BIOLOGICA NYSSANA
DOI: 10.5281/zenodo.200408
7 (2) • December 2016: 113-124 12th SFSES • 16-19 June 2016, Kopaonik Mt

Original Article

Received: 30 October 2016
Revised: 01 December 2016
Accepted: 07 December 2016

Floristic Investigation of the "Grand Park of Tirana" with regard to urban indicators

Ajola Mesiti, Liri Dinga

University of Tirana, Faculty of Natural Science, Research Center of Flora and Fauna

** E-mail: ajola_mesiti@yahoo.com*

***Abstract*:**

Mesiti, A., Dinga, L.: ***Floristic Investigation of the "Grand Park of Tirana" with regard to urban indicators. Biologica Nyssana, 7 (2), December 2016: 113-124.***

The paper presents a floristic investigation undertaken in the urban "Grand Park of Tirana" in three years' period (2012 – 2015). The purpose of this study is to give floristic data and distribution of spontaneous plant species which occur in "Grand Park of Tirana" and determine and analyze their urban indicators. Spontaneous flora of the park contains 240 species of vascular plants from 179 genera and 54 families. Among the families the most dominants in species are the Poaceae (30 species), Fabaceae (24) and Asteraceae (21). The analysis of life-form spectra shows that the dominant life form is the hemicryptophyte. The urban indicators analysis shows that the "Grand Park of Tirana" is characterized by a high number of urbanophobic species, which mean that the park has still particular natural places.

Key words: urbanity, urban park, anthropotolerance, urban ecology

***Apstrakt*:**

Mesiti, A., Dinga, L.: ***Floristička istraživanja "Grand parka Tirana" u odnosnu na urbane indikatore. Biologica Nyssana, 7 (2), Decembar 2016: 113-124.***

U radu su prikazana floristička istraživanja sprovedena u urbanom "Grand parku u Tirani" i trogodišnjem period. Cilj studije je bio da se daju floristički podaci i distribucija samoniklih biljnih vrsta koje se javljaju u "Grand parku u Tirani" i da se odredi i analizira njihova urbana indikacija. Samonikla flora parka sadrži 240 vrsta vaskularnih biljaka iz 179 rodova i 54 familije. Među familijama najdominantnije vrstama su Poaceae (30 vrsta), Fabaceae (24) i Asteraceae (21). Analiza spectra životnih formi je pokazala da je dominantna životna forma hemikriptofita. Analiza urbanih indikatora pokazuje da je "Grand park u Tirani" okarakterisan velikim brojem urbanofobnih vrsta, što ukazuje da park još uvek ima prirodnih površina.

Key words: urbanizacija, urbani park, antropotolerancija, urbana ekologija

Introduction

Urban parks are defined as delineated open space areas, mostly dominated by vegetation and water, and generally reserved for public use. Urban parks are usually locally defined (by authorities) as "parks" (Konijnendijk et al., 2013). If they are well organized and maintained, they serve the city in different ways.

The process of urbanization, has profoundly changed the landscape, and created new environmental conditions for plants (Sukopp,

1973; Sukopp & Werner, 1983). Two-third of all Europeans now reside in towns or cities (Girardet, 1992; EEA, 1998) and recently aspects such as "amount of public green spaces per inhabitant", "public parks" and "recreation areas" are often mentioned as important factors to make the city livable, pleasant and attractive for its citizens, which makes them one of the indicators of sustainable cities (Chiesura, 2004).

Beside the direct impact on the environment such as noise reduction, air purification, microclimate stabilization, parks benefit the city life quality and fulfill other important human need. Social capital is created in parks. The parks ensure a place where people can meet together, interact with each other in a shared environment (Kuo et al., 1998). A well-organized park system contributes in the citizen's health. Certain areas for jogging, playing or bike lanes or areas to walk pets provide the possibilities to make an active lifestyle (Schroeder, 1991). Natural capital is preserved in parks. The parks are not only recreation spaces, but natural sustainable structures which affect the evaluation of nature by inhabitants. Urban parks are also attraction to tourists (Konijnendijk et al., 2013), as an example we can mention the "Central Park of New York". According to Crompton (2001), it is well known that urban parks affect the prices of the real estate and buildings around them, which is true in Tirana for the areas nearby "Grand Park of Tirana".

The arguments mentioned above, are strong reasons which have attracted scientists interest to study urban parks (Chiesura, 2004; Ignatieva & Konechnaya, 2004; Nielsen et al., 2014 etc.). The first comprehensive studies of flora of urban ecosystems started in the 1970′s (Falinski, 1971; Sukopp, 1973 etc.), and then continued (Sukopp & Werner, 1983, Wittig et al., 1985; Kowarik, 1990). Nowadays deep studies of flora on Urban Habitats, mostly in Central and Northern Europe, are carried out (Sukopp, 2002; Kuhn et al., 2003; Bomanowska & Witoslawski, 2008; Moraczewski & Sudnik-Wojcikowska,, 2007 etc.), more recently they are undertaken also in South Europe, in Italy (Bianco et al., 2003; Celesti-Grapow et al., 2006; Buccheri & Martini, 2015), Croatia (Milović & Mitić, 2012; Alegro et al., 2013), Bosnia and Herzegovina (Maslo, 2014), Serbia (Jovanović, 1994; Stavretović & Jovanović, 2010), Montenegro (Stešević & Jovanović, 2008; Stešević et al., 2009, 2014) and Greece (Chronopoulos & Christodoulakis, 1996, 2000), and such interest is spread all over the World (Moore et al., 2003; Zanin et al., 2005 Loeb, 2006 etc.).

In Albania, this study in "Grand Park of Tirana" represents the first scientific work on floristic investigations in urban parks. Till now, the only publications related to the study area are some memories of agronomists who worked during and after the construction of the park (Nishani, 2007; Nishani & Mëziu, 2013). The other publication is focused on natural ecosystems and they are very few, such as "Flora of Tirana" (Paparisto et al., 1962), PhD thesis "Vlerësimi i biodiversitetit floristik e fitosociologjik i Parkut Kombëtar (i propozuar) të Dajtit" (Kalajnxhi, 2006).

The goal of this study was to give floristic data and distribution of native plant species which occur in "Grand Park of Tirana", and determine and analyze their urban indicators.

If considered that "Grand Park of Tirana" represents the only one of its kind in the country the study takes even more importance. Additionally, current political developments give priorities to urban parks construction in other cities in the frame of urban development, thus this paper would support policies on further management of these areas.

Material and methods

Study area

The Grand Park was built in the autumn of 1958 on the southern hills of the Tirana city with a total surface of 350 ha (Nishani & Mëziu, 2013) and on existing area of vegetation. On the other hand, within this territory was also built the "Artificial Lake of Tirana" with a surface of 48 ha. Here were planted thousands of trees, shrubs and herbaceous ornamental plants, such as *Fraxinus ornus*, *Acacia dealbata*, *Ligustrum* sp., *Cupressus sempervirens*, *Laurus nobilis*, *Pinus* sp. etc. (Nishani, 2007). It used to be the most important event of those years. Inside the Grand Park are built many facilities like Summer Theater, memorial center, artworks which settled this area as true urban park. Nearby the park, it is found also the "Presidential Palace Park" which is surrounded by walls and it is allowed to be frequented by the city inhabitants.

