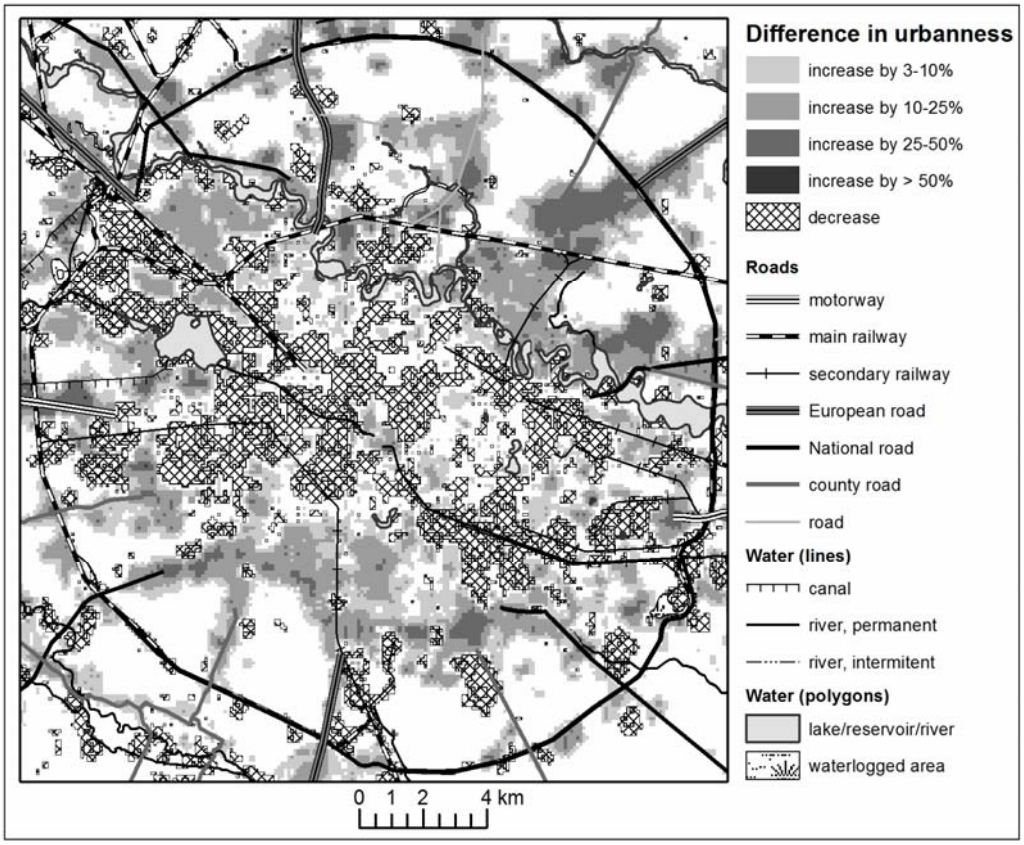

Figure 2. Difference in the degree of urbanness of Bucharest (1988 - 2010)
(Source: models by authors)

For a more detailed analysis, the design and elaboration of some profiles based on cardinal points, was seen as relevant from the academic point of view. These profiles emphasize the differentiated dynamics of the built-up space, revealing the importance of the major access axis of the city, besides the center-periphery disparities (figure 3).

Globally, these results emphasize the turbulences at urban level, generated by the chaotic development of the peripheries and by the disharmonic implants of some huge building in the central city area. All these became possible in the framework of an unclear legislation, aiming to regulate the processes of urban expansion. This has led to the total neglecting of the community interests in favor of the individual ones. The spatial effect of these developments materialized in the present structure with incomplete infrastructure, with underdeveloped urban furniture, hardly adaptable to the exigencies of a west-European urban life style.

The synthetic representation of the results, by using the above maps, allows the identification of some aspects that can be commented. Firstly, the obvious tendency to diminishing the share of built-up space in the central areas as against the peripheries must be underlined. Such a diminishing, for Bucharest is determined by the total restructuring of the industrial zones from the peri-central area of the city (Chelcea, 2008). Their demolition and the existence of a large reserve of open space are to be found in the comparative analysis, as a diminishing of the share of built-up space. The demolitions form the period of the economic "boom", which were not yet rebuilt by mid-2010, were added to these ones. Besides these real processes, the much slower growths of the built space of the central areas as compared to the peripheries must be taken into consideration.

