A Method for Evaluation of the Efficiency of Urban Green Spaces; Aksaray, Turkey

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Abstract

The aim of this study is to evaluate the efficiency of urban green spaces in the city of Aksaray, Turkey. The estimates are based on quantitative data obtained from Aksaray 1/1.000 scale development plans along with reports and field surveys. At the end of the study, it was determined that children playground, neighborhood-quarter parks, sports facilities and city parks which form the uses of Aksaray city urban green space fall below spatial standards in terms of size, per capita space, and show inequality distribution in all Aksaray city. By using findings, some suggestions relating to urban open-green space systems for the future are defined in terms of e sustainable urban development.
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Keywords : GIS; Green systems; Spatial analyses; Sustainability.

1. INTRODUCTION

Urban green spaces have a significant role in forming a more liveable environment for rapidly growing cities. Urban green spaces propound recreational opportunities that may at the least ease pressures that an urban environment causes, creating a more liveable environment with the social, economic and ecological functions that these spaces offer (Chiesure, 2004). Urban green areas as public spaces for meeting the local community are also places where people can socialize. In addition, urban green spaces contribute to social integration by gathering people from various social, educational, cultural and economic levels (Thompson, 2002).
Climate regulation, cleaning soil and water resources, distribution of biological variety to the whole city are major ecological functions of urban green spaces. When designs and planning are done correctly, these urban spaces also become important shelters for wildlife (Burke and Ewan, 1999). Urban green areas can also be seen as a domain of active experience. They provide a sense of challenge, privacy and intimacy, and aesthetic and historical continuity (Aksoy, 2001). Besides the social and psychological benefits, the functions of urban nature can provide economic benefits for both municipalities and citizens. Furthermore, aesthetic, historical and recreational values of urban open and green areas increase the attractiveness of the city and promote it as a tourist destination, thus generating employment and revenue. Also, natural elements such as trees or water increase property and home values and prices, and therefore tax revenues as well (Chiesure, 2004).

Numerous countries in the world have developed standards, regulations and laws intended to create and protect urban green spaces, which have great importance for more liveable environments. Standards of open green areas are determined by density, distribution and qualities of population and recreation types. These standards may vary for different countries

and cities. As per the provisions of Regulation on the Zoning Plan and the Principles of its Modification published in the 02.09.1999 dated and 23804 numbered Official Gazette; the green space standard per-capita in urban areas has been determined as at least 10 m². However, studies conducted on the quantitative sufficiency level of urban green space in Turkey cities indicate that the value of green space per person is well below legal standards. In fact, while Aksoy (2001) mentions in his study, conducted on the city of Istanbul, about the existence of 1.90 m² green space per capita, Gul and Kucuk (2001) confirm that it is 3.00 m² for the city of Isparta, Ozcan (2006) is 2.20 m² for the city of Kirikkale, Doygun and Ilter (2007) is 1.40m² for the city of Kahramanmaras and Yenice (2012) is 4.01 m² for the city of Burdur. When these findings are scrutinized within the scope of the European Union's cities which have adopted sustainable urban development strategies, it can be seen that the amount of green space per capita and their minimum size varies between approximately 10-125 m² (Ersoy, 1994; Ozcan 2006). In the Urban Audit Report (Anonymous, 2000) published by the European Commission, the green space data for the year 1996 for 37 European cities was examined. In that study, it was understood that the value of the average green space per capita reached 42 m² (Table 1). Therefore, it is obvious that the existence of open-green space in Turkish cities and the green space standards determined within the context of zoning legislation are quite behind the European Union cities.

Table 1. Values of the open-green space per capita at some European Union cities

Country	City	square meters per capita
Germany	Berlin	23.60
	Hamburg	31.10
Belgium	Brussels	29.20
Denmark	Copenhagen	25.30
Italy	Milano	26.10
	Palermo	14.50
England	Birmingham	25.00
	Liverpool	32.90
Austria	Vienna	124.70
Finland	Helsinki	122.40
Norway	Oslo	122.40
Spain	Barcelona	18.00

The purpose of this study is to examine, in detail, the spatial sufficiency and the accessibility criteria of the children's playgrounds, neighbourhood-quarter parks, sports facility areas and the city parks that make up the urban green space facitilities of Aksaray. We believe that this examination will contribute to the urban population's benefit from neighbourhood-level urban green spaces opportunities as well as identification of the design-planning principles of future-oriented urban green space system.