Over the last decades, Tirana's urban areas have expanded, "swallowing" from farmland and forests. Therefore, with the green areas decrease, the Grand Park of Tirana has become the more frequented and consequently affected by the anthropogenic pressure, due to the lack of management and the over exploitation by its inhabitants. It is surrounded by roads with high traffic, inhabitant's buildings, urban waste especially from restaurants and other recreational centers that

Fig. 1. Geographical position and the boundaries of the Grand Park of Tirana

are around the park. Nowadays, the "Grand Park of Tirana" has an area of about 250 ha (**Fig. 1**).

The climatic conditions are related with the hilly lowland relief. The climate is classified as Mediterranean climate with a wet winter and a warm and dry summer. Of particular importance are the amplitudes of the higher annual average temperatures ranging from 15 to 22 ^{0}C in summer to below zero in winter (K a b o , 1990).

Vegetation of the study area

The "Grand Park of Tirana" is situated in an existing vegetation, which is still present nowadays. Therefore, it makes this park a hybrid construction, composed by the native flora and the cultivated one. Anyway the native vegetation where the park was build is the vegetation around the Tirana city. In these areas mainly prevails the natural vegetation of Mediterranean shrubs. It is represented by the alliance *Quercion ilicis* Br.-Bl. ex Molinier 1934 (Ass. *Orno-Quercetum ilici*s Wald.), but in the flysch slopes it degrades towards *Erico-Arbutus unedo* community (H o r v a t et al, 1974).

On the upper altitudes, Tirana city is surrounded by thermophile oak forests (*Quercetalia pubescentis* Br.-Bl. 1931), mainly of the alliance of *Quercion confertae*, and in the degraded places is represented by the alliance *Carpinion orientalis* Horvat 1958 (K a l a j n x h i , 2006; H o r v a t et al., 1974).

Afforestation has influenced the park too. Within the park is planted a small forest with *Pinus halepensis* Mill., and it is created the street of 1000 Cypress trees (*Cupressus sempervirens* L.).

Floristic analysis

This analysis was based on application of the following procedures: 1) literature review, 2) collecting field data (**Fig. 2**), 3) mapping of the species distribution using ArcMap 10.1 (Environmental Systems Research Institute, New York, NY, USA); 4) analyzing components of flora, life form, chorology and urban indicators (urbanophobic, urbanoneutral, urbanophilic).

Our floristic investigation was conducted within the period 2012-2015 and the records were carried out for all the year (for some winter species), but most of the excursions were carried out during flowering seasons (from April to October).

The main information of ecological plant groups (pine forest, oak forest, meadows, wetland) was derived by interpreting aerial photographs. The total area surface was divided into quadrants (300x300 m) (**Fig. 2**). It was used as layers, topographic maps of Tirana at a scale 1:10000 from 1957 and 1990 year, GIS format shapefile map of the "Grand Park" at a scale 1:1250, and 9 aerophotogrammetric maps, which were obtained from the State Archives Building. The coordinative system used for the cartography was WGS, 1984.

Field data collection was mainly based on floristic registration, GPS data recording with Garmin software, photography and the unknown species were preserved in the Herbarium. Taxonomic identification was done by using the determination Key Books such as: "Flora e Shqipërisë" (P a p a r i s t o et al., 1988-2000), "Flora ekskursioniste e Shqipërisë" (D e m i r i , 1983), "Flora Europea" (T u t t i n et al., eds., 1964-1980), "Udhëheqës fushor i florës së Shqipërisë" (V a n g j e l i , 2003, 2015) and different international plant databases such as Plant List and Biolflor (www.theplantlist.org, www.biolflor.de).

Life form classification was defined according to the Raunkiaer system (E l l e n b e r g & M u e l l e r - D o m b o i s , 1967) and for the conservation status of plants it is used the IUCN proposed system (W a l t e r & G i l l e t ., 1998) and the National Red List of Wild Flora and Fauna (A n o n y m o u s , 2013).

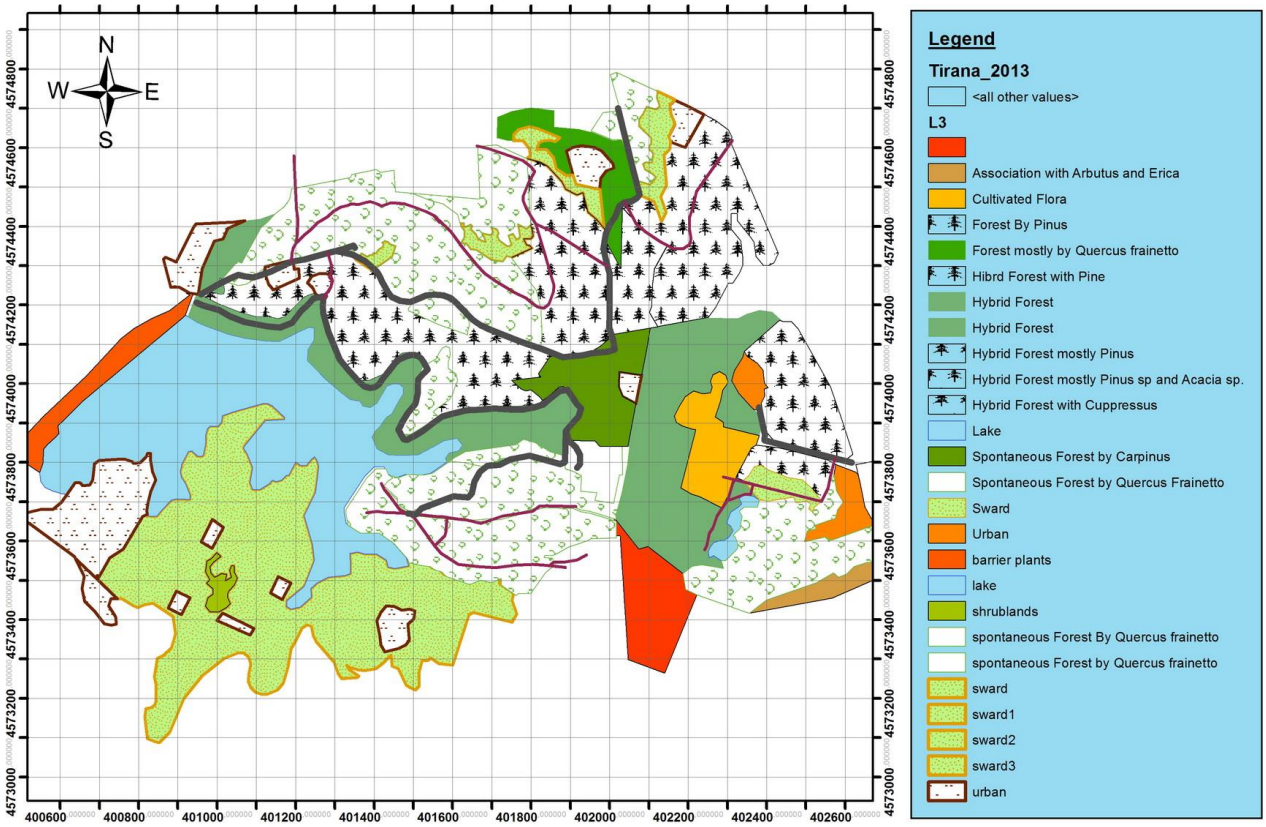

Fig. 2. Subdivision of the ecological groups of "Grand Park of Tirana" into quadrants

The plants species nomenclature was defined according the new system by EURO+MED Plant Database (ww2.bgbm.org).

