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The connection between meteorological conditions and recreation in green spaces of the city: A case study of Maksimir Park in Zagreb

Abstract

Maksimir Park is one of Zagreb's green spaces which offers possibilities for many forms of active and passive recreation under different meteorological conditions throughout the year. Regarding air temperature and bio-meteorological assessments of thermal comfort, the most favorable seasons of the year for recreational activities for most recreationists are spring (March, April, and May) and autumn (September, October, and November). The main goal of this research is to determine the differences in the characteristics of recreationists in the park regarding different recreational activities performed under different meteorological conditions. The following characteristics of recreationists have been taken into account: socio-demographic characteristics; characteristics of recreational mobilities; motivation of recreationists; recreational activities performed in the park; expenditures of recreationists; and level of satisfaction with the existing recreation and hospitality infrastructure of the park. The differences between recreationists in Maksimir were determined by comparing: a) sunny days in all four seasons of the year; b) rainy days in spring and autumn; and c) sunny and rainy days in spring and autumn. Data were collected through face-to-face surveying of recreationists in the park in multiple locations, using the convenience sampling method. The population in the research consisted of adult residents of the City of Zagreb and its surroundings (settlements of Zagreb County), who were involved in recreational activities in the park. The total sample consisted of 603 recreationists in Maksimir, with approximately equal sub-samples from 6 non-working days with regard to the season of the year, i.e. meteorological conditions (air temperature, precipitation) during 2013 and 2014. The statistical analysis was carried out with the SPSS program using standard statistical methods: one-way ANOVA; chi-square test; and t-test. The collected results are a contribution to a better understanding of the profiles of recreationists and recreational activities under different meteorological conditions, and can provide a starting point for higher-quality conception of future recreational supply in Maksimir, as well as other green spaces in Zagreb.

Key words: recreation; meteorological conditions; seasons of the year; green spaces; Maksimir Park; Zagreb; Croatia

Introduction

Recreation encompasses activities chosen by an individual on the basis of their own interests, needs, and motivations; the purpose of which is recreation, relaxation or psychophysical relaxation. The type of activity, and the place in which it is undertaken, depend largely on meteorological conditions in the moment of activity planning, a person's mood, and their comfort level in the moment of decision making. Active recreation includes both mental and physical components and can be carried out in the place of residence – but can also be carried out outside the place of residence (Marković & Marković,

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1976; Opačić et al., 2014). Passive recreation is, above all, of a mental nature, and unfolds without greater physical activity on the part of the recreationist, and does not include spatial movement outside of the place of residence (Marković & Marković, 1976; Opačić et al., 2014).

Functions of human well-being include rest and relaxation, and undertaking activities in moderation results in contentment, fulfillment, and recuperation. Research carried out within the "The Happiness of Movement" project of 2015 (on a sample of 800 recreationist respondents in Croatia regarding recreational-sport habits) showed walking to be the favorite sporting activity for 62% of respondents, followed by bike riding and cycling, while a fifth of respondents preferred jogging. More than half of the respondents (52%) practice some activity multiple times per week, and more than 80% of respondents perform their activity, from the domain of active recreation, in areas with attractive ambiance.

Due to the increase of stress in the daily rat race, urban citizens have developed the need for recreational activities in both open and enclosed spaces. With the goal of altering work and living ambiance, which is ever more linked with enclosed spaces; there has been a rise in active and passive recreational activities undertaken in open spaces – regardless of weather conditions. Green space in cities have a key role thereby, e.g. neighborhood parks, city parks, recreational-sport zones in the city, forest parks, as well as green spaces on the level of city agglomeration (Vresk, 1990). According to Vresk (1990, p. 166) "the hierarchical system of green spaces can have up to seven levels, depending on the size of the city. The lowest level being a park in one residential settlement (neighborhood, microsections), and the highest being green spaces in the suburban zone."

Opačić et al. (2014, p. 62) defined the following types of green spaces in Zagreb with regard to functional-gravitational potential: a) neighborhood parks; b) squares that are also parks (e.g. squares on the eastern part of the Lenuci horseshoe – Nikola Šubić Zrinski Square, Strossmayer Square, Tomislav Square); c) city parks (e.g. Maksimir, Ribnjak); d) recreational-sport zones (e.g. Jarun, Bundek, The Sava Embankment); and e) green spaces in the suburban zone (e.g. Medvednica Nature Park, Dotršćina Forest).

The recreational-sport spaces around the lakes Jarun and Bundek, Tuškanac Forest Park, Dubravka's Path, Cmrok, Jelenovac, and thirty other parks with defined walking paths similar to Maksimir Park form a precondition for the quality of life, physical and mental health (Šimpraga, 2011), and recreation for Zagreb's population. The infrastructure, as well as additional suprastructure (walking and cycling paths, athletic tracks, rest areas, hospitality objects, sport fields, lakes, forests), provides the opportunity to perform various forms of active and passive recreation throughout the entire year.

Maksimir Park is one of the most visited of Zagreb's recreational areas. Recreationists from all parts of the city and its surroundings enjoy recreational activities there, because of its proximity to the city center, its important protected area category (according to the *Nature Protection Act, Official Gazette 80/13*, it is protected as a monument of park architecture, and according to the *Protection and Preservation of Cultural Property Act, Official Gazette 69/99*, it is registered as cultural property), its natural recreational suitability, and its organized recreational infrastructure. During winter months, on cold and rainy days, recreational activities in the park are reduced to physically more active recreational activities such as jogging or nordic walking; unlike in summer months, when on sunnier and warmer days, physically more passive recreational activities such as walking and psychophysical relaxation in nature increase in intensity - along with the aforementioned types of recreation.

Literature review

There are many papers connected with the important influence that city parks have on human health, carrying out recreational activities in spaces with good ambience and their contribution to the good psychophysical status of a person (Cooper & Barnes, 1999; Catlin, 2003; Davis, 2003; Godbey & Mowen, 2010; Anderson, 2011; Elliot, 2011; Adevi & Lieberg, 2012; Berman, 2012; Knez, Dolenc, Bokan, Jurić & Kovačević, 2013).