2. Materials and Methods
The use of urban green spaces with different functions and spatial size in the city of Aksaray constitutes the subject of this study. In this context, the city of Aksaray, in terms of green space use, density of the population use and activity opportunities, includes children's playgrounds, neighbourhood-quarter parks, sports facility areas and city parks.

In the study, a method aimed at evaluating the effectiveness and adequacy of the presence of urban green space along with quantitative date obtained from the 1/1.000 scale map of the Aksaray city, aerial photographs and the area assessment works. This methodology consists of four stages. The first stage is to combine the functional and spatial structure of the green area presence of Aksaray city, the neighbourhood population of the city and the information on their

boundaries in a database, which is established by means of geographic information systems. Thus, an opportunity to perform a mixed-query was developed by combining the spatial and non-spatial data. The second stage is to examine, in detail and on a neighbourhood level, the children's playgrounds, neighbourhood-quarter parks, and the sports facility areas that make up the green space of Aksaray and the percapita value of the spatial size of the city parks. The findings obtained at this stage are combined with the green space values in European Union cities and the size of minimum areas indicated in the Turkish zoning laws are then analyzed.

The third stage of the study method is to compare the ideal criteria of the children's playgrounds, neighbourhood- quarter parks, city parks and sports facility areas in terms of spatial size. It is possible to find several research studies that define the ideal size of the urban green spaces according to their functionality. However, as these studies are similar regarding some criteria of the urban green spaces, they also differ at some points. For example, Tumer (1976) defines the criteria of size as 0.8-2 ha for children's play grounds, 2-4 ha for neighbourhood and vicinity parks, 40,000-100,000 ha for city parks and 4-6 ha for sports areas. As for Cetiner (1991), hecalls for a children's playground size 2-4 ha, quarter parks at 0.8 ha and above, and the sports areas at 4-12 ha. In another study, Herzele and Wiedemann (2003) define the minimum sizes as 10 ha surface (5 ha park) for the neighbourhood parks, 30 ha surface (10 ha park) for quarter parks and 60.00 ha for city parks. In their study conducted on the city of Kahramanmaras, Doygun and Ilter (2007) accept the criteria as 4 ha for the neighbourhood parks and 16 ha for the vicinity parks (Table 2). Based on this cumulative research, the minimums for this study are, for children's playgrounds 0.80 ha, for neighbourhood and quarter parks 2.00 ha, city parks 40.00 ha and for city sports facilities 4.00.

The fourth stage of this study is to identify the impact areas of the children's playgrounds, sports facility areas and urban parks according to their access distance.

Table 2. According to the studies conducted the ideal criteria for the urban open green areas

Function	Tümer (1976)	Çetiner (1994)	Herzele and Wiedemann (2003)	Doygun and İlter (2007)
Children playgrounds	0.80 - 2.00 ha	2.00 – 4.00 ha	-	-
Neighbourhood-Quarter Parks	2.00 – 4.00 ha	0.80 ha and over	10.00 – 30.00 ha	4.00 – 16.00 ha
City Park	40.00 – 100.00 ha	-	60.00 ha	-
Sport Facility	4.00 – 6.00 ha	4.00 – 12.00 ha	4.00 – 6.00 ha	4.00 – 12.00 ha

Distance or walking time from home has appeared to be the single most important precondition for use of green spaces (Herzele and Wiedemann, 2003). As a matter of fact, within the sustainable urban development strategies, to equally benefit from public services and to accept the accessibility as an important criterion in providing social justice reveal the importance and the necessity of the accessibility principle (Chan and Lee, 2008). Studies have shown that the location and distribution of green spaces in the city influence the use of those green spaces by the population (Grahn and Stigsdotter, 2003; Neuvonen at al. 2007).

In the Urban Audit Report, prepared by the European Commission, an ideal walking time for the urban green areas located within the public service group at the same time is considered to be 15 minutes (Anonymous, 2000). Altunkasa (2004) studied urban green space use in Turkey and abroad, he defines the accessibility distance for the children's playgrounds as approximately 10 minutes walk and 400 meters impact area and for the neighbourhood-quarter parks as approximately 20 minute walk and 800 meters impact area. As for Cetiner (1991) and Herzele and Wiedemann (2003) who share the same view, they indicate that while the play and rest areas of a neighbourhood unit is at a 400-meter impact area, then with a rest area or a playground area within the same scales as a vicinity, this distance is 800 meters. In addition, Onder et al. (2011) defines 20 minute walking and 800 meters impact area for the sports facility

areas and approximately 30 minute walking and 1200 meters impact area for the city parks. Yenice (2012) uses this criteria in his study conducted for the city of Burdur (Table 3).

