

URBAN BUILT SPACE VERSUS GREEN SPACE IN CITY ZONING CHALLENGES. A CROSS STUDY OF THE MUNICIPALITIES OF IASI AND SUCEAVA – ROMANIA

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Abstract

The organization of urban space is a product of its functional dynamics, subjected to a conversion and regeneration process. It is determined by the action of a vector complex, defined by all types of agents and actions that influence a territory, within a certain period of time. The urban built up areas are under the pressure of residential use, which rapidly changes the relationship between the existing, green spaces and the built up ones. The presented case studies, located in the North - East Development Region of Romania compares, the binomial of green and built space in the urbanism policy of two municipalities with a great real estate and economic dynamism: Suceava, which complies with the European norms of occupied areas with green spaces (28% in 2018, according the data of the Statistic National Institute) and Iasi who aspire to this indicator of quality of urban life (18% in the same year, compared to 26 sqm / inhabitant as is the standard of the European Union)..

Keywords: urban dynamics, residential area, green space, Suceava, Iași

INTRODUCTION

Cities share a wide range of utilities of the space [1], [2]. The development of the urban centers is influenced by a series of factors, among which stand out the following: natural conditions, demographic and economic evolution, and methods of urban planning as well. From this perspective, cities are knotty systems that generate social and economic models [3] which, in their turn, are designed to serve as functional zoning of the space within cityscapes [4].

The mitigation of urban open spaces for the development of the built space presents a situation which is a common and overwhelming feature of Europe's conurbations and major cities. The pressure applied on any type of space within cities or their proximity, in terms of utility, is increasing with the growth of the population. Thus, space becomes a limited good that requires long-term planning and an integrated approach of the development. Soon, keeping the large/ attractive green spaces within cityscapes will turn into a

growing challenge for supporting the quality of urban spaces [5]. In Romania, the dynamics of green spaces has been analyzed in direct correlation with the political, social and economic changes occurred after the fall of the communist regime. The reason behind this punctual time delimitation, namely the year of 1989, lies in the fact that the events of the above-mentioned year lost the mechanisms of centralized planning. Shortly after, a large tract of lands located in urban areas became private property following the mass retrocessions (Law 18/1991, Law on Land Resources) and, at the same time, the wheels of the capitalist economy started to turn on the real-estate market [6]. Cities developed both in situ [7] and by taking over suburban areas at the expense of agricultural areas [8].

This increase of the built spaces completed by the urban territorial expansion has destroyed a large part of the vast green spaces from the previous period. Later, the administrative decentralization

allowed the adoption of urban development strategies at a local and county level [9], [10], which, in turn, allowed cities to set up the objectives concerning the territorial planning, including the design and management of green spaces. The current legislation on the administration of public green spaces in urban areas [11] anchors the concept to an exclusive aesthetic approach by ignoring its ecologic, social, and cultural potential. Besides this matter, the green space is constantly under the pressure exerted by the real-estate market and infrastructure developments [12]. Thus, it often ends up being treated indifferently, lightly and sometimes it is even excluded by changing its purpose of use. Further, the very notion of green

FROM THE SOCIAL FEATURE OF URBAN GREEN SPACES TO THEIR ECOLOGICAL ROLE

The matter of green spaces is differently approached across Europe. Thus, the English public administration regards the green space as a network of wide-range elements of different roles and purposes. All open spaces which include vegetation are considered green spaces. This fact determines the London authorities in place to speak about green infrastructure instead of green space. The green infrastructure is regarded as an independent network of open green spaces and elements, such as green roofs or walls [13]. Consequently, under the circumstances, green spaces are characterized by the social role as recreation and leisure areas, besides the presence of vegetation, while green infrastructures firstly play an ecological part and secondly a social one. Additionally, the aesthetic role is secondary for both concepts, which shows the necessary evolution of adjustment to the nowadays urban status [14]. In Germany, the urban green space comprises public parks, playgrounds for children, trees, community gardens and graveyards [15]. Thus, the German legislation does

space is afflicted by the lack of an agreement in terms of its perception and its management principles as well, which fact often escalates into irreversible damages. The failure to acknowledge the benefits generated by green spaces for inhabitants, economy and environment, as well as ignoring the social and cultural roles played by green spaces give rise to their strictly quantitative management by the appropriate institutions. Under the circumstances, the present paper aims to make a comparative study between two cities located in the North-East Development Region of Romania, namely Iași and Suceava. The analysis of the existing green space in these two cities has been run according to our own methodology.

not consider as green spaces the following items: sports facilities, urban forests or green spaces along the streets and roads. In France, green spaces are those areas dominated by vegetation and associated with recreation and leisure activities and not simply any planted areas [16].

In the central and Eastern part of Europe, the management of green spaces is mainly associated with the ownership of the land in the urban areas. The sale of a large part of the State Housing Fund after 1990 turned tenants into owners of the inhabited dwellings, while the land on which the residences are located could be the property of another part (municipality, private owner, etc). In this case, public spaces are neglected till ownership is established [17]. Given the diversity of the urban challenges across Europe, their constantly growing range and environmental issues as well, the international community has started to analyze the evolution of the concept of green space versus green infrastructure [18], [19].