The thematic connected with the functions of city parks and their role in economic development and aspects of management, has been mainly dealt with in individual papers which can be grouped into those with emphasis on the social dimension of parks (Stiperski, 1997; Čaldarović, 2006; Rosenberger, Bergerson & Kline, 2009; Whiting, Larson & Green, 2012), environmental (Vresk, 1990; Obad Šćitaroci & Bojanić Obad Šćitaroci, 1996; Matošević, Pernek & Županić, 2006; Janev Hutinec, Kolačko & Dolenc, 2013; Matić, 2013; Mrđa & Bojanić Obad Šćitaroci, 2013; Paladino & Staničić, 2013; Varga, 2013), or ecological dimension (Knežević & Dolenc, 2011; Manning et al., 2011). For the economic valorization of parks, their attraction factor, and the role which they have in raising the quality of life in urban environments see Chiesura (2004); Archer (2006); and Cianga and Popescu (2013).

Regarding the recreational and health function of recreation in open spaces, research cites the health uses for the human body which can be perceived through the physical, mental, spiritual, and social components of health (Morris, 2003). Recreational activities can be divided into seasonal activities, according to colder or warmer periods of weather, and into active and passive recreational activities according to type – which are most often performed in open spaces, parks, sport fields, and in recreational centers closest to the place of residence (Walker, 2004; Harnik, Martin & O'Grady (eds.), 2014). Thereby, meteorological conditions are one of the factors which influence the choice of type of recreation (Perry, 2004; Vrtačnik Garbas, 2006; Zaninović & Matzarakis, 2007).

Research on the visitors to Royal Parks of London has shown that Primrose Hill, one of London's nine parks, is the park which is visited by the highest percentage of local residents (on average 45 years of age), whereby 78% of respondents visit the park one or more times per week. The average distance between visitors' place of residence and the park is 11 minutes (74% of respondents come to the park on foot) and the average time visitors spend in the park is 48 minutes. The order of the importance of attractive features for visitors, such as: park maintenance; ease of access; quality of the surroundings; and peace and quiet, are conditional on the reason for their visit: walking (59%); fresh air (31%); peace and quiet time (28%); walking pets (7%); enjoying nature (10%); recreation for children (5%); picnic (8%); and from active recreation: exercising in nature (8%); jogging (4%); and cycling (3%) can be recognized. The Royal Parks of London are attractive places in which types of active and passive recreation are undertaken, and which document a large number of visits during all four seasons of the year. More than half of the respondents (66%) visit the parks in all 4 seasons of the year. The summer months are the most attractive time for visits for 17% of the respondents, 7% prefer winter, 5% autumn, and 5% spring respectively (Gabrieli & Wilson, 2010).

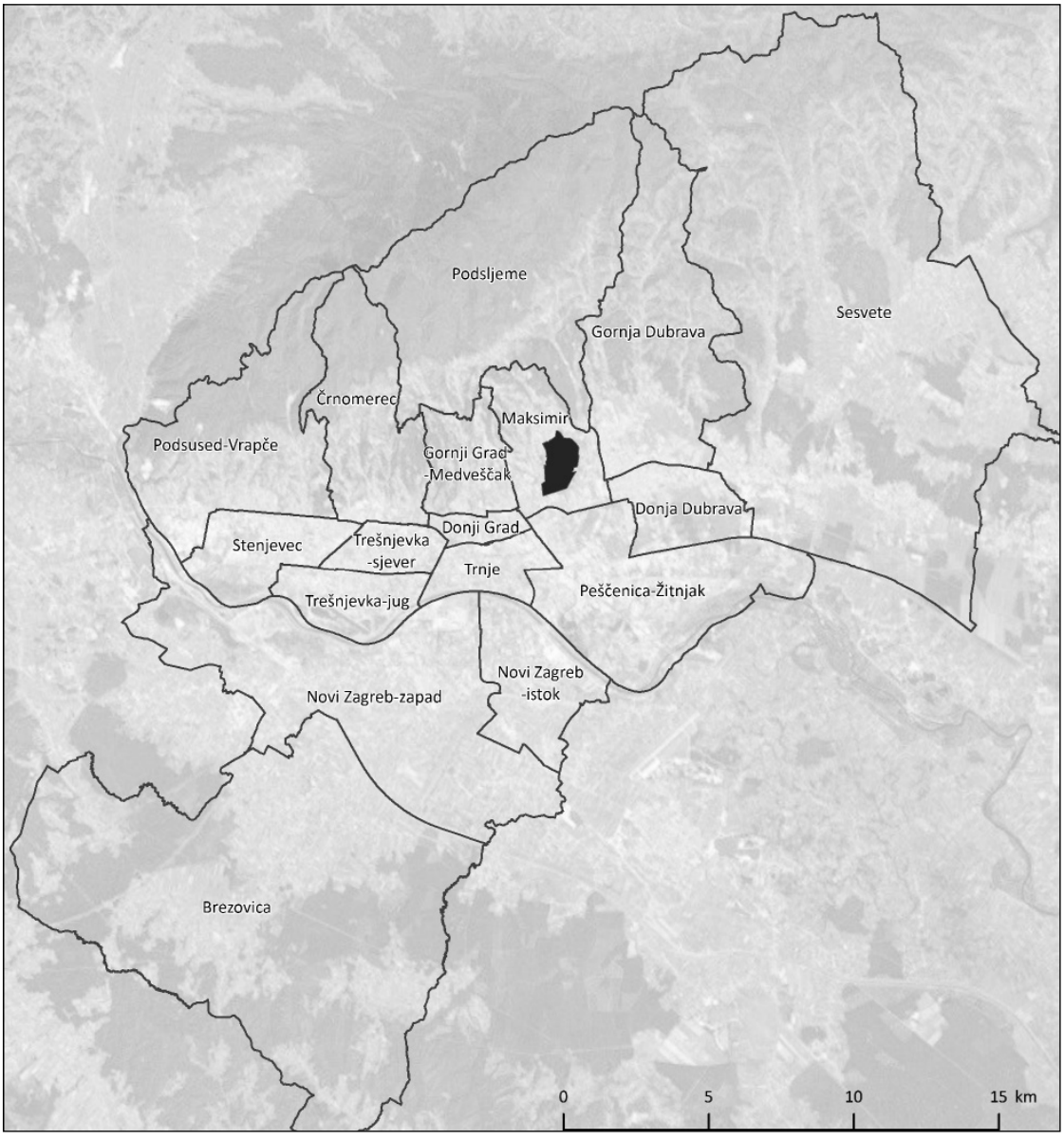
Parks of the city of Zagreb are present as a research theme in both scientific and professional literature (e.g. Maruševski, 1992; Obad Šćitaroci, 1992; Gostl 1994; Knežević, 1996), and there were many scientific and professional conferences organized for the theme (e.g. by The Croatian Academy of Sciences and Arts, The Association of Landscape Architects, The Croatian Association of Landscape Architects). Maksimir Park has been researched by domestic authors who looked upon it in historical and horticultural contexts, for example on the theme of cultural heritage (Maksimir - monografija, 1982; Jurković, 2004). A relatively small number of scientific papers highlights the need for scientifically