Table 3. Average walking distance to urban green spaces**.**

Function	Çetiner (1994)	Herzele and Wiedemann (2003)	Altunkasa (2004)	Önder et al. (2011)	Yenice (2012)
Children playgrounds	400	400	400	400	400
Neighbourhood-Quarter Parks	800	800-1600	800	800	800
City Park	-	3200	-	1200	-
Sport Facility	-	-	-	800	800

Within the scope of this research, the ideal walking time and the accessibility distance of the urban green spaces, based on their functionality and user groups; the children's playgrounds are expected to be 400 meters, neighbourhood-quarter parks and sporting facility areas 800 meters and city parks 1200 meters. And within this methodology, the analytical maps were examined which were produced based on the green area existence, spatial adequacy and accessibility indicators of the Aksaray.

3. Results and Discussion

The city of Aksaray is located in central Anatolia, which is also known as Cappadocia. Findings obtained from the archaeological excavations near city vicinity indicate that it was a permanent settlement region from the Neolithic area to the present day (Özkan, 1994). The fact that the Aksaray is located on the route of the historical Silk Road and on the east-west-north-south junction of Anatolia has made the city very important throughout history. The spatial development of the Aksaray city entered a rapid growth pattern with the establishment of the Mercedes Benz-Turkish truck factory in 1986. The completion of the establishment phase of the Aksaray University in 2006 points out that the urban population will increase further, thereby increasing the spatial development of the city. According to the 2011 address-based population registration system data, the city of Aksaray, which is made up of 44 neighbourhoods, now as a population of more than 160,000 (Figure 1).

Figure 1- The location of Aksaray city in the middle Anatolia

In the studies conducted in the 44 neighbourhoods of the city, it was determined that there is a total of 81.03 ha of urban green space. Of this 16.97 ha are neighbourhood-quarter parks, 20.86 ha are children's playgrounds, 23.59 ha are sports facility areas and 19.60 ha are city parks. When the urban green space amount per capita is analyzed on a neighbourhood level, only 5 neighbourhoods have the minimum of 10 m² green spaces per capita, predicted as per the current Zoning Law, which draws our attention. And in 7 neighbourhoods, there was no space allotted for urban green use (Figure 2). If we were to make an assessment throughout the city, the value of urban green space per capita is 4.80 m². When this value is compared to the cities of the European Unit; aside from being quite low, it also does not meet the requirements of the Zoning Law which regulates the values of green spaces in Turkish cities (Table 4).

Table 4. Examining, on a neighbourhood level, the green space of Aksaray city in terms of per capita indicator

Neihgborhood Name	Population (person)	Park (m²)	Children Playgrounds Areas (m²)	Sport facilities Area (m²)	City Park (m²)	TOTAL (m²)	m²/person
Bahçeli	3271	0.00	0.00	0.00	0.00	0	0.00
Bayram Baba	485	0.00	0.00	0.00	52000	52000	107.22
Bedir Muhtar	664	0.00	0.00	0.00	0.00		0.00
B.Bölcek	11333	19162	18638	0.00	0.00	37800	3.34
Çerdiğin	4026	871	2415	0.00	0.00	3286	0.82
Çiftlik	3244	5012	801	0.00	0.00	5813	1.79
Çoğlakı	5577	2074	3800	20473	0.00	26347	4.72
Cumhuriyet	2809	0.00	0.00	0.00	0.00	0	0.00
Dere	928	3000	300	0.00	0.00	3300	3.56
Ereğlikapı	8439	3900	20082	5000	0.00	28982	3.43
Fatih	11356	28730	18835	15600	0.00	63165	5.56
Hacı Hasanlı	3152	10000	500	0.00	0.00	10500	3.33
H.Harmanı	4239	6900	9300	0.00	0.00	16200	3.82
Hasas	5191	1370	10375	0.00	0.00	11745	2.26
Hamidiye	3188	600	700	0.00	0.00	1300	0.41
Hürriyet	3223	1350	5915	0.00	0.00	7265	2.25
Kalanlar	243	0.00	0.00	0.00	77000	77000	316.87
Kılıçaslan	6603	4130	8276	0.00	0.00	12406	1.88
Kurtuluş	4380	0.00	7800	5700	0.00	13500	3.08
K. Bölcek	11121	5980	11418	10950	0.00	28348	2.55
Laleli	2952	0.00	0.00	0.00	0.00	0	0.00
Meydan	5766	4130	6502	0.00	0.00	10632	1.84
M.Akif Ersoy	2439	0.00	7600	0.00	0.00	7600	3.12
Minarecik	156	3000	0.00	0.00	0.00	3000	19.23
Muhsin çelebi	786	0.00	0.00	0.00	0.00	0	0.00
Nakkaş	3040	0.00	0.00	0.00	0.00	0	0.00
Pamucak	2660	300	3000	0.00	0.00	3300	1.24
Paşacık	6043	6970	12820	0.00	0.00	19790	3.27
Pınar	3963	0.00	4899	0.00	0.00	4899	1.24
Selçuklu	2050	0.00	3828	0.00	0.00	3828	1.87
Sofular	1000	2100	900	0.00	0.00	3000	3.00
Şeyh Hamit	4155	1500	4100	0.00	0.00	5600	1.35
Şamlı	1472	0.00	675	0.00	0.00	675	0.46
Somuncu Baba	1026	0.00	0.00	0.00	0.00	0	0.00