METHODOLOGY

The research methodology has been set up on the basis of a few premises:

- Iași city was mentioned in 2019 as the most polluted city of Romania and one of the most polluted cities of Europe as well (Within the Air Visual Report it occupies the 27th position on a list of 930 analyzed cities) [20]. The pollution is caused by a series of factors, where the massive infrastructure investments, residential constructions and means of transport create a hard-handle and vicious circle.
- In the past 25 years, the retail activities, office buildings, storage facilities of various merchandises and materials as well as the expansion of built-up areas have taken over the industrial and agricultural landscapes of the two cities under analysis.
- Suceava is a city of a constant economic and investment dynamics, also engaged into an intense make-over process which marks off the South Bukovina from the rest of the North-East Development Region of Romania.
- In 2010, Suceava was the city which had the highest density of modern commercial spaces in the country, namely more than 1.38 square meters per inhabitant. At present finding and designing green spaces within the city in the context of 4 malls and 8 supermarkets located within the city, plus their parking lots, proves to be quite a challenge for the city's administration. The above-mentioned premises have provided the reason for abandoning the concept of green spaces as defined by the national legislation and directed us towards an imperfect instrument for the moment, but deeply connected to a reality which does not set apart the public green spaces from those which are privately owned (by individuals or state). We have considered that this sole hypothetical reconfiguration can provide a real analysis of the green space within the city. Thus, the existing green spaces in these two cities (managed by the local authorities) are merely a part of the planted spaces within the city.
- Hereinafter, we shall name them, after the French model independent green spaces [21]. The concept includes a wide range of planted spaces comprising vegetation, but they not necessarily attached to other urban

equipments or forms. Under this category, the authors of this paper shall introduce the planted areas with agricultural purpose (e.g. pastures, small private agricultural gardens, urban farms and agri-horticultural areas).

Naturally, we are aware of the fact that the national legislation and the manner of defining the concept of green space has deep repercussions on the level of control over the land purpose and changing its purpose. Opening the concept of green space as viewed by the national legislation to the idea of green infrastructure (a far-reaching term, but carrying different economic weights), falls upon the shoulders of the professional associations that manage the subject by having in view the consequences caused by this change.

Nevertheless, a calculus exercise comprising all areas occupied by different categories of green space within the two analyzed cities can prove beneficial for the policy and administrative makers if we consider the factor of public health.

Under the circumstances, it has been calculated the green space area of 18 neighborhoods in Iași city (which comprises 67% of the city's total area) and 14 neighborhoods in Suceava city (which comprises 43% of the city's total area).

In this study we use two datasets and analyses the arrangement of 13 land use categories of green space, both to the city and of the neighborhoods level. Specifically, the types of public and private green space were parks, recreation grounds, botanical garden, sport fields, forests, grasslands, pastures, meadows, orchards, farms, vineyards, compacted green-space (e.g. squares, roundabouts, areas with decorative shrubs, patches of grass between houses, industrial green spaces), and cemeteries.

In order to obtain the surface of urban green space (USG) we complete the vectors datasets extracted from Open Street Map (OSM) (Fig. 1a) with metadata from World Imagery (WI) (Fig. 1b). The second source provide the better satellite and aerial imagery, with 1m resolution imagery resolution and 15m TerraCollor at small and mid-scale which can be used by GIS User Community.

The cartographic analyses were processed using ArcGIS 10.2.2 software in order to evidence the principal differences between neighborhoods, vectoring the principal green space from WI. The

next was to merge the polygons from OSM and WI into one vector shapefile, in order to calculate the

surface of green space. Finally, the representation was the results of the last step of the methodology.

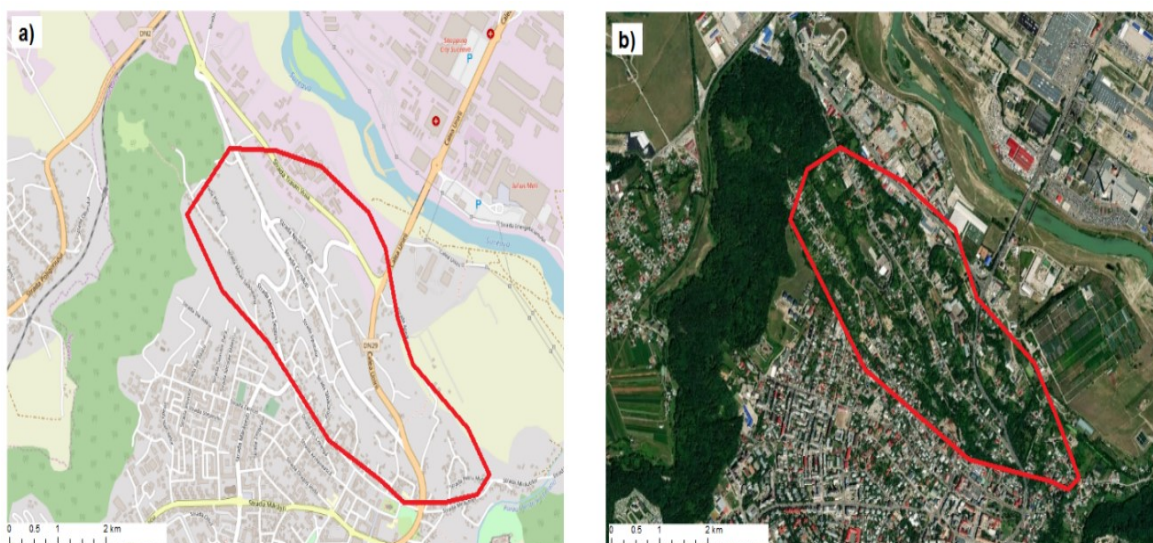


Figure 1. a) Open Street Map View and b) World Imagery in the Serpentine neighborhood to Suceava. The World Imagery shows the green lines. (© 2009 Open Street Map, and the GIS User Community, © 2019 Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community).