grounded research to be carried out, especially that with interdisciplinary character (Vitasović Kosić & Aničić, 2005; Dolenc, 2010; Knežević & Dolenc, 2011; Dolenc, Grbac Žiković & Knežević, 2012; Mirt, 2014).

Recreation and climatic conditions in Maksimir Park

Maksimir Park, located in the eastern part of Zagreb, is a thirty minute walk from the city center and contains a zoo as a component part; from its inception it has been used as a place for recreational and free-time activities (Figure 1).

Figure 1
The location of Maksimir Park in relation to the neighborhoods of the City of Zagreb



Source: ArcGIS Imagery (December 1st 2015). Central Registry of Spatial Units of the Republic of Croatia, State Geodetic Administration (2005).

The basic idea which guided bishop Maksimilijan Vrhovac in opening of one of the oldest public parks in Europe in 1794, was to turn the old diocese's forest into a space for rest and relaxation for the citizens of Zagreb; thus Maksimir Park became linked with the beginnings of many sport events and games: the opening of the first skating rink in Zagreb in 1853; the first skiing classes and tours were organized in 1894; the first international swimming competition and water polo game were held in 1923; the first golf course was opened in 1931 (Ivanković, 2007). Today the park is a protected monument of park architecture and cultural property of the Republic of Croatia, covering an area of 316 hectares with rich natural heritage and organized recreational infrastructure. The park attracts recreationists from all parts of the city and its surroundings throughout the year, regardless of meteorological conditions. According to observational research, the park is visited by 1,500,000 visitors per year (Dolenc, 2010).

According to data for the number of tickets to the Zagreb Zoo sold in 2014 (Table 1) it can be seen that the zoo, and also the park, are most visited in the warm half of the year – the end of spring and the summer months: May; June; and August (increased number of tourists in Zagreb); somewhat less in: March; April; July; September; and October; and the least during the coldest part of the year – the winter months: January; February; November; and December.

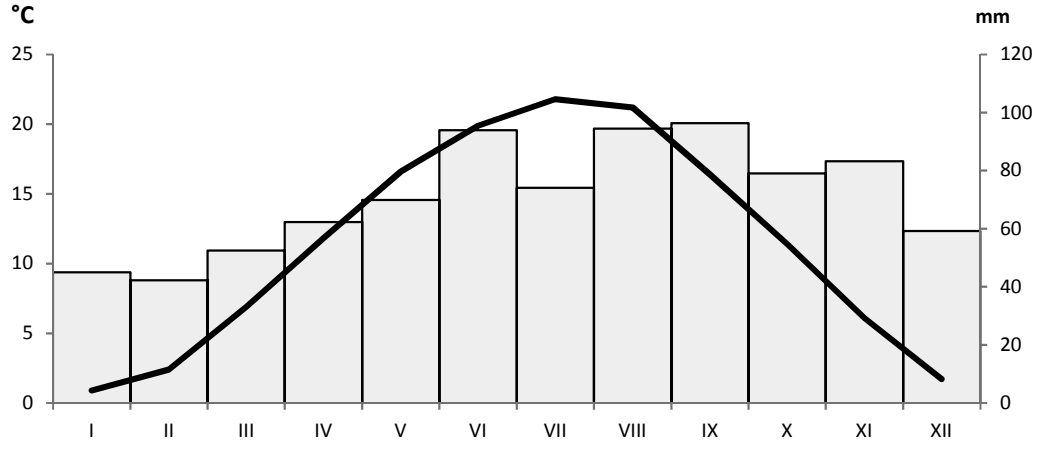
Table 1
Number of tickets to the Zagreb Zoo per month for 2014

Category of ticket	Jan	Feb	Mar	Apr	May	Jun
Adults	6,814	4,985	19,579	15,513	23,921	33,358
Children (age 7-14)	1,692	709	2,871	2,656	4,003	6,379
Kindergartens	14	155	604	337	4,658	1,219
Schools	21	222	1,378	3,033	11,035	6,817
Total	8,541	6,071	24,432	21,539	43,617	47,773

Jul	Aug	Sep	Oct	Nov	Dec	Total
23,799	33,816	15,179	24,260	7,185	4,791	213,200
5,578	6,931	2,178	3,870	1,153	776	38,796
88	11	188	610	122	8	8,014
237	421	5,175	5,398	829	296	34,862
29,702	41,179	22,720	34,138	9,289	5,871	294,872

Source: Zagreb Zoo Archive (2015).

Figure 2
Mean monthly air temperature (°C) and precipitation (mm) for the Zagreb-Maksimir meteorological station (1985-2014)



Source: Meteorological and Hydrological Service of the Republic of Croatia, (2015).