According to Sukopp & Werner (1983), the number of taxa of vascular plants in urban floras is determined by a series of factors: geographic positioning, climatic conditions and the possibility for the immigration of species. The flora of the park is analyzed based on confronting personal observation with literature data (Wittig et al., 1985; Ignatieva & Konechnaya, 2004; Buccheri & Martini, 2015; Stešević et. al., 2014). It was studied according to the anthropotolerance and following urban indicators:

a. Urbanophilic plants (UPHI)—species that prefer human-disturbed or human-altered habitats. They can be subdivided into extreme urbanophilic (UPHI=5) and moderate urbanophilic (UPHI=5)

b. Urbanoneutral plants (UN)—species that can grow in undisturbed natural habitats as well as in human-disturbed habitats,

c. Urbanophobic plants (UPHO)—species that avoid human-altered urban habitats. They can be subdivided into extreme urbanophobic (UPHO=1) and moderate urbanophobic (UPHO=1)

According to the theory of Universal Adaptive Strategy (Grime & Pierce, 2012) we identified the ecological strategy of the park native species.

Results and discussion

From our floristic investigations in this study, we could identify 240 species of spontaneous vascular plants in the "Grand Park of Tirana" which contains from 179 genera and 54 families. This paper has not been analyzed the cultivated flora of the park, which makes 40% of the total number of plant species (Mesiti et al., 2015), because it is quite difficult to analyze their urbanity indicators, since most of them are planted randomly in the area of study. It would need further studies to see the attitude of the cultivated flora in the future. Also we excluded the species which we could not determine the urbanity indicators because of insufficient literature or recorded data. The entire study of park's flora is an ongoing process, with determining unknown species and urban indicators.

The spontaneous vascular flora of the Park is 15% of the "Flora of Tirana" (Paparisto et al., 1962). The dominant families in species are Poaceae (30 species), Fabaceae (24 species), Asteraceae (21 species), Brassicaceae (15 species), Lamiaceae (13 species), Ranunculaceae (11 species), Liliaceae (10

Table 1. Presence of plant families in spontaneous flora of the "Grand Park of Tirana" (N – Number of species)

Family	N	Family	N
Poaceae	30	Portulacaceae	2
Fabaceae	24	Oxalidaceae	2
Asteraceae	21	Ericaceae	2
Brassicaceae	15	Papaveraceae	2
Lamiaceae	13	Araceae	2
Ranunculaceae	11	Araliaceae	2
Liliaceae	10	Typhaceae	2
Caryophyllaceae	8	Urticaceae	2
Scrophulariaceae	8	Malvaceae	2
Rosaceae	6	Betulaceae	2
Boraginaceae	6	Hyppericaceae	1
Rubiaceae	5	Solanaceae	1
Geraniaceae	5	Chenopodiaceae	1
Caprifoliaceae	4	Cornaceae	1
Fagaceae	4	Apocynaceae	1
Apiaceae	4	Ulmaceae	1
Convolvulaceae	4	Rutaceae	1
Euphorbiaceae	4	Aristolochiaceae	1
Aceraceae	3	Plantaginaceae	1
Poligonaceae	3	Corylaceae	1
Salicaceae	3	Platanaceae	1
Polypodiaceae	2	Dioscoraceae	1
Gentianaceae	2	Equisetaceae	1
Primulaceae	2	Verbenaceae	1
Oleaceae	2	Violaceae	1
Iridaceae	2	Linaceae	1
Orchidaceae	2	Lythraceae	1
		Grand Total	240

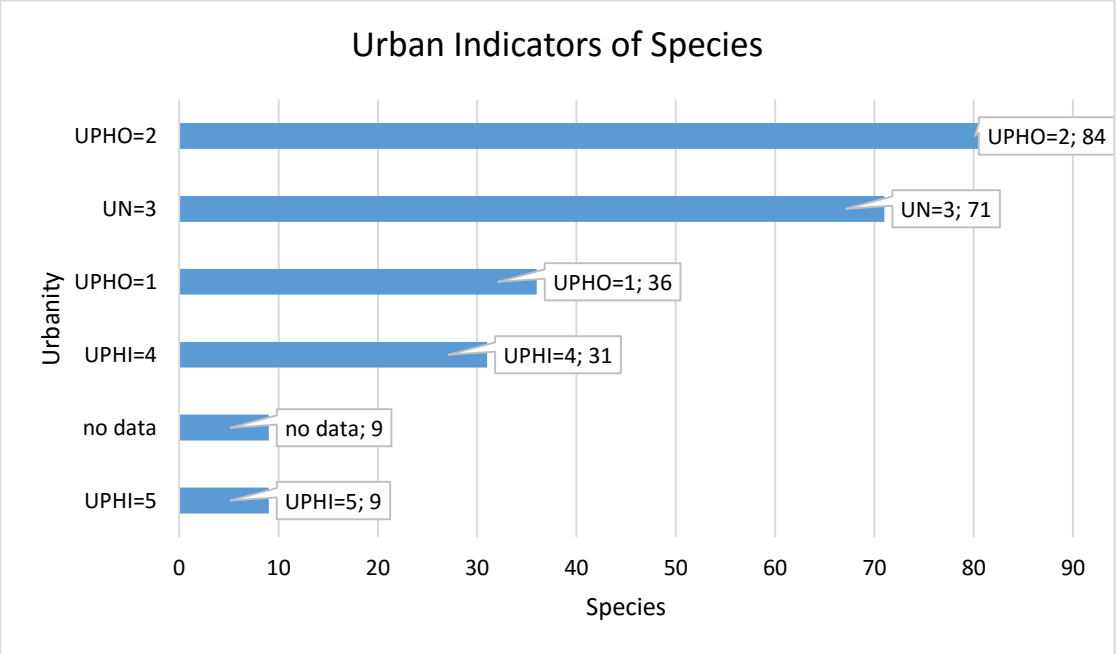

Fig. 3. Analysis of the Urban Indicators of species

species). Also there is a variety of families represented by small number of species (**Tab. 1**).

Various genera in the study area give their contribution to the park natural floristic resource. Among them, 142 genera are represented with only 1 species, 22 genera are represented with 2 species, 10 genera are represented with 3 species, 3 genera are represented with 4 species, 1 genera (*Geranium*) is represented with 5 species and 1 another (*Trifolium*) is represented with 7 species. By analyzing the floristic list, it is noticed in a high frequency the plants such as: *Plantago major* L., *Trifolium repens* L., *Poa annua* L., which are indicators of a high human disturbance such as mowing, trampling and constructing.