RESULTS AND DISCUSSIONS

According to the data provided by the National Institute of Statistics [22], in the year of 2018, in Romania there were registered 26.905 ha of urban green spaces, with 5.272 more than they were previously recorded in 1991. Based on Law 24/2007 republished and updated, it is related to the green spaces used for parks, public gardens, squares, plots of trees and flowers, woods, graveyards, sports facilities located within the

built-up areas of the cities, namely public green spaces (Table 1). Here are not included the green houses, vegetable gardens, agricultural lands and aquatic areas. At European level, it is envisaged an area of 30 - 40 square meters /inhabitant for green spaces, an area which is under the average recommended by World Health Organization (50 square meters).

Table 1 The typology of the green spaces in the Romanian legislation

A.	Public green spaces of unlimited access: Parks, gardens, squares, planted land strips
	Public green spaces of specialized use: Botanical and zoological gardens, open museums, exhibition spaces, environmental and leisure areas for circus trained animals
B.	Lands associated with public facilities, such as: nurseries and daycare centers, kindergardens, schools, medical units, social protection facilities, institutions, religious buildings, graveyards
	Sports facilities: sports grounds or parks for performing competitive, professional sports
C.	Green spaces for pleasure: recreational and leisure centers and facilities, sports grounds and facilities
D.	Green spaces for the protection of water bodies
E.	Protection color against the technical infrastructure
F.	Recreational forests
G.	Plant nurseries and greenhouses

Source: Law 24/2007, republished and updated

In Romania, the Law no. 24/2007 (concerning the regulation and administration of green spaces in urban areas) specifies in article 2 that green space is “the green zone within cities and municipalities defined as a mosaic network or a system of semi-natural ecosystems of a vegetation nature (woody, ground vegetation, shrubby and flowery layers)”. The law has triggered the emergence of the Green Space Office within city halls, which, in turn, has given rise to the development of the Green Space Registers. These register the areas of green spaces located in the public domain of the state or private domain of the city halls, including the tree alignments or trees located in graveyards or along the streets, roads and inside squares.

The pressure exerted by the near infringement of the EU Commission on the environmental quality has determined the local administrations to look for new ways of reaching the minimum value of green space per capita (26 m²/ inhabitant), in agreement with Law 24/2007. Therefore, degraded lands (the North-West hill of Suceava, slopes, wetlands), graveyards, playgrounds were included in the category of green space.

This approach should be associated with running a complex quasi exhaustive process of inventory and identification for all green areas or having a green/blue potential within urban areas, such as: private and public lands, private and public gardens, pastures, patches of woods, parks or graveyards, public parks, sports facilities, plots of gardens, recreation grounds within urban areas, wetlands located in the city proximity. These two cities under analysis are differently connected in the urban network of the North-East Development Region of Romania (Fig. 2). Although they are both municipal county seats and second-rank cities, they have different regional connections in terms of urban polarization [23], [24]. The difference lies in their synopated evolutions as commercial and administrative centers during the inter-war years of the 20th century, university center (in the case of Iași city) as early as the 19th century, industrial and administrative centers during the centralized period and later commercial, cultural and university cities

(mainly Iași city). Under these circumstances, the last decades have registered an expansion process of the residential function as a natural consequence of the conurbation and gentrification processes. The most expansionary evolutions of the urban residency have taken place at the expense of the “areas of urban breathing” or of the green spaces.

Here are to be noted the so-called workers’ neighborhoods built in the 70th and 80th of the past century in the immediate vicinity of the industrial areas. At the same time, the evolution of the cities has been marked by the expansion of the built-up areas of residential use at the expense of the unincorporated areas. In both cases of expansion of the built-up space, it is notable the fact that the green space has been overlooked. Further, we intend to run a comparative analysis of the green space (Table 2 and 3).

Thus, according to the National Institute of Statistics, in 2018, Iași city owned 696 ha of green spaces (18 square, meters / inhabitant) with the following distribution:

- 428 ha under the administration of the city hall;
- 127 ha under the administration of the Owners-Occupiers Associations;
- 141 ha private property.

Based on the methodology previously suggested, the total green space acquired the area of 2241 ha. Even in this context, out of the 18 neighborhoods analyzed, just 7 of them reach or exceed the threshold level intended by the administration, namely 30 % of area occupied by green space (Fig. 3). These are as it follows: Copou (63 %), Moara de Vânt (54%), Bucium (48%), Aviației (40%), CUG (39%), Galata (38%) and Frumoasa (30%). In the table below we have delivered the detailed values on categories of use, in order to identify the type of green space which caused the high ponderosity. Even if, in terms of social, aesthetic and/ or recreational use, the grass carpets and floral arrangements are important within the city, from an ecological perspective, the parks or patches of woods play an air-purifying role creating a much more comfortable environment.