Climatic and bio-climatic conditions in Zagreb change throughout the year, from the colder periods lasting from October to April, to the warmer period which is characterized by a thermal comfort[1], which ranges from very hot to uncomfortably hot. The annual change in mean air temperature (°C) and precipitation (mm) per month for the Zagreb-Maksimir meteorological station for the time period of 1985-2014 is shown in Figure 2. It should be stressed that the mean annual air temperature for the Zagreb-Maksimir station is 11.4°C, while the mean annual precipitation is 852.5mm.

The warm and cool parts of the year are separated by short periods of climatic conditions which are the most favorable for the human body, with the prevailing apparent temperature coming in comfortably brisk to warm, or simply mild (Zaninović, 1983). The spring and autumn seasons, with periods of favorable climate, are the most favorable for active recreation like walking or sports (Blazejczyk, 2005). During those periods, mornings and evenings are typically brisk, even cold in early spring and late autumn, while conditions during the day are comfortable. Though the average thermal comfort during winter is "cold", winter days can vary significantly amongst themselves. On winter days with weak wind, the daily change of thermal comfort mainly follows the daily change of temperature, whereby mornings and evenings are most often cold or very cold, while conditions during the day are typically just cold. In the event that the temperature does not change a lot, as would be the case on foggy days, then there is little daily change of thermal comfort, and it is typically either cold or very cold throughout the whole day. The coldest days are the ones with the lowest temperatures and stronger wind. The daily change of thermal comfort is under the influence of the wind speed, and in certain cases falls into the extremely cold category. However, during the most favorable bio-meteorological conditions of winter, along with proper clothing, footwear, and increased physical activity, outdoor activity can be comfortable (Dolenc, 2010).

The results of the bio-meteorological research show that weather influences peoples' moods, behavior, the perception of the feeling of pain, and the human body overall (Zaninović & Gajić-Čapka, 2008; Junačko & Buljan, 2011; Havrle Kozarić, 2012). Thus, sunny days with low humidity are the most comfortable for the majority of people, and gusts of cold air, followed by strong wind and a sudden jump in air pressure, are most uncomfortable for those suffering from chronic illnesses, while the intensity of pain increases when atmospheric pressure drops accompanied by a simultaneous increase in humidity and air temperature (The Weather and Climate of the Croatian Adriatic, 2015). Thereby, it follows that the choice of recreational activity, its duration, as well as its intensity all depend on the following climatic elements and occurrences: air temperature; precipitation (rain, snow); cloud cover; fog; wind direction and speed; and humidity.

Research methodology

During the research of the interconnectedness of meteorological conditions and the characteristics of recreation taking place in Maksimir Park, the main goal was to determine the differences in some characteristics of recreationists in the park with regard to the undertaking of recreational activities under differing meteorological conditions in order to identify a typical recreationist profile under different meteorological conditions. Recreationist characteristics taken into account included: socio-demographic characteristics; characteristics of recreational mobilities, motivation of recreationists; recreational activity performed in the park; recreationist expenditures; and satisfaction with recreational and hospitality infrastructure in the park. Differences between recreationists in Maksimir have been determined according to the listed parameters, by comparing: a) sunny days in all four seasons of the year; b) rainy days in spring and autumn; and c) sunny and rainy days in spring and autumn. Data were collected through face-to-face surveying of recreationists in the park in multiple locations, using

the convenience sampling method. The population in the research consisted of adult residents of the City of Zagreb and its surroundings (settlements of Zagreb County), who were involved in recreational activities in the park. The total sample consisted of 603 recreationists in Maksimir, with approximately equal sub-samples from 6 non-working days with regard to the season of the year, i.e. meteorological conditions (air temperature, precipitation) during 2013 and 2014 (Table 2).

Table 2
Number of respondents, official meteorological data and thermal comfort on days surveyed at the Zagreb-Maksimir station at 13:00

Sunny days		Number of respondents	Air temperature (°c)	Humidity (%)	Air pressure (hpa)	Wind velocity (m/s)	Thermal comfort
Spring	Apr 6th 2014	100	17	68	1,016.9	0.4	comfortable
Summer	Jul 5th 2014	100	25	53	1,010.8	0.2	warm
Autumn	Oct 12th 2013	101	17	60	1,019.9	0.1	comfortable
Winter	Jan 11th 2014	103	4	80	1,022.1	0.0	brisk
Rainy days		**Number of respondents**	**Air temperature (°c)**	**Humidity (%)**	**Air pressure (hpa)**	**Wind velocity (m/s)**	**Thermal comfort**
Spring	May 11th 2013	100	15	87	1,012.1	0.1	comfortable
Autumn	Nov 24th 2013	99	8	92	1,007.8	0.1	brisk

Source: Meteorological and Hydrological Service (2015).

Structure of respondents, by day surveyed, according to socio-demographic characteristics is shown in Table 3.

Table 3
Socio-demographic structure of respondents by day surveyed (%)

Sample characteristics		Sunny days				Rainy days		Total (n=603)
		Spring (N=100)	Summer (N=100)	Autumn (N=101)	Winter (N=103)	Spring (N=100)	Autumn (N=99)	
Gender	Male	49.0	43.0	46.5	47.6	53.0	45.2	47.4
	Female	51.0	57.0	53.5	52.4	47.0	54.8	52.6
Average age		41.7	39.7	41.1	45.2	37.7	45.3	41.8
Level of education	Primary school	2.1	3.1	1.0	0.0	3.0	4.1	2.2
	High school	40.2	30.6	36.1	37.3	44.0	27.6	36.0
	College	9.3	14.3	11.3	7.8	18.0	12.2	12.2
	University and higher (PhD)	48.4	52.0	51.6	54.9	35.0	56.1	49.6
Place of residence	Nearby city neighborhoods	67.0	50.0	71.3	76.7	49.0	75.8	65.0
	More distant city neighborhoods	27.0	50.0	18.8	15.5	36.0	15.2	27.0
	Zagreb County	6.0	0.0	9.9	7.8	15.0	9.0	8.0

It can be seen that men and women are equally represented in the total sample of 603, the average respondent age is a little higher than 40 years of age, nearly half of the respondents have higher education, and nearly two-thirds of the respondents live in city neighborhoods near Maksimir Park. Place of residence in relation to distance from the park has been categorized thusly: a) nearby city neighborhoods (Donji Grad, Gornji Grad-Medveščak, Trnje, Maksimir, Peščenica-Žitnjak, Gornja Dubrava, Donja Dubrava, Podsljeme); b) more distant city neighborhoods (Novi Zagreb-istok, Novi Zagreb-zapad, Trešnjevka-sjever, Trešnjevka-jug, Črnomerec, Stenjevec, Podsused-Vrapče, Sesvete, Brezovica) (Figure 1); and c) settlements in the surroundings of the City of Zagreb (in Zagreb County).