In order to analyze the urban impact in the plant list, it was carried out the urban indicators for the native plants species of the park, which is shown in (**Fig. 3**).

From analyzing the urban indicators, it is clearly shown in the table above that the moderate urbanophobic (UPHO=2) species prevails from the others and they are 84 species. The moderate urbanophobic species or Mäßig urbanophobe Arten, usually are placed externally to the urban area, but however, do not fail to penetrate toward the city, along rivers or green corridors (azonal distribution) (Buccheri & Martini, 2015). The moderate urbanophobic species in the "Grand Park of Tirana" are: *Anemone apennina* L., *Anemone hortensis* L., *Asparagus acutifolius* L., *Briza maxima* L., *Clematis flammula* L., *Cyclamen hederifolium* Ait., *Marrubium vulgare* L., *Pteridium aquilinum* (L.) Kuhn, *Typha latifolia* L., etc. In addition, within the park exist a considerable amount of extreme urbanophobic species which are 36 species. One of the strong reason why the urbanophobic species are in a high number is because of the "Presidential Palace" park presence, which is forbidden for the public entrance therefore it serves as a shelter for most of the urbanophobic species (Mesiti et al., 2015). Some of the extreme urbanophobic species are: *Colchicum autumnale* L., *Carex flacca* Schreb, *Muscari racemosum* (L.) Mill, *Ononis spinosa* L., *Orchis laxiflora* Lam., *Teucrium chamaedrys* L., etc.

Meanwhile, as it is shown in the map of distribution the urbanophobic plants (**Fig. 4**), most of them are in the peripheral areas of the park, at the most spontaneous ecological groups such as: under oak forests, meadows, in the shrub community of maquis, hornbeam forests and on the lake shore. But it is clearly noticed that some spots are very near with the main roads of the park where the human influence is very high. This is due to the presence of some semi natural or hybrid habitats in different parts of the park. Studying the ecological strategy of the urbanophobic species it results that almost 58.2% of them tend to adapt in semi natural habitats, because of their competitor feature. Also, 40.8% of urbanophobic taxa are stress tolerant, which mean that they can leave in areas with high intensity of stress. They respond environmental stress with physiological variability (Grime & Pierce, 2012). Such species are found in the park and we can mention: *Origanum vulgare* L., *Phragmites australis* (Cav.) Steud, *Rumex acetosella* L., etc.

As it was expected, the urbanoneutral is the second indicator richest in species, with 71 species and they are spread all over the park, without showing any special patterns for their distribution (**Fig. 5**). These plants have a large specter of distribution, because of their ecological features such as: stress-tolerant species (21%) and competitors (33%). But, most of them are ruderal species (46%) and that is a valuable feature which permit them to adapt into various areas of the park. The urbaneutrale species maintain an indifferent attitude toward nutrients, water or sunlight. Their presence clearly show that the park is under various forms of pressure. Typical urbanoneutral species found during the floristic investigations are: *Achillea millefolium* L., *Alopecurus utriculatus* (L.) Pers., *Capsella bursa-pastoris* (L.) Medik., *Dactylis glomerata* L., *Echium vulgare* L., *Euphorbia helioscopia* L., *Fumaria officinalis* L., *Geranium molle* L., *Hedera helix* L., *Lolium perenne* L., *Myosotis arvensis* (L.) Hill., *Plantago lanceolata* L., etc.

The urbanophilic parameter is the third urban indicator that was analyzed. In the park 40 urbanophilic species were carried out. As it is presented in the distribution map (**Fig. 6**), these species are found mostly on the park main street border. This street serves as promenade for the park and it the most frequented area, for different recreation activities. It starts from the northern part of the park and it crosses the entire park area, till southern part of the park. The urbanophile vascular plants found nearby this area, are competitors (37.5%), mostly ruderal plants (40.5%), and the rest are stress-tolerant plants (15%). These species gradually decline from the main street toward the periphery. Any spot presented in the map is correlated with more than one urbanophilic species. Some of the Urbanophilic species found in the park are: *Cymbalaria muralis* G. Gaertn., B. Mey. & Scherb, *Rapistrum rugosum* (L.) All., *Xanthium spinosum* L., *Verbena officinalis* L., *Mercurialis annua* L., etc.

During our determinations it resulted for some species the urban indicators differ from those one given in the literature. Thus, according to the literature we can mention urbanophilic species such