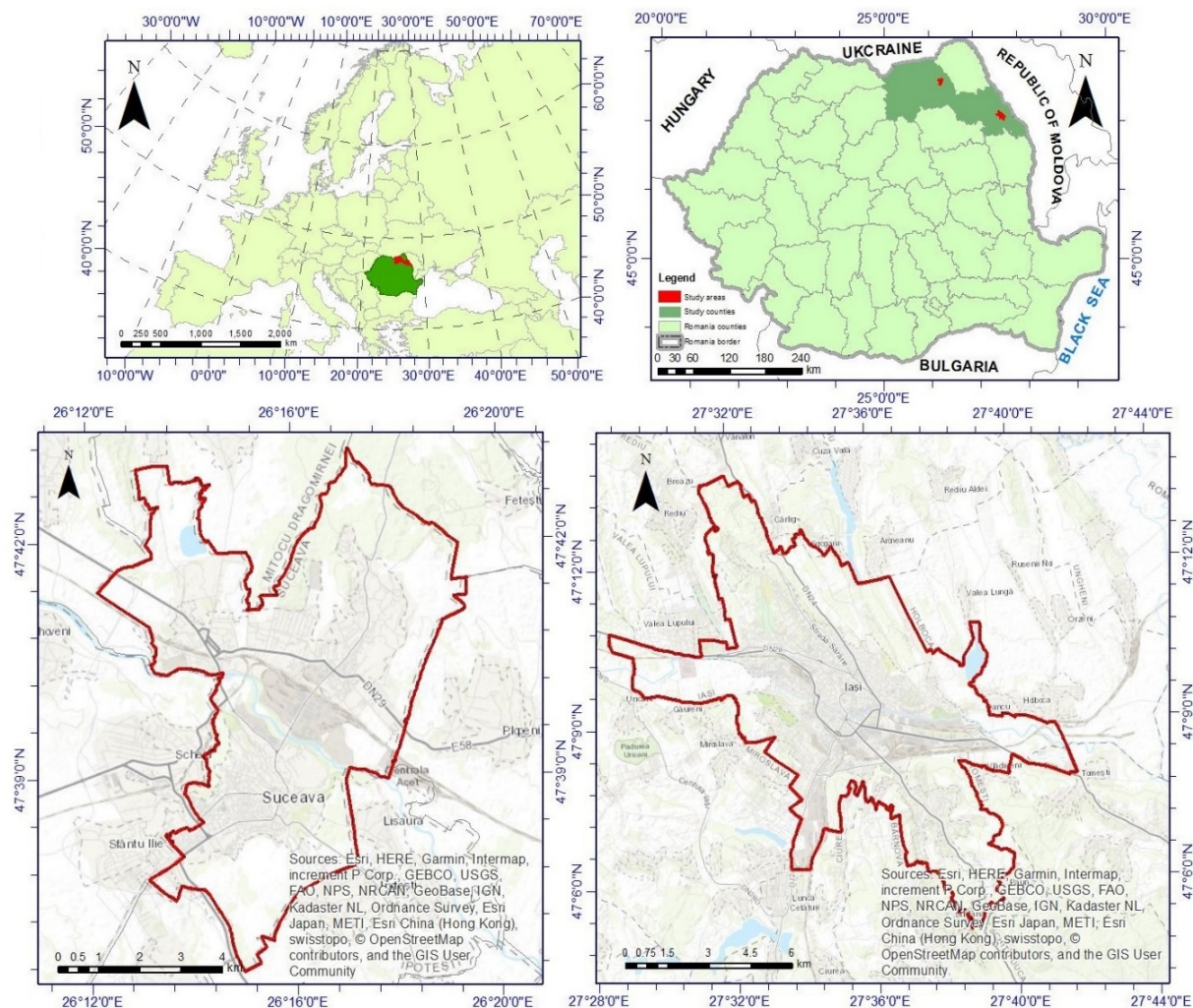


Figure 2. The geographical location of the municipalities Suceava and Iasi.

Table 2 The green space distribution (ha) and weight (%) by neighbourhoods, in Iasi Municipality intra-muros, in 2020

Neighbourhood	Total area (ha)	Green space (ha)	Green space weight (%)
Dacia	371.3	246.3	66.4
Copou	666.6	421.0	63.2
Moara de vant	287.0	156.2	54.4
Bucium	784.7	377.7	48.1
Aviatiei	581.6	230.2	39.6
CUG	276.8	109.2	39.4
Galata	465.4	176.3	37.9
Frumoasa	186.2	56.5	30.3
Pacurari	388.0	84.0	21.7
Zona Industrială	986.3	209.5	21.2
Ticau Sararie	339.7	68.1	20.0
Tatarasi	195.6	28.0	14.3
Nicolina	199.6	27.8	13.9
Mircea cel Batran	68.6	7.7	11.3
Alexandru cel Bun	130.8	14.3	11.0
Centru	229.6	22.0	9.6
Studentesc	85.2	4.5	5.3
Cantemir	65.9	1.7	2.6

Table 3 The main structures of the green space (ha) by neighbourhoods, in Iași intra-muros, in 2020