Statistical analysis of data was carried out with the SPSS program using standard statistical methods: one-way ANOVA; chi-square test; and t-test.

Results and discussion

Differences between recreationists and their attitudes during sunny days in all seasons of the year

Statistically significant differences between respondents regarding their place/neighborhood of residence were determined by chi-square test (χ^2=43.993; df=9; p=0.000). Two-thirds (66.3%) of recreationists who come during sunny days in all seasons of the year, come from nearby neighborhoods. The largest share of them is evident in the winter months (76.7%), and the smallest in summer (50.0%) (Table 3). The largest share of recreationists from more distant city neighborhoods come during summer (50.0% of all summer recreationists), and the smallest in winter (15.5%), while the largest number of recreationists who live in the surroundings of the City of Zagreb come during autumn (9.9%), during summer none come at all. The division of recreationists according to season supports the conclusion that the gravitational influence of Maksimir as a recreational area increases parallel to the increase of acceptable meteorological conditions for outdoor recreation. Due to this, mainly residents from nearby neighborhoods enjoy recreation in the park during winter (which has less suitable weather for outdoor recreation), while residents from more distant neighborhoods, as well as those from the surroundings of Zagreb are more strongly represented in spring and autumn, when the meteorological conditions for recreation are more favorable and the daylight lasts longer.

In order for respondents to assess the optimal air temperature for their recreation in relation to season of the year, values for air temperature have been arranged into the following categories: 1st category: < 5 °C; 2nd category: 5–15 °C; 3rd category: 15–25 °C; 4th category: > 25 °C. Statistically significant differences in the assessments of the respondents were determined through one-way ANOVA (F=14.509; df=3; p=0.000). Respondents on the four sunny days throughout different seasons of the year prefer the highest temperature as most comfortable in autumn (M=2.94; SD=0.369), followed by summer (M=2.88; SD=0.518), then spring (M=2.65; SD=0.609), while the lowest temperature was preferred as most comfortable during winter (M=2.52; SD=0.540). From the findings it follows that the assessment of optimal temperature for recreation increases proportionally to the measured temperature on days surveyed with the exception of summer, when respondents preferred a somewhat lower temperature than that preferred in autumn – which is in agreement also due to the somewhat less favorable thermal comfort of summer in relation to that of autumn.

Statistically significant differences between respondents in relation to their assessments of whether meteorological conditions have an influence on their recreational activity in Maksimir were also determined by chi-square test (χ^2=22.001; df=3; p=0.000). Nearly two-thirds (63.9%) of recreationists on sunny days in all seasons of the year assessed that meteorological conditions affect them while performing recreational activity. The largest part of recreationists who assessed that meteorological conditions had an influence on their recreational activity were found in autumn (77.0%) and summer (71.0%) (Table 4).

Table 4
Do meteorological conditions have an influence on respondents' recreational activities on sunny days in all seasons of the year (% of respondents' answers)

Season of the year	Yes	No
Spring	60.6	39.4
Summer	71.0	29.0
Autumn	77.0	23.0
Winter	47.6	52.4
Total	63.9	36.1

To sum up, when meteorological conditions are more favorable, i.e. the thermal comfort is more favorable, there are many recreationists in Maksimir whose recreational activity is influenced by meteorological conditions, as opposed to days less favorable for recreation (winter) when the majority of recreationists assessed that less-favorable meteorological conditions did not have an influence on their recreational activity, although the thermal comfort was less favorable. In less-favorable meteorological conditions recreationists mostly perform specific recreational activities, which can be explained by their very specific motivation, as opposed to recreationists, whose motivations are not as specific or oriented on a specific recreational activity, who spend time in Maksimir during favorable weather conditions according to a prevailing general desire to visit the park.

The main motivating factors for recreation in Maksimir identified by respondents have been classified into two general groups: natural amenities (e.g. forests, lakes); and recreational infrastructure (e.g. defined paths, playgrounds, other recreational supply, catering offering). Thereby, respondents were able to select a maximum of three of the offered motivating factors. Each selected motivating factor was assigned a value of 1, resulting in a cumulative sum for the group of natural amenities and the of group recreational infrastructure. Through one-way ANOVA ($F=3.685$; $df=3$; $p=0.012$) a statistically significant difference in the answers of the respondents from the four sunny days in different seasons of the year regarding the presence of recreational infrastructure as a motivating factor was determined. Respondents who practice recreation in Maksimir during the summer mostly indicated recreational infrastructure as the reason for their visit ($M=1.13$; $SD=0.75$). In the remaining seasons, recreational infrastructure as a motivating factor is equally represented between recreationists: autumn ($M=0.89$; $SD=0.63$), winter ($M=0.88$; $SD=0.69$), spring ($M=0.84$; $SD=0.66$). Natural amenities as a motivating factor were evenly represented between recreationists in all seasons of the year, therefore, according to this criterion no differences were found between recreationists.