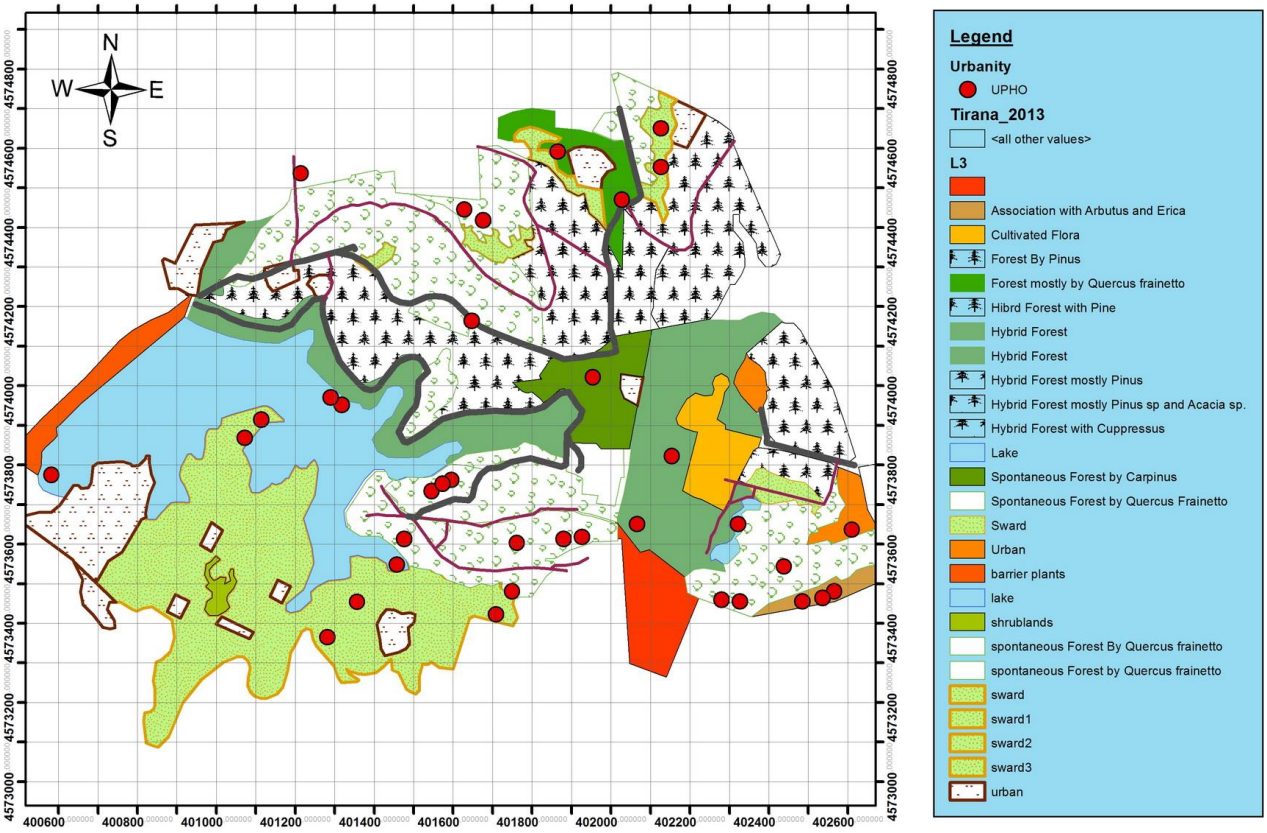

Fig. 4. Distribution map of the urbanophobic species in the Park

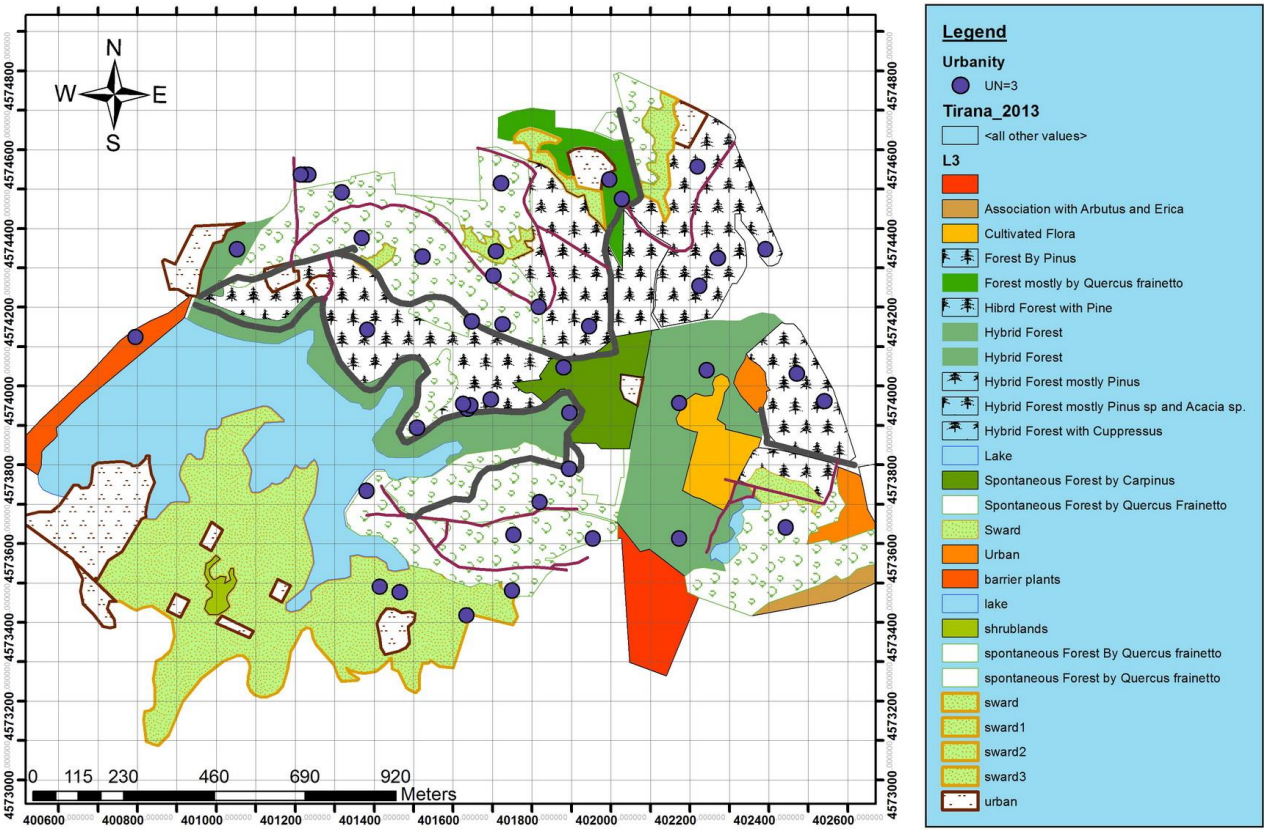

Fig. 5. Distribution map of the urbanoneutral species in the Park

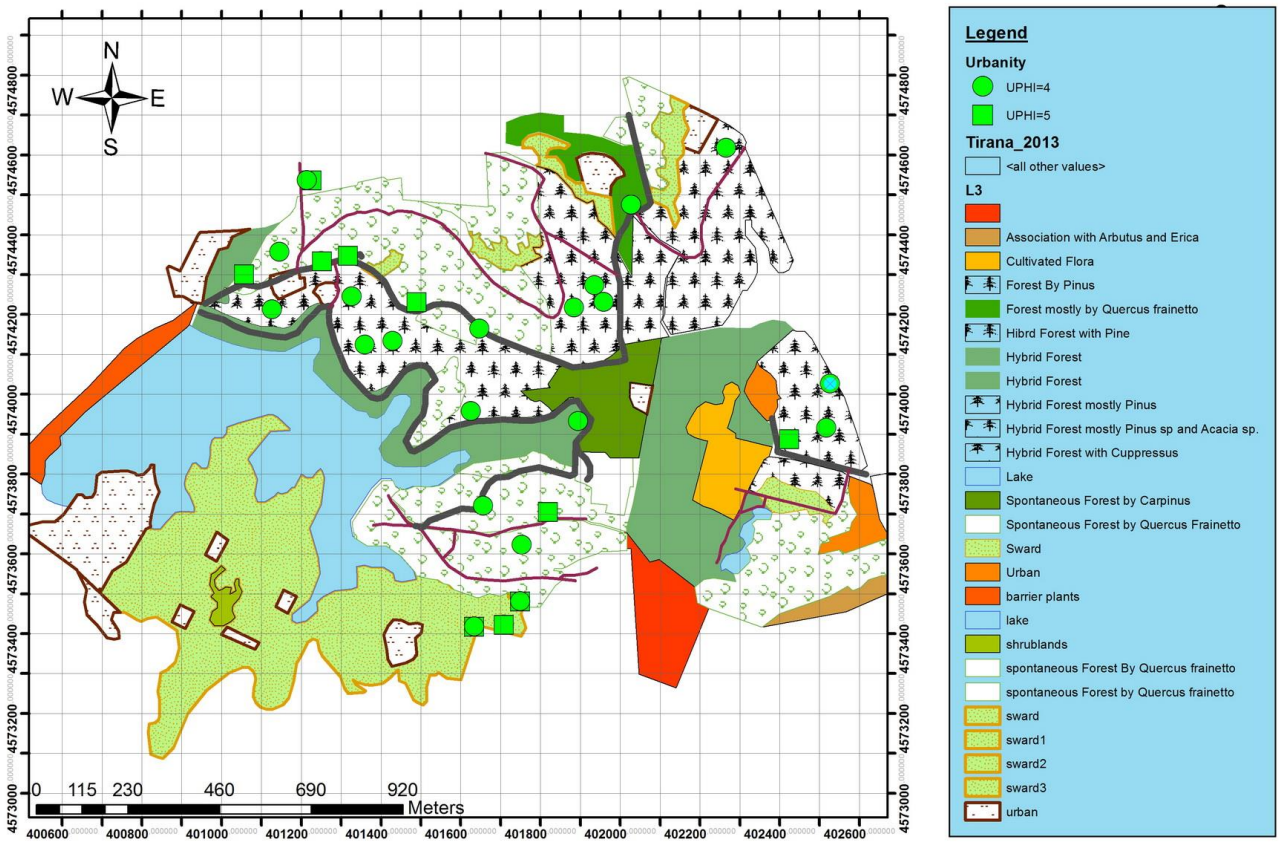

Fig. 6. Distribution map of the urbanophilic species in the Park

as, *Bellis perennis* L., *Malva sylvestris* L., *Medicago arabica* (L.) Huds etc. that in the literature (Stešević et al., 2014) are considered urbanoneutrale but in the park were found in altered habitats. This means that most of the park is very disturbed by various anthropogenic and urban factors so the species have been adapted to thus changes. But anyway, the study of urban indicators is an ongoing process. The management of the park is changing and now it is part of the Agency of Parks and Recreation. Therefore new analysis will be carried out for the spontaneous plants of this park.

Based on the park floristic list it was analyzed the plants life form. The analysis of the life forms shows that the dominant form is the Hemicryptophyte (82 species), followed by the Therophyte (72 species), Phanerophyte (40 species), Geophyte (37 species), Chamephyte (8 species) and Nanophanerophytes (1 species). The prevalence of the therophytes is due to the high urban disturbances in the park, and the presence of the geophytes in an urban area, is mentioned as a characteristic of Mediterranean cities (Stešević et al., 2014).

The life form analysis demonstrates the plants ecological suitability, therefore it is given a correlation between the life form spectrum and urban indicators (**Tab. 2**). For the study facility and to be understood better the correlation of the life forms and urban indicators, we have joined the urbanophobic subdivisions into one (UPHO=1+UPHO=2). The same was done for the urbanophilic subdivisions.

Table 2. The life form analysis of the species in "Grand Park of Tirana"

	Urban Indicators				
Life forms	**no data**	**UPHI**	**UN=3**	**UPHO**	**Total**
Nanophanerophyte			1		1
Chamephyte		2		6	8
Geophyte		4	8	24	37
Phanerophyte	1	9	12	18	40
Therophyte	4	11	28	29	72
Hemicryptophyte	4	14	21	44	82
Grand Total	**9**	**40**	**71**	**120**	**240**

It is clearly related that the large number of urbanophobic species is due to the large number in species of hemicryptophytes, therophytes and geophytes. The high number of hemicryptophyte urbanophobic species derives from the natural areas found in the southern-eastern part of the park such as: oak forest and hornbeam forest, where the urban

Table 3. Correlation of the chorotypes and the urban indicators

	URBAN INDICATOR				
Chorotypes	**no data**	**UN=3**	**UPHI**	**UPHO**	**Total**
European-Mediterranean	**1**	**7**	7	19	34
Mediterranean	**3**	**5**	4	21	33
Paleotemperated		**6**	3	12	21
Circumboreal		**5**	1	7	13