Neighborhood	Green space structure (ha)													Total
	Cemetery	Grassland	Orchard	Forest	Park	Pasture	Green bark	Stadium/sports field	River meadow /food plain meadow	Recreation ground	Farm	Vineyard	Botanical Garden	
Copou	30,0	0,0	0,0	18,9	35,6	3,0	75,1	4,8	28,0	0,0	4,2	149,2	72,3	421,0
Bucium	2,4	0,0	33,8	86,0	3,2	16,0	77,1	0,0	0,0	0,0	91,8	67,4	0,0	377,7
Dacia	0,0	0,0	0,0	0,0	237,4	0,5	8,4	0,0	0,1	0,0	0,0	0,0	0,0	246,3
Aviatie	0,0	23,6	0,0	175,9	0,0	0,0	0,6	1,1	28,2	0,7	0,0	0,0	0,0	230,2
Zona industriala	0,0	0,0	0,0	10,1	0,0	0,0	159,5	0,2	39,6	0,0	0,0	0,0	0,0	209,5
Galata	18,5	0,0	4,7	65,4	0,9	42,5	43,1	0,0	0,7	0,0	0,0	0,4	0,0	176,3
Moara de Vant	40,6	0,0	1,7	107,1	0,0	0,0	1,4	1,0	1,1	2,8	0,5	0,0	0,0	156,2
CUG	0,0	0,0	0,0	3,2	0,0	0,0	99,8	0,0	6,1	0,0	0,0	0,0	0,0	109,2
Pacurari	0,0	0,0	0,0	0,0	1,9	29,9	51,4	0,0	0,0	0,0	0,0	0,0	0,9	84,0
Țicau-Sararie	0,0	0,0	0,0	44,4	2,5	0,0	21,1	0,1	0,0	0,0	0,0	0,0	0,0	68,1
Frumoasa	0,0	0,0	2,3	17,4	0,0	0,0	12,0	0,0	0,0	0,0	0,1	24,6	0,0	56,5
Tatarasi	0,4	0,0	0,0	0,0	7,1	18,3	2,2	0,0	0,0	0,0	0,0	0,0	0,0	28,0
Nicolina	0,0	0,0	0,0	0,0	3,0	0,0	24,8	0,0	0,0	0,0	0,0	0,0	0,0	27,8
Centru	0,0	0,0	0,0	0,7	21,1	0,0	1,1	0,0	0,1	0,0	0,0	0,0	0,0	22,0
Alexandru cel Bun	0,0	0,0	0,0	0,0	1,9	0,6	11,2	0,7	0,0	0,0	0,0	0,0	0,0	14,3
Mircea cel Batran	0,0	0,0	0,0	0,0	1,4	0,0	6,3	0,0	0,0	0,0	0,0	0,0	0,0	7,7
Studentesc	0,0	0,0	0,0	0,0	0,0	0,0	4,4	0,1	0,0	0,0	0,0	0,0	0,0	4,5
Cantemir	0,0	0,0	0,0	0,0	0,3	0,0	1,5	0,0	0,0	0,0	0,0	0,0	0,0	1,7
Total	91,9	23,6	42,5	529,3	316,1	110,8	600,0	7,9	104,0	3,6	96,6	241,6	73,2	2241,1

All neighborhoods which exceed the 30% threshold of green space have forested areas on their territories. At present, the forested area of Iași city reaches nearly 400 ha, and there are forests/ patches of forests in the following neighborhoods: Copou and Bucium (Breazu forest - 8,5 ha, Munteni - 11,95 ha), Țicău – shooting range (45,63 ha), Țicău – ski slope (48,75 ha) and Ciric (234,68 ha), in the immediate vicinity of Aviation neighborhood. In Copou neighborhood, there are also located the largest parks of Iași city, namely Copou and Exhibition

parks, the Botanical Garden, large vineyards (S.C. Vinifruct - Copou S.A) and “V. Adamachi” teaching farm as well. Moara de vânt neighborhood has recreational spaces and one forest, orchard and farming areas for producing flower propagating material in greenhouses (3100 square meters) and in the field (11,056 square meters). CUG neighborhood hosts a nursery which produces plant propagating material for trees and shrubs (18,32 ha), while Galata district has a forestry nursery (11,7 ha).

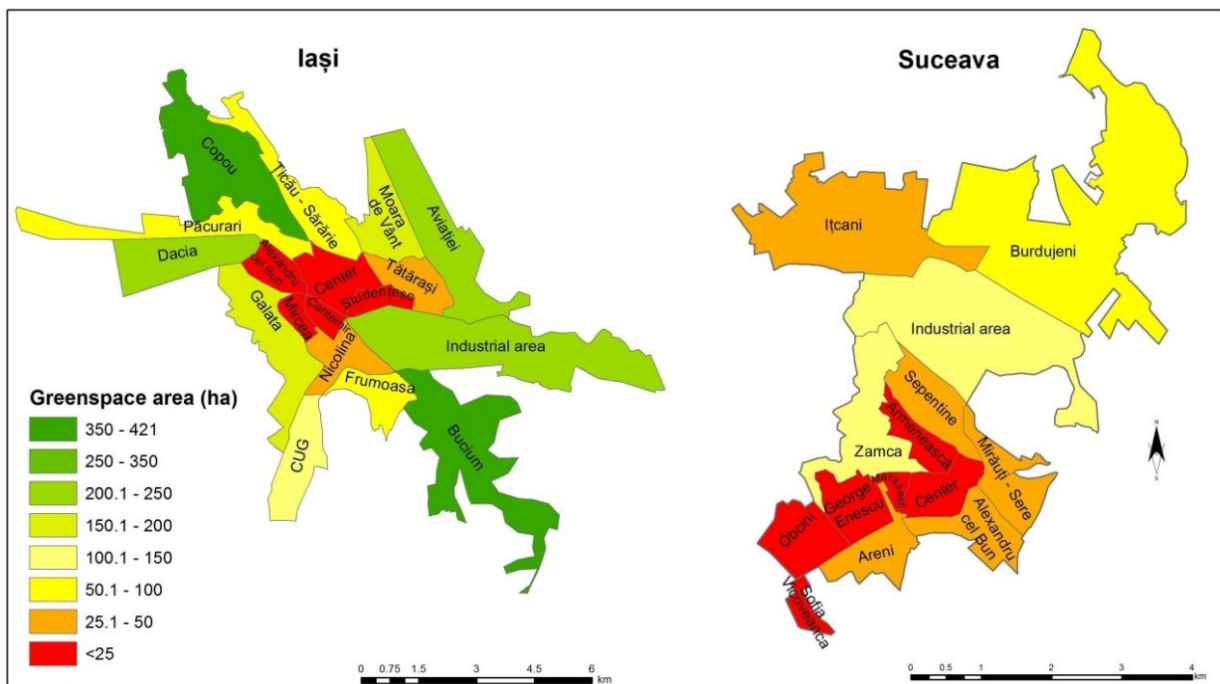


Figure 3. Iași and Suceava municipalities green space distribution by neighbourhoods, 2020

These 30 differently sized parks of the city and the surrounding green strip of forests play an important part in terms of environmental protection by improving the climate and purifying the air and also have a social role as recreational areas for the city's inhabitants.