In order to determine differences between recreationists in terms of active and passive recreation performed in different seasons, recreational activities being performed by respondents during surveying have been divided into two groups. The following were classified into the active forms of recreation group: jogging; cycling; rollerblading; combat sports; ball sports; nordic walking; power walking; working out; and badminton. The following were classified into the passive forms of recreation group: walking; sightseeing; resting; photography; playing with children; and dog walking. Accordingly, respondents were able to indicate a maximum of three recreational activities which they do most often in Maksimir. Each recreational activity was assigned a value of 1, which resulted in a cumulative sum for the groups of active and passive recreational activities. Through one-way ANOVA ($F=5.947$; $df=3$; $p=0.001$) statistically significant differences between respondents on the four sunny days in different seasons of the year, regarding the presence of active recreation in the recreational activities they perform, were determined. Thus, recreationists performing various forms of active recreation are more present in winter in Maksimir ($M=1.53$; $SD=0.93$), while in the remaining seasons a smaller number

of recreationists performing such types of recreational activities is evident: spring (M=1.35; SD=0.88); summer (M=1.14; SD=1.02); autumn (M=1.01; SD=0.93). Also through one-way ANOVA (F=5.544; df=3; p=0.001) statistically significant differences between respondents from the four sunny days in different seasons of the year in relation to the presence of forms of passive recreation performed were also determined. Thus recreationists who, on average, perform more forms of passive recreation are more present in Maksimir in autumn (M=1.02; SD=0.42), while in the remaining seasons there is a smaller and very balanced representation of such types of passive recreation: winter (M=0.87; SD=0.44); spring (M=0.79; SD=0.52); summer (M=0.77; SD=0.55). It follows that most recreationists who visit Maksimir during winter are interested in some form of active recreation, while most of those who visit Maksimir during the more climatically favorable seasons of the year are, by enlarge, performing equal measures of passive and active recreational activities.

With the goal of determining differences in the daily expenditures of recreationists in Maksimir in regard to season, amounts in Croatian kuna (HRK) have been grouped into the following categories: 1st category: 0 HRK; 2nd category: < 20 HRK; 3rd category: 20–50 HRK; 4th category: 50-100 HRK; 5th category: > 100 HRK. Statistically significant differences in the answers of respondents were determined using one-way ANOVA (F=6.892; df=3; p=0.000). Respondents from all four sunny days in different seasons of the year in Maksimir spent the most in summer (M=2.55; SD=1.158), followed by autumn (M=2.22; SD=1.110), spring (M=2.18; SD=1.167), and winter (M=1.83; SD=1.115). It can be stressed that, apart from numerous offerings which create expenditures, which is more expressed in summer (during more favorable meteorological conditions for recreation) than in winter, expenditure levels are positively influenced by the larger number of recreationists from more distant city neighborhoods who visit Maksimir less often and are prone to spending more during visits.

Recreationists' satisfaction with catering offerings in Maksimir was measured with the help of the Likert scale on which the score 1 indicated the lowest level of satisfaction, and the score 5 the highest. Statistically significant differences in the in the level of respondents' satisfaction with catering offerings were determined using one-way ANOVA (F=3.957; df=3; p=0.008). Respondents from all four sunny days in different seasons of the year were most satisfied with Maksimir's catering offerings in autumn (M=3.45; SD=1.300), followed by winter (M=3.32; SD=1.122), summer (M=3.20; SD=1.082), and were the least satisfied in spring (M=2.90; SD=1.193). It can be seen that satisfaction with the catering offerings of Maksimir is positively influenced by a larger number of recreationists who visit the park more rarely – a larger number of visitors from more distant city neighborhoods, who visit Maksimir less often and are thus less acquainted with the status of the park's catering offerings and are less likely to offer criticisms than recreationists who visit Maksimir more often, i.e. those who live in nearby city neighborhoods.

Differences between recreationists and their attitudes on rainy days in spring and autumn

Statistically significant differences between the respondents in relation to place/neighborhood of residence were determined by chi-square test (χ^2=17.225; df=3; p=0.001). The majority of recreationists (62.3%) from the rainy survey days in spring and autumn came from nearby city neighborhoods. A larger share of them were evident in autumn (75.8%), than in spring (49.0%) (Table 3). Meteorological conditions for recreation, i.e. air temperature, were somewhat more favorable in spring than in autumn (Table 2). This confirms the conclusion that the more favorable the weather conditions are for recreation, the larger the number of recreationists from more distant city neighborhoods, which is also

visible from the earlier comparison of representation of recreationists from sunny days in relation to the how close they live. Additionally, the fact should be stressed that citizens' recreational needs are greater in spring (longer days, the onset of nicer weather), than in autumn. This can explain the larger share of recreationists who live in settlements in Zagreb County in spring (15.0%), that in autumn (9.0%).

Statistically significant differences in the respondents' assessments of the optimal air temperature for recreation were determined by t-test (t=3.586; df=196.598; p=0.000). Values for air temperature have been divided into the same classes as in the analysis of difference during the four sunny days in all seasons of the year. The assessment of the most favorable temperature is somewhat greater during the rainy day in spring (M=2.89; SD=0.549), than the rainy day in autumn (M=2.61; SD=0.568). It is important to stress that the thermal comfort during the spring rainy day was warm, and during the autumn rainy day it was brisk (Table 2). It can be concluded that the assessments of optimal temperatures for recreation increase proportionally to the measured air temperature (a similar conclusion to the comparison of the same indicators for the four sunny days as well), as well as the degree of thermal comfort.

In order to determine the differences between respondents who perform recreation in Maksimir during rainy days in spring and autumn, the frequency of their visits to the park have been categorized into the following classes: 1st class: every day; 2nd class: two to three times per week; 3rd class: once per week; 4th class: once per month; 5th class: several times per year; 6th class: once per year. Statistically significant differences in the frequency of respondents' visits were determined by t-test (t=2.865; df=197.000; p=0.005). Differences between spring and autumn rainy days in relation to the frequency of visits to Maksimir can be easily seen. Respondents who perform recreation in Maksimir during the rainy day in autumn (M=2.91; SD=1.371), visit the park more often than respondents who perform recreation in Maksimir during the rainy day in spring (M=3.48; SD=1.439).

Statistically significant differences between respondents were also determined in relation to age by t-test (t= -3.180; df=197.000; p=0.002) and it was confirmed that the average age of respondents during the rainy day in autumn was higher (M=45.33; SD=17.58), than in spring (M=37.72; SD=16.17). Therefore, recreationists who visit Maksimir more often from nearby city neighborhoods, regardless of weather conditions, are mainly older.