Eursiber		3	2	3	8
Sub-Mediterranean			0	1	1
Subcosmopolitan		**5**	2	6	13
European		2	2	4	8
Central-European			0	4	4
Eurasian		5	2	9	16
North Mediterranean			0	3	3
Euroasian-Subcosmopolitan		1	0	1	2
Sub-Balkanic			2	2	4
South East European		1	2	4	7
Subendemic		1	0	1	2
South Center European			0	1	1
European-Caucasian		4	1	6	11
South European			1	3	4
Paleotemperated and subtropical		3	0	0	3
East Asian	1		0	0	1
Pontic		1	0	0	1
South East European and Pontic		1	0	1	2
Mediterranean and Central Asian		2	1	0	3
South East European and South Siberian			0	1	1
North American		1	1	0	2
Balkanic	2	1	1	3	7
Paleotemperated and Cosmopolitan		1	0	0	1
Central American	1		0	0	1
European and Western Asian		1	0	0	1
Submediterranean and Subatlantic		2	0	0	2
Mediterranean and Atlantic			1	1	2
n/a	1	1	0	0	2
East Mediterranean		1	1	1	3
Western European		1	0	0	1
North East Mediterranean		1	0	0	1
Center European and Caucasian			0	1	1
East Asian			0	1	1
East European and Caucasian		1	0	0	1
Paleotemperated and tropical			1	1	2
North American and East Asian		1	0	0	1
Asian			1	0	1
Cosmopolitan		6	2	2	10
South East Asian		1	0	0	1
Artic			0	1	1
South American			1	0	1
Euro Mediterranean and Pontic			0	1	1
Grand Total	**9**	**71**	40	120	240

pressure is lower, and because of the presence of "Presidential Palace", which we mention above, the anthropogenic presence is forbidden. The therophytes assign the urbanoneutral type. Meanwhile the urbanophilic type is represented by almost all the life forms at the same way but mostly by hemicryptophytes and the therophyte.

The phanerophyte type are very important for the park, because they compose the spontaneous forest of the park. Most of them are urbanophobic and urbanoneutral species such as: *Quercus frainetto* Ten., *Carpinus orientalis* Mill., *Arbutus unedo* L., *Erica arborea* L., *Fraxinus ornus* L., etc.

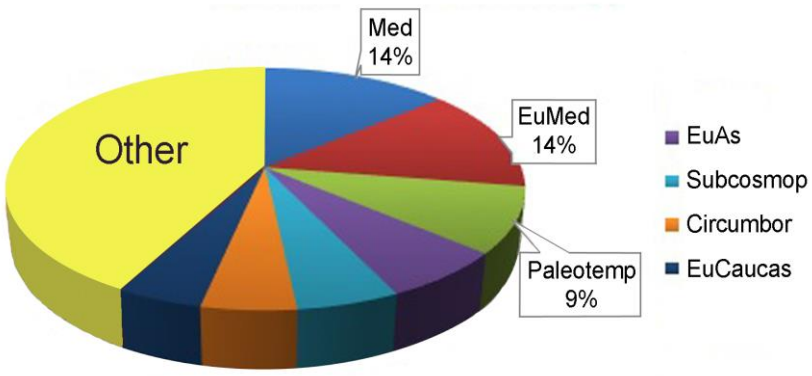

Fig. 7. Data on plant chorology

In addition to the floristic investigation it was analyzed also the chorology of the native vascular plants of the park. The park floristic values are enhanced by the presence of many species with distant bio geographical conditions such as: Asian floristic elements (39 species) and European elements (68 species).

In the total floristic elements of the park flora prevails the Mediterranean and European-Mediterranean type with 33 species, which is an expected value, because of the geographical position, climatic conditions, and the native vegetation of the park. They are followed by Paleotemperate with 21 species, Eurasian with 16 species, 13 Subcosmopolitan species and many other, such as: Alpine, Caucasian, Eurasian, Central and East European floristic elements. The most important is the presence of 11 Balkan endemic and subendemic species. The entire spectrum of chorotypes is presented in the **Fig. 7**.