The smallest areas covered by green spaces are in the following neighborhoods: Student district - Tudor Vladimirescu, Cantemir, City Center, Mircea cel Bătrân, Alexandru cel Bun and partially Tătărași, which have under 10% of green spaces out of the total area, more precisely, each of them has

usually under 10 ha of green space (Fig. 4). Similar to the case of Suceava city, in Iași city this situation is the consequence of a residential urbanism consolidated in the communist period characterized by collective dwellings resembling workers' neighborhoods or crowded student hostels, where green spaces are limited (squares or herbaceous plant alignments). In 2018, according to the National Institute of Statistics and Law 24/2007, Suceava city owned 251 ha of green spaces (20 square meters / inhabitant), with the following distribution:

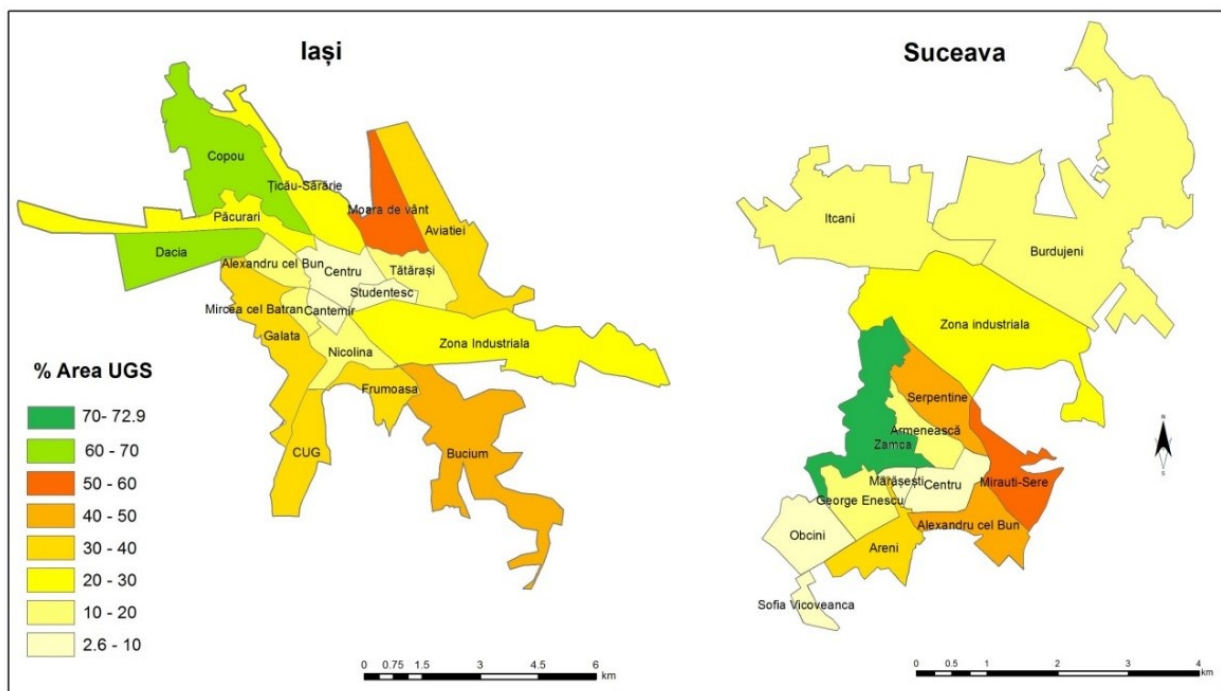


Figure 4. The green space weights (%) by neighbourhoods in Iași and Suceava municipalities, in 2020

- 686.030 square meters – parks;
- 326.475 square meters – squares;
- 241.379 square meters – alignments;
- 1.120.000 square meters – lands (including lands affected by landslides).

Based on the methodology proposed, the green space has totaled an area of 531,26 ha.

Out of the 14 neighborhood analyzed, merely 5 surpassed the 30% threshold of green space in agreement with the methodology of calculus, namely: Zamca (73%), having 116 ha of green space for 160 ha built/ street space, Alexandru cel Bun (43%), Areni (39%), Mirăuți-Sere (54%) and Serpentine (45%). Also, in the case of Suceava city, the neighborhoods which register the highest

percentages of green space are those that have forests: Zamca forest of 105,72 ha (the ownership transfer from Romsilva National Forestry Agency to the municipality administration is expected to happen soon) and Șipote forest (50,56 ha), sharing the same situation as Zamca (Table 4 and 5). Besides the 7 parks of relatively large dimensions, among which stand out Șipote and Zamca, in Suceava municipality emerges a category of limited access green space, such as the green spaces of Hanul Domnesc, Sf. Ioan cel Nou Monastery, Sf. Dumitru church – Princely Court), or green spaces included in the category of forests of landscape interest around the cultural monuments (the forest surrounding the Royal Citadel and Zamca fortress).