Chi-square test was used to identify statistically significant differences between respondents in relation to their level of professional qualification (χ^2=12.574; df=4; p=0.014). A "better" educational structure can be seen during the rainy day in autumn, when more than a two-thirds of respondents performing recreation in the park (68.3%) had high or higher professional qualifications (Table 5).

Table 5
Structure of respondents in relation to professional qualification during rainy days in spring and autumn (%)

	Primary school	High school	College	University	MSc/ PhD
Spring	3.0	44.0	18.0	33.0	2.0
Autumn	4.1	27.6	12.2	45.9	10.2
Total	3.5	35.9	15.2	39.4	6.0

It can be concluded that less-favorable meteorological conditions for recreation have a lesser influence on recreationists with higher education while performing recreational activities, than on recreationists with less education.

Identical to the analysis of the differences between respondents during the four sunny days, the main motivating factors for recreation in Maksimir indicated by respondents have been classified into two basic groups: natural amenities (e.g. forests, lakes); and recreational infrastructure (e.g. defined paths, playgrounds, other recreational supply, catering offering), and points were assigned using the aforementioned method. Statistically significant differences between respondents regarding the presence of recreational infrastructure as a motivating factor during the rainy days in spring and autumn, were determined by t-test (t= 4.809; df=197; p=0.000). Namely, the qualities of recreational infrastructure are more expressed in respondents' motivations during the rainy day in spring (M=1.130; SD=0.661), than in autumn (M=0.707; SD=0.576), which can be explained by the fact that on the rainy spring day in Maksimir the average recreationist was younger, as a rule interested in doing forms of active recreation, and they undertake recreation in the park primarily due to favorable recreational infrastructure. In contrast, via t-test it was also determined that respondents differ in the presence of natural amenities as a motivating factor. Thus, during the rainy day in autumn, natural amenities were more expressed in the motivations of the respondents (M=1.44; SD=0.59), than in spring (M=1.08; SD=0.66). These findings can be explained by the fact that during the rainy day in autumn in Maksimir recreationists were older on average, as a rule interested in doing forms of passive recreation (in comparison to their counterparts in spring); and they are primarily performing recreation in Maksimir due to its natural amenities for recreation.

Statistically significant differences between respondents, in relation to presence of active and passive recreation in recreational activities which they perform (Table 6), were determined by t-test.

Table 6
Presence of preferred form of active and passive recreation on rainy days in spring and autumn

Forms of recreation	Spring		Autumn		T-test
	M	SD	M	SD	
Active recreation	1.86	0.91	1.32	0.88	t=4.232 df=197 p=0.000
Passive recreation	0.70	0.44	0.86	0.40	t=-2.084 df=166.883 p=0.039

Thus, on the rainy day in spring recreationists undertake more forms of active recreation and fewer passive. Conversely, on the rainy day in autumn respondents undertake more forms of passive recreation than active. This can be explained by the fact that on the rainy day in spring in Maksimir recreationists were, on average, younger; and recreationists on the rainy day in autumn were, on average, older. It should be stressed that the forms of active and passive recreation were divided into the same groups as in the case of the analysis of differences on the four sunny days in all seasons of the year, and points were assigned in the aforementioned method.

In order to determine the differences in daily expenditure of recreationists in Maksimir on rainy days in spring and autumn, amounts in Croatian kuna (HRK) were grouped in an identical way to the case of the analysis of difference on the four sunny days in all seasons of the year. Statistically significant differences in the answers of the respondents were determined by t-test (t=3.836; df=178.672; p=0.000). Respondents spent more on the rainy day in spring (M=2.39; SD=1.21), than in autumn (M=1.82; SD=0.86). Statistically significant differences in the respondents' satisfaction with the catering offerings were also determined using the same statistical method (t=2.588; df=197.000; p=0.010). Respondents

were more satisfied with the catering offerings of Maksimir during the rainy day in spring (M=3.53; SD=1.03), than in autumn (M=3.15; SD=1.03). Therefore, expenditures, like catering offerings, are positively influenced a larger number of recreationists who visit Maksimir more rarely, spend more, are not as well acquainted with the conditions in Maksimir, and are less prone to criticism.

Differences between recreationists and their attitudes during sunny and rainy days in spring and autumn

Statistically significant differences between respondents in relation to whom they perform recreational activities with in Maksimir during sunny and rainy days in spring and autumn were determined by chi-square test (χ^2=22.793; df=3; p=0.000). Thus, on sunny days in spring and autumn there were more recreationists with children present, i.e. families (36.3% of the total number of respondents on that day), while on rainy days there were somewhat more recreationists who were there with friends (32.4%), or with their partner (28.5%), while the share of recreationists with children, i.e. families, was noticeably lower (16.2%). The share of recreationists who come to Maksimir alone is equal in sunny and rainy weather in spring and autumn. It is noticeable that less-favorable meteorological conditions predominantly bothered children, i.e. parents with children (Table 7).

Table 7
Structure of respondents in relation to who they come to the park with on sunny and rainy days in spring and autumn (% of respondents)

	Alone	With partner	With family (children)	With friends
Sunny days	22.8	15.5	36.3	25.4
Rainy days	22.9	28.5	16.2	32.4
Total	22.8	21.8	26.6	28.8

Additionally, statistically significant differences between respondents in relation to their assessment of whether meteorological conditions have an influence on their recreational activity in Maksimir were determined by chi-square test (χ^2=20.825; df=1; p=0.000). More than two-thirds of recreationists (68.8%) on sunny days in spring and autumn assessed that meteorological conditions had an influence on their undertaking of recreational activities. On rainy days the majority of recreationists (53.8%) think that meteorological conditions do not have an influence on their undertaking of recreational activities (Table 8).