Each of the floristic elements are very important for the park floristic values, but in order to give a general view of the floristic elements in the park, we joined the species with chorological affinity. Therefore, from this analysis we carried out that the floristic elements that prevails is the Mediterranean one with 82 species followed by the European element with 68 species. Thus analysis is important and shows that the park is influenced by the Mediterranean climatic.

Even for the chorology plan exists a correlation with the urban indicators (**Tab. 3**). The European-Mediterranean type and the Mediterranean types assign all of the urban indicators of the native plants species. Besides them, the urbanoneutral type is characterized by a large specter of distribution, with Paleotemperated, Circumboreal, Subcosmopolitan, and Cosmopolitan species. The urbanophilic species are characterized, mostly by the paleotemperated type. The urbanophobic species are distinguished for being mostly European, Mediterranean, Paleotemperated, and Eurasian type.

It is very important and valuable that the park preservers some species with a specific status, important in national level and part of the Albanian Red List of Flora (Anonymous, 2013) such as *Colchicum autumnale* L. (EN A1B), *Hypericum perforatum* L. (EN A1B) and *Crocus boryi* J. Gay (LRcd) (**Fig. 8**). In tearms of urbanity *Hypericum perforatum* is an urbanoneutral type, but in national level its areal is very disturbed by the urban influence, since this plant is collected not properly for medicinal uses. The other two species, being geophytes and endangered are both urbanophobic type.

Conclusion

The "Grand Park of Tirana" is an urban park with different ecological groups, which are natural, semi-natural and cultivated for ornamental purposes. It is the only one urban park for the city, and for the entire country.

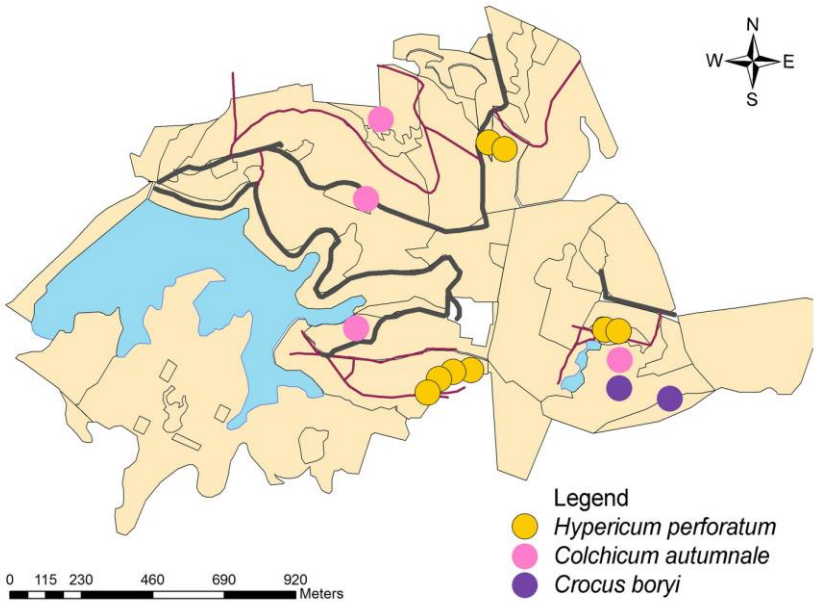

Fig. 8. Distribution of *Hypericum perforatum*, *Colchicum autumnale* and *Crocus boryi* in the Park

The area is large enough and has the favorable geographical position and stable climatic conditions, to shelter a variety of plant native species. Only in this study was carried out the analysis of 240 species from 179 genera and 54 families, most of them are Hemicryptophytes and with Mediterranean origin. In this park we found that 35% of the flora is urbanophobic, mostly ruderal and stress tolerant, which means that beside the urban pressure, that threatens the park continually, it is preserved well, and the natural habitats of the parks still prevails.

It is strongly recommended that some areas of the park, especially the most natural one found in the southern part of the park, where the urbanophobic species prevails, must be better managed or become forbidden for the public frequentation. This site protection would prevent further deterioration of the native species and habitats in the park, and would give the possibility of damaged areas rehabilitation. Even for the introduction of ornamental species within the park in the recreational areas, it is recommended to plant species from the native vegetation, which has ornamental values, and can adapt easily in urban areas such as the urbanoneutral species, such as: *Quercus frainetto* Ten., *Clematis vitalba* L., *Colutea arborescens* L. and *Gladiolus communis* L..

Also, beside this specific work, it is needed the knowledge of urban flora and especially the one that is inhabited and is in strong conflict with natural or semi natural habitats. Urban indicators are an important feature to be considered in the future for the better management of the area. The "Grand Park of Tirana" must be considered as a place of urban development and environmental education of its visitors.

References

Alegro, A., Bogdanović, S., Rešetnik, I., Boršić, I., Cigić, P., & Nikolić, T. 2013: Flora of the seminatural marshland Savica, part of the (sub) urban flora of the city of Zagreb (Croatia). *Natura Croatica*, 22 (1): 111-134.

Anonymous 2013: National Red List of Wild Flora and Fauna. Ministry of Environment of Albania.

Bianco, P.M., Fanelli, G., Tescarollo, P., Pignatti, S. 2003: Ruderalization in a Roman Park as a Result of Changing Management, *Urban Habitats*, 1 (1): 87-104.

Bomanowska, A., Witoswlaski, P. 2008: Selected aspects of diversity of synanthropic flora in the chosen cities of central Poland. *Biodiversity Research and Conservation*, 9-10: 35-42.

Buccheri, M., Martini, F. 2015: Piante urbanofobe, urbanoneutrali e urbanofile Trieste. *Natural History Science*, 2 (1): 31-38.

Celesti Grapow, L., Pyšek, P., Jarošik, V., Blasi, C. 2006: Determinants of native and alien species richness in the urban flora of Rome. *Diversity and Distributions*, 12: 490–501.

Chiesura, A. 2004: The role of urban parks for the sustainable city. *Landscape and Urban Planning*, 68: 129–138.

Chronopoulos, G., Christodoulakis, D. 1996: Contribution to the urban flora of Greece: the flora of the city of Patras and surrounding area. *Botanica Helvetica*, 106: 159-176.

Chronopoulos, G., Christodoulakis, D. 2000: Analysis of the adventive flora of a Greek city: the example of Patras. *Botanica Helvetica*, 110: 171-189.

Crompton, J.L. 2001: The impact of parks on property values: a review of the empirical evidence. *Journal of Leisure Research*, 33 (1): 1-31.

Demiri, M. 1983: Flora Ekskursioniste e Shqipërisë. *Shtëpia Botuese e Librit Shkollor*. Tiranë, 985 p.

Ellenberg, H., Mueller-Dombois, D. 1967: A key to Raunkiaer plant life forms with reviesed subdivision. *Berichte des Geobotanischen Instituts der ETH*, Stift., Rübel, Zürich, 37: 56-73.

European Environment Agency (EEA), 1998: State of the European Environment. Copenhagen.