All neighborhoods analyzed have agricultural areas on their territories (orchards, pastures or meadows), and some of them are quite large. As seen in the analysis of green space distribution on neighborhoods, there are significant differences between the two cities under scrutiny. In Suceava

city, the most deprived neighborhoods, in terms of green space, were built in the 7th and 8th decades of the past century, namely the workers' neighborhoods: Ițcani (12%), Burdujeni (11,2%), Mărășești (4,5%) and Obcini (4,5%).

Table 4 The green space distribution (ha) and their weight (%), by neighbourhoods, in Suceava Municipality intra-muros, 2020

Neighbourhood	Total area (ha)	Green space (ha)	Green space weight (%)
Zamca	160,0	116,3	72,7
Mirauti-Sere	90,0	48,8	54,2
Serpentine	91,8	40,9	44,6
Alexandru cel Bun	83,2	36,5	43,9
Areni	75,9	29,5	38,9
Zona industrială	398,2	109,1	27,4
George Enescu	72,2	11,9	16,5
Armeneasca	50,0	8,1	16,3
Ițcani	329,6	40,7	12,3
Burdujeni	674,9	75,9	11,2
Sofia Vicoveanca	23,1	2,3	10,0
Centru	66,9	6,5	9,7
Marasesti	15,6	0,7	4,5
Obcini	86,3	3,9	4,5

Intermediate values are recorded by Alexandru cel Bun, Areni and Serpentine neighborhoods (ranging between 30% and 45% of green space). According to the analysis run on a wide-range of areas which can be included on the list of green spaces, Iași city is “greener” than Suceava (Fig. 5), as a natural

consequence of the fact that there are parks of urban heritage (Copou and Exhibition parks) and areas included in the built-up space between Moara de Vânt and Agronomy neighborhoods. The subject brings up contradictory notes and a certain amount of ambiguity in what concerns the official data.

Table 5 The main structures of the green space (ha) by neighbourhoods, in Suceava city intra-muros, in 2020.

Neighborhood	Green space structure (ha)								Total
	Cemetery	Grassland	Orchard	Forest	Park	Pasune	Green bark	Stadium/sports field	
Zamca	0,0	0,0	0,1	111,3	2,0	0,7	2,1	0,1	116,3
Industrial area	0,0	21,6	0,0	27,3	10,8	12,1	37,4	0,0	109,1
Burdujeni	2,4	19,3	2,3	11,5	1,6	29,6	9,1	0,0	75,9
Mirauti-Sere	5,8	9,3	0,0	25,0	3,2	0,1	5,4	0,0	48,8
Serpentine	0,5	16,7	1,8	4,7	1,8	2,5	12,9	0,0	40,9
Ițcani	0,0	12,3	0,4	8,4	3,7	12,7	3,1	0,0	40,7
Alexandru cel Bun	0,8	5,2	13,4	13,0	0,3	1,1	2,7	0,0	36,5
Areni	0,0	8,1	0,2	0,0	1,4	10,8	7,3	1,7	29,5
George Enescu	1,4	0,0	0,0	0,1	6,6	0,0	3,9	0,0	11,9
Armeneasca	0,9	0,1	0,7	0,7	0,0	0,0	5,6	0,0	8,1
Centru	0,0	0,0	0,0	0,0	3,6	0,0	2,9	0,0	6,5
Obcini	0,0	0,0	0,2	0,1	0,2	0,4	3,0	0,0	3,9
Sofia Vicoveanca	0,0	0,6	0,8	0,0	0,0	0,7	0,3	0,0	2,3
Marasesti	0,0	0,0	0,0	0,0	0,0	0,0	0,7	0,0	0,7
Total	7,7	60,4	3,2	176,7	28,4	29,2	68,9	0,1	374,7