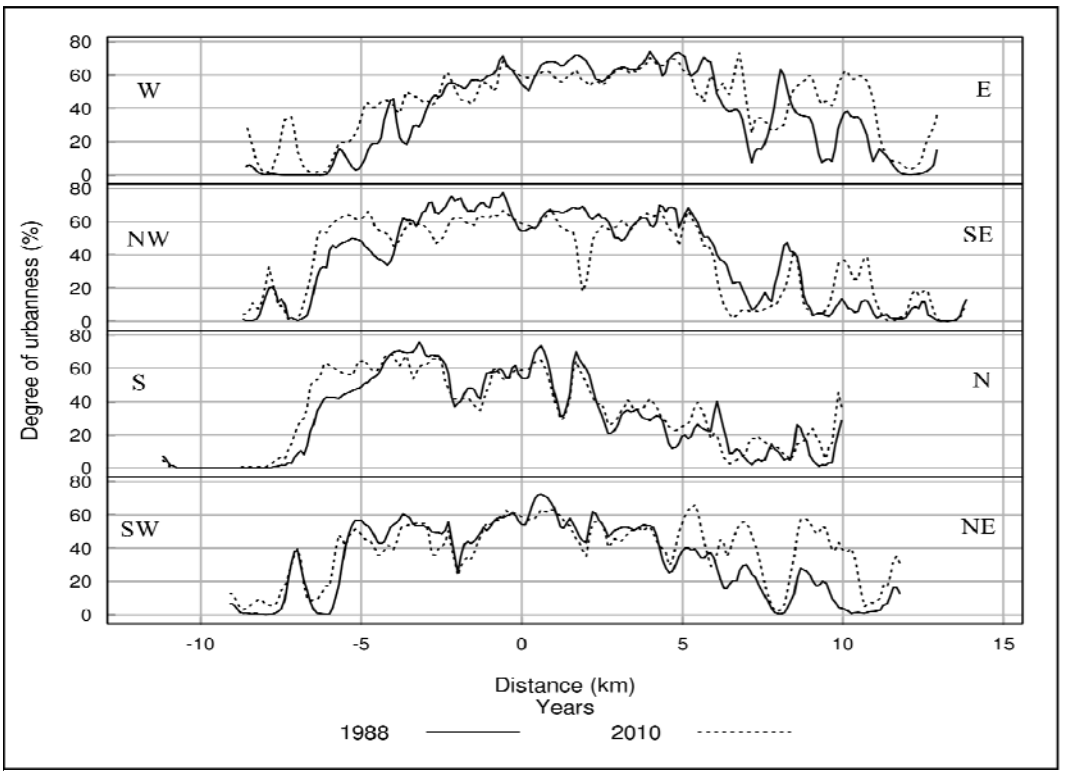

Figure 3. Cross-section profiles through urbanization pattern models of Bucharest
(Source: profiles by authors)

Secondly, one can notice big differences in relation to the process of urban expansion: the Southern peripheries of the city are characterized by a compact expansion whereas the Eastern and the Southeastern ones are on the contrary very fragmented. The first case concerns the expansion of the built spaces from between the two major penetration axis of the city (Bucureşti-Alexandria and Bucureşti-Oltenița), especially after 2004. This compact type of expansion is due to the more accessible price of the land, several times smaller than the one of the land in the Northern areas of the city. In the second situation, the more reduced attraction is due to the pollution caused by the chemical industrial zone of Popeşti-Leordeni, or by the vicinity of Glina landfill. Besides those elements that explain the fragmentation of the built-up space, the existence of some forested areas as well as of some assets of cultural tourism, has favored the development of new residential areas but of a relatively limited size.

Thirdly, if one looks to the Northern part of the city, a powerful social segregation can be noticed that is reflected by the structure of the built-up space. The numerous areas covered by lakes and forests, to which the existence of a complex infrastructure and the lack of polluting industries can be added, have favored the expansion of the new built up areas in the open ones, generating an alternant structure. The attractiveness of this space has generated an increased aggressiveness towards the recreational areas, the public debates on their destruction being of notoriety (The Bordei Park, The Băneasa Forest, and *"French Village"*).

Fourthly, it is quite well known the important role played by the mixed road and rail ring, surrounding the capital city, in generating some contradictory processes for the dynamics of the built-up space: fragmentation vs. integration. These processes took place over a short period of time and had a successive character. In the first place the fragmentation of this space was due to the preferred

location of the built space mainly belonging to services for enterprises and to logistics. After 2005, a generalized process of integration of these spaces with isolated built-up areas took place along the entire area, except its Southern part. Local developments took place, mainly at the crossroads of this ring with the major penetration axis of the city: the national roads Ploieşti-Bucureşti, Urziceni-Bucureşti, Târgovişte-Bucureşti and the A1 highway (Piteşti-Bucureşti).

CONCLUSION

The apparent chaotic expansion of the built-up space of the city of Bucharest has followed ways that were foreseen by population and developers, by making use of certain opportunities provided by accessibility and general elements of location. Briefly, the densification of urban fabric around the lakes and forested areas, or nearby access axis can be noticed. At the same time, the shortcomings due to the presence of some polluting enterprises, landfills, or other disturbing elements, were avoided. The massive aggression of urban fabric, over the agricultural lands in the urban fringe, can be explained by the huge desire of the inhabitants from the big communist collective residential areas to leave them for individual housing (Ianoş, 2008).

On the basis of these general tendencies the urban expansion occurred without a very clear vision. Although the general urban plan of the city of Bucharest, elaborated in 2000, clearly provided specific areas for residential and logistical use or for productive activities etc. the processes of intra-urban changes have led to its modification by zone urban plans even when it should not. These abusive actions, given the lack of a weak and unclear legislation, have created and still will big problems in insuring the fundamental requirements for a sustainable development of the capital city.

Acknowledgments

This work was partially elaborated during a postdoctoral research stage financed by University of Bucharest.

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Submitted: December 04, 2011 | Revised: February 03, 2012 | Accepted and published online April 22, 2012