Falinski, J.B. (ed.), 1971: Synanthropisation of plant cover. II. Synanthropic flora and vegetation of towns connected with their natural conditions, history and function. *Mater. Zakłado Fitosocjologie Stosowanej* Univ. Warsz. Warszawa-Bialowieza, 27: 1–317.

Girardet, H. 1992: The GAIA Atlas of Cities: New Directions for Sustainable Urban Living. Anchor Books, New York,.191 p.

Grime, J.P., Pierce, S. 2012: The Evolutionary Strategies that Shape Ecosystems. Wiley-Blackwell.

Horvat, I., Glavač, V., Ellenberg, H. 1974: Vegetation Südosteuropas. Fischer Verlag, Stuttgart.

Ignatieva, M., Konechnaya, G. 2004: Floristic Investigations of Historical Parks in St. Petersburg, Russia. *Urban Habitats*, 2 (1): 174-216.

Jovanović, S. 1994: Ekološka studija ruderalne flore i vegetacije Beograda. Biološki fakultet Univerziteta u Beogradu, Beograd.

Kabo, M. 1990: Gjeografia Fizike e Shqipërisë, Akademia e Shkencave., Qendra e Studimeve Gjeografike, Tiranë.

Kalajnxhi, A. 2006: Vlerësimi i biodiversitetit floristik e fitosociologjik i Parkut Kombëtar (i propozuar) të Dajtit, PhD Thesis, Tiranë, 206 p.

Konijnendijk, C., Annerstedt, M., Nielsen, A., Maruthaveeran, S. 2013: Benefits of Urban Parks. A Report for IFPRA, Copenhagen. 70 p.

Kowarik, I. 1990: Some responses of flora and vegetation to urbanization in Central Europe. In: Sukopp, H., Hejny, S., Kowarnik, I. (eds.), Urban Ecology: Plants and Plant Communities in Urban Environments. SPB Academic Publishing, Amsterdam, 45-74.

Kühn, I., Brandl, R., May, R., Klotz, S. 2003: Plant distribution patterns in Germany: will aliens match natives? *Feddes Repertorium*, 114, 7–8: 559–573.

Kuo, F.E., Bacaioca, M., Sullivan, W.C. 1998: Transforming inner city landscapes: trees, sense of safety, and preferences. *Environment and Behavior*, 30 (1): 28–59.

Loeb, R. 2006: A comparative flora of large urban parks: intraurban and interurban similarity in the megalopolis of the northeastern United States 1.. *The Journal of the Torrey Botanical Society*, 133 (4): 601-625.

Maslo, S. 2014: The urban flora of the city of Mostar (Bosnia and Herzegovina). *Natura Croatica*, 23 (1): 101-145.

Mesiti A., Dinga L., Galloni M., Pezzi G. 2015: A GIS Approach for the Managemnt Purposes and the Floristic and Vegetation Features of the "Grand Park" of Tirana. *Albanian Journal Agriculture Sciences*, 14 (3): 256-261.

Milović, M., Mitić, B. 2012: The urban flora of the city of Zadar (Dalmatia, Croatia). *Natura Croatica*, 21 (1): 65.

Moore, G., Steward, A., Clemants, S., Glenn, S, Ma, J. 2003: An overview of the New York metropolitan flora project. *Urban Habitats*, 1 (1): 17-24.

Moraczewski, I.R., Sudnik-Wójcikowska, B. 2007: Polish urban flora: conclusions drawn from Distribution Atlas of Vascular Plants in Poland. *Annales Botanici Fennici*, 44: 170-180.

Nielsen, A.B., van den Bosch, M., Maruthaveeran, S., van den Bosch, C.K. 2014: Species richness in urban parks and its drivers: A review of empirical evidence. *Urban ecosystems*, 17 (1): 305-327.

Nishani T. 2007: Njerëz të mirë të luleve, Ngjyrat e kohës, Tiranë. 413 p.

Nishani T., Mëziu S. 2013: Ngjarje ne Parkun e Madh te Tiranes, Ngjyrat e Kohes, Tirane, 136 p.

Paparisto K., Demiri M., Mitrushi I., Qosja Xh., Vangjeli J., Ruci B., Mullaj A. 1988-2000: Flora e Shqipërisë, 1-4. Instituti i Kërkimeve Biologjike. Tiranë.

Paparisto, K., Qosja, Xh., Demiri, M. 1962: Flora e Tiranës. Universiteti Shtetëror Tiranë, Tiranë.

Schroeder, H.W. 1991: Preferences and meaning of arboretum landscapes: combining quantitative and qualitative data. *Journal of Environmental Psychology*, 11 (3): 231–248.

Stavretović, N., Jovanović, S. 2010: Phytogeographical analysis of the flora of Belgrade lawns. *Phytologia Balcanica*, 11 (2): 185-191.

Stešević, D., Caković, D., Jovanović, S. 2014: The urban flora of Podgorica (Montenegro, SE Europe): Annotated checklist, distribution atlas, habitats and life-forms, taxonomic, phytogeographical and ecological analysis. *Ecologia Montenegrina*, Suppl. 1: 1-171.

Stešević, D., Jovanović, S. 2008: Flora of the city of Podgorica, Montenegro (taxonomic analysis). *Archives of Biological Sciences Belgrade*, 60 (2): 245-253.

Stešević, D., Jovanović, S., Šćepanović, S. 2009: Flora of the city of Podgorica, Montenegro – a chorologic structrure, and comparative analysis with the floras of Roma, Patras and Thessaloniki. *Archives of Biological Sciences Belgrade*, 61 (2): 307–315.

Sukopp, H., Werner, P. 1983: Urbanenvironment and vegetation. In: Holzner, W., Werger, M.J.A., Ikusinla, I. (eds.), Man's impact on vegetation, Junk Publ., The Hagu, 247-260.

Sukopp, H. 1973: Die Groβstadt als Gegenstand ökologische Forschung. *Schriften des Vereins zur Verbreitung naturwissenschaftlicher Kenntnisse*, Wien, 113: 90–140.

Sukopp, H. 2002: On the early history of urban ecology in Europe. *Preslia*, 74: 373–393.

Tutin, T.G., Heywood, V.H., Burges, N.A., Moore, D.M., Valentine, D.H., Walters, S.M., Webb, D.A. (eds.), 1964-1980: Flora Europaea, I-V.. Cambridge University Prees. London.

Vangjeli, J. 2003: Udhëheqës fushor i florës së Shqipërisë. Tiranë, 602 p.

Vangjeli, J. 2015: Excursion Flora of Albania. Koeltz Scientific Books. 662 p.

Walter, S., Gillet, J.H., 1998: IUCN Red List of Globally Threatened Species. IUCN.

Wittig, R., Diesing, D., Gödde, M. 1985: Urbanophob-Urbanoneutral-Urbanophil. *Das verhalten der Arten gegenüber dem Lebensraum Stadt. Flora*, 177 (5-6): 265–182.

Zanin, E.M., dos Santos, J.E., Henke-Oliveira, C. 2005: Environmental analysis and zoning for an urban park management purpose. *Brazilian Archives of Biology and Technology*, 48 (4): 647-655.