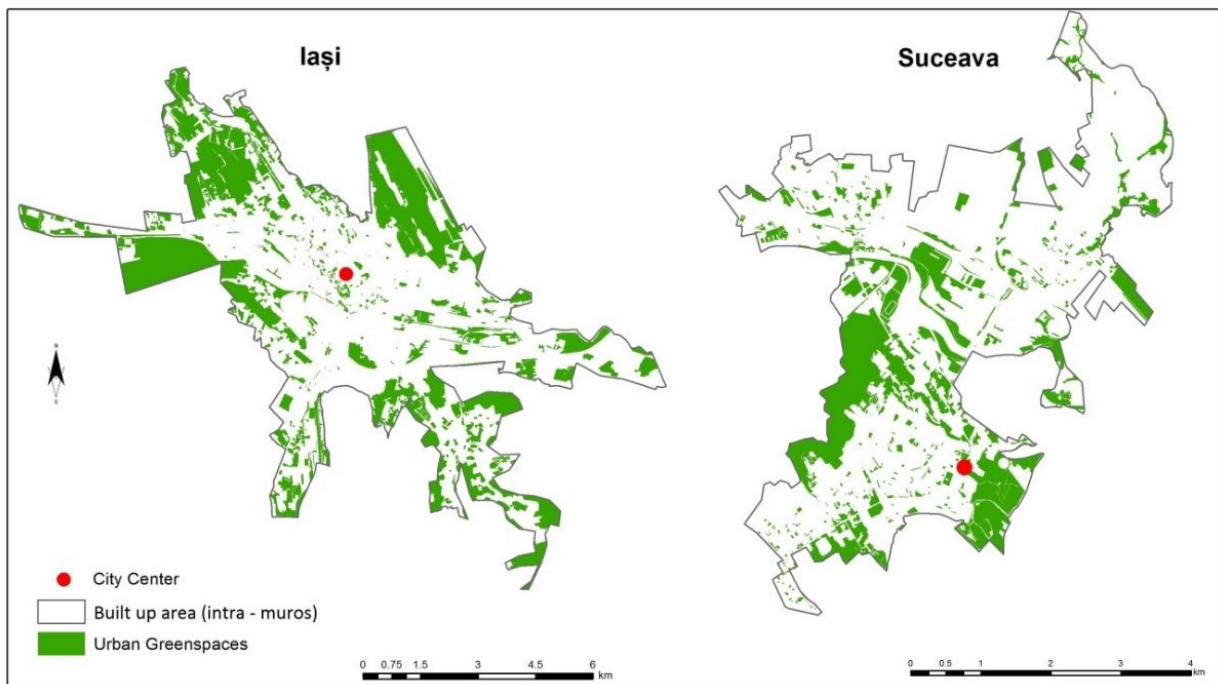


Figure 5. The distribution of the green space in the Iași and Suceava municipalities in 2020.

Although the report should have a unitary nature, the data provided by the specialized offices of the two city halls indicate different values from those reported by the Agency of Environmental Protection as shown by the latest statistics of the National Institute of Statistics. Thus, based on an analysis of the green spaces shown in the Romanian Parliament, Suceava municipality exceeded the EU rules of 2018, by having 27,8 m² of green space per inhabitant, while Iași city

recorded merely 18,6 m²/inhabitant. Quite often, the reporting level varies and it is largely incomplete: on one hand, there is no mention of the neighborhood population in the official recordings, necessary for making an effective analysis of the disparities registered within the city, while, on the other hand, the calculation of the relevant indicator took into account, most likely, the total population of Suceava city according to the official census done in 2011.

CONCLUSIONS

The presence of green spaces in the more and more crowded cities is both a challenge and a necessity. Regardless of the countless economic, social, aesthetic and cultural functions a city possesses, it needs to breathe. The presence of plants and green spaces is a vital element for the city's metabolism. In the past few years both cities under scrutiny have been under the siege of investments and real-estate developments caused by the population growth in urban area, economic development and running European funding programmes for improving the road infrastructure.

- In conclusion there are some common elements distribution of green areas in the two cities:
- Both cities include former industrial areas, that have undergone an urban conversion process, where the green spaces exceeding 20%;
- The forests at the border of the cities determine

a large increase of green spaces in the neighboring neighborhoods, without these necessarily bring added comfort to them or to the inhabitants, due to them not arranging/territorial planning as forests parks, prks or recreational areas (Zamca, Șipote, Galata, Frumoasa etc.)

- The surfaces with agricultural role do not enter the inventory of the green space registers (Sărărie -Țicău, CUG, Ițcani, Burdujeni Sat);
- The largest and most important weights of green spaces are located in the neighborhoods with heritage parks (Copou neighborhoods in Iași, Zamca and Center in Suceava).

The comparative analysis of the green spaces has aimed their quality and availability in the cities of Iași and Suceava, both located in the North-East Development Region of Romania. The research

has been made by analyzing the degree of fragmentation, area, connectivity of green spaces, accessibility and their integration in the relation between the built-up and outside the built-up areas. These data are provided by the land consolidation method of the green spaces associated with the parks of Iași and Suceava: the recreation area of Tătărași, the soon-to-be Șipote park or Zamca forest, have significant areas of green spaces for Suceava city, although they have a limited level of connectivity.

From a cartographic and statistical analysis perspective as well, both cities register a high degree of green space fragmentation in the former workers' neighborhoods and partially in the central areas, mostly in the case of Iași. The compactness of the green spaces is visible in the forests or peripheral forests and parks of Suceava. The poor connectivity is present in the peripheral areas of the built-up spaces of Suceava. The quality of green spaces comprises features related to the existing ecosystems through the diversity of the species. Most urban ecosystem structures in the analyzed built-up areas are corresponding with the areas of planted or second vegetation, preserve varieties of trees and shrubs planted and, seldom, parts of the old forests which adjusted well to the polluted

urban environment, such as linden and chestnut trees (Iași) or a blend of pine trees and hornbeam, elm, maple, acacia and beech trees in the forest patches of Zamca and Șipote located in Suceava. The accessibility of green spaces has taken into account the recreation and leisure areas, such as Ciric (Iași), Ștrand (Public Swimming Pool) and Șipote (Suceava) and the access facilities to the parks. The parks of both cities are generally accessible. However, if we consider the dimensions of the two cities, there are neighborhoods located beyond the isochrone of half an hour in terms of public means of transportations for the inhabitants of the former workers' neighborhoods (for instance, CUG, Nicolina, Galata). Their degree of attractivity is increased by organizing various cultural, artistic and entertainment events in the parks associated with these districts. The analysis of the green space use has aimed the social, sports and recreational activities, walks, and also the cultural features, jobs or urban economy. Given the size and connectivity of the green space within Iași city, it is our opinion that they are better used than the green spaces of Suceava city due to the actions run in Copou and Exhibition parks and the Botanical Garden, which is the largest garden of the sort in the country and one of the largest in the Eastern Europe as well

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¹ In the case of the two forest areas, the City Hall of Suceava is currently in a final stage of transferring these areas (as protection forests) from the administration of the Environment Ministry to the public domain of local administration. By this transfer, Zamca forest and Șipote area will be regarded as recreational forests or urban parks. Our analysis has already considered them within the urban space of Suceava, given the agreement reached with the Ministry of Environment, Water and Forests.

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