Table 8
Do meteorological conditions have an influence on the recreational activities of the respondents on sunny and rainy days in spring and autumn? (% of respondents' answers)

Meteorological conditions	Yes	No
Sunny days	68.8	31.2
Rainy days	46.2	53.8
Total	57.5	42.5

This can be explained by the fact that during sunny weather in Maksimir the number of recreationists who come to the park less frequently is greater, while during rainy weather in Maksimir recreationists are predominantly those who spend time in the park more often, upon whom meteorological conditions have a lesser influence; this agrees with the results of the same analysis during the four sunny days in all four seasons of the year.

Statistically significant differences between respondents in relation to the presence of active recreation in their recreational activities during sunny and rainy days in spring and autumn were identified by t-test (t=4.422; df=398; p=0.000). Thus, during rainy days recreationists undertook more active forms of recreation (M=1.6; SD=0.93), than on sunny days (M=1.18; SD=0.92), which can be explained by the fact that during less-favorable weather conditions recreationists who visit Maksimir are those who perform their, mainly active, recreational activities in all weather conditions. Through the same method, statistically significant differences were determined between respondents on sunny and rainy days in spring and autumn in relation to the presence of forms of passive recreation which they are undertaking (t= -2.457; df=392.363; p=0.014). During sunny days recreationists do more passive forms of recreation (M=0.91; SD=0.49), than on rainy days (M=0.78; SD=0.54). This can be explained with the fact that there were more recreationists with "non-specific" motivations for certain recreational activities on sunny days in Maksimir, as well as more families with children, which also meant a larger share of recreationists who preferred passive recreational activities. For this analysis the forms of active and passive recreation were divided into the same groups as in the case of the analysis of difference on the four sunny days in all seasons of the year, and the analysis for rainy days in spring and autumn, and points were assigned in the aforementioned method.

Conclusion

Independent of their functional-gravitational potential, green spaces of the city create a lively atmosphere with good ambiance, ecological and social worth, which in greater part comes to be expressed through direct application of active or passive use on the part of recreationists. Orderliness, size, and location of green spaces influence the amount of visits, and the use of the space, infrastructure, and suprastructure influence the functionality and satisfaction with the supply.

Maksimir Park is an important recreational zone in Zagreb. Along with the traditional role of satisfying the individual recreational needs of citizens, the recreational function of the park is also significantly strengthened by organized recreational activities which are led by various civic associations (e.g. Athletic Club "Veteran", Athletic Club "Dinamo", Society for Sport Recreation "Maksimir", Heart Zone Nordic Walking, Orientation Club "Vihor", Scout Squad "Maksimir", Adidas Running School), which significantly increases the number of recreationists regardless of meteorological conditions.

There is a visible change in the form of recreation in the park during time, seasons of the year, and meteorological conditions. Some of the sport activities which were once performed in the park, no longer happen today (e.g. golf which was played on natural terrain with nine holes, ice skating which took place on the Maksimir's First and Second lake, or recreational riding on the park's paths), which reduces the current recreational supply to mainly basic recreation. In this way the possibility of widening the recreational supply which would enrich the visits of the existing circle of recreationists, and certainly also attract new recreationists during different meteorological conditions, is lessened.

The research determined the importance of Maksimir Park as a recreational zone of the city in all meteorological conditions. Two basic recreationist profiles can be indentified in relation to the (un) favorability of meteorological conditions for recreational activities.

In more favorable meteorological conditions in Maksimir there are more recreationists with "non-specific" motivations for certain recreational activities, who come less often, commonly from the city's surroundings, and more families with children, which also means a larger share of recreationists who prefer passive recreational activities and have a greater tendency towards spending money during their visit.

In contrast, recreationists who spend more time in Maksimir, visit the park despite less-favorable meteorological conditions for recreation, as a rule undertake a specific recreational activity (mainly from the domain of active recreation); they are generally younger and the majority live in nearby city neighborhoods, come to the park alone, and/or with their partners or friends, and spend less money.

Comparing available research carried out in parks throughout the world with the research we carried out in Maksimir, it can be understood that city parks as recreational zones bring health, recreation, motivation, and other social and health benefits to recreationists with their aesthetic, ecological and social characteristics, regardless of meteorological conditions or season of the year. In terms of satisfying recreational needs, the parks located near visitors' places of residence have the highest importance. The example shown by the results of the research on visitors carried out in Royal Parks in London (Gabrieli & Wilson, 2010), and research on the connection between meteorological conditions and recreation in the case study of Maksimir Park have similarities in the socio-demographic structure of their visitors. For example, the majority of surveyed recreationists of Primrose Hill Park and Maksimir Park are middle-aged women (40-ish years of age) who mostly live in city neighborhoods near the parks. Both parks are spaces where forms of active and passive recreation take place, and motivating factors are dependent on natural amenities, recreational infrastructure, and meteorological conditions.

The obtained results contribute to better understanding recreationist profiles and recreational activities under different meteorological conditions, and can serve as a starting point for conceiving higher quality recreational supply in Maksimir Park and Zagreb's green spaces, as well as in other cities.

Notes

[1] The thermal comfort or subjective feeling of heat is "the state of mind which expresses satisfaction with the temperature conditions of the environment" (ANSI/ASHRAE Standard 55, 2010, 4).

The thermal comfort or feeling of warmth of a person depends on meteorological parameters, temperature, humidity, wind, and radiation. Namely, a person normally has the ability to adjust to a wide range of outside influences. A loss of heat too large can be expressed as cold, while in conditions where it is not possible to escape high temperatures it can feel uncomfortably hot. The higher the air temperature, the hotter a person feels, but as long as there is wind it will cool the human body. Wind has a higher impact in low temperatures and a lesser impact when the temperature is high. Humidity acts indirectly through evaporation, because the body sheds excess heat through sweating. When the air is dry, the feeling of heat is less due to fast evaporation of water from the body. In high humidity a person often feels stuffiness. In those conditions the feeling of heat is greater because sweat does not evaporate as fast due to the saturation of the air, thus the body is not cooled. Radiation from the sun or from artificial sources such as asphalt and concrete channel heat to the body, and in low temperatures the body loses heat. The feeling of heat can be show with the help of the cooling index and the thermal comfort index which are calculated on the basis of meteorological parameters (Weather and Climate of the Croatian Adriatic, 2015).

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