Şifahane	3607	1700	10660	0.00	0.00	12360	3.43
Taşpazarı	12884	6360	10339	31412	67000	115111	8.93
Tacin	3462	0.00	6220	0.00	0.00	6220	1.80
Zafer	2998	18436	1404	0.00	0.00	19840	6.62
Zincirli	735	500	0.00	0.00	0.00	500	0.68
İstiklal	1124	12450	0.00	113000	0.00	125450	**111.61**
Yavuz Sultan Selim	5380	10400	0.00	0.00	0.00	10400	1.93
Yeni sanayi	3073	1900	7660	0.00	0.00	9560	3.11
Yeni Mahalle	878	0.00	2750	0.00	0.00	2750	3.13
Yunus Emre	3634	6900	6100	33840	0.00	46840	12.89
TOTAL	**168755**	169725	208612	235975	196000	810312	4.80

When Aksaray's green space use is evaluated, in terms of size, it is seen that 98% of the children's playgrounds are below the value of 0.80 ha, which is considered to be the minimum ideal criteria. When the distribution of the parcel size of the children's playgrounds is examined, it is observed that the 30.61% of them are below the value of 0.1 ha, 22.45% of them between 0.1-0.2 ha and 34.69% of them between are between 0.20-0.40 ha. Similarly, none of the neighbourhood- quarter parks meet the value of 2 ha, which is considered to be the minimum area size within the ideal criteria. 20.75% of the neighbourhood- quarter parks are below the 0.1 ha, 33.96% between 0.1-0.2 ha, 24.53% between 0.2-0.4 ha and 20.75% of them are between 0.40-0.60 ha (Table 5).

Table 5. Spatial size distribution of Aksaray city's urban green areas

	< 0.10 ha	0.10-0.20 ha	0.21-0.40 ha	0.41-0.60 ha	0.61-0.80 ha	0.80 ha and above	TOTAL
Children playgrounds							
Number	30	22	34	8	2	2	98
Rate (%)	30.61	22.45	34.69	8.16	2.04	2.04	100.00
Neighbourhood-quarter parks							
Number	11	18	13	11	-	-	53
Rate (%)	20.75	33.96	24.53	20.75	-	-	100.00

When the spatial size of the Aksaray's sports areas is examined, within the framework of ideal criteria, it is seen that only 1 sports are in 4,00 ha and over. While 50% of the sports facility areas are smaller 2.00 ha, 30% of them are between 2,01-3,99 ha. These findings indicate that the sports areas of Aksaray are quite smaller than the ideal criteria. When the city parks of Aksaray are examined within the framework of the ideal criteria, it is seen that they do not meet the ideal minimum size of 40 ha. In fact, it is observed that there are 2 urban green space areas evaluated within the framework of Aksaray's city park and these parks are between 6.70 ha and 12,90 ha in size. All the findings point out that the city of Aksaray is well behind the accepted ideal criteria in terms of the spatial size of the open green space.

When the children's playgrounds, neighbourhood- quarter parks, sports areas and city parks which make up the green areas of the Aksaray city are are evaluated for their accessibility to the population, it can be said that almost 87% part of the urban space is at a level where it can reach any of these green spaces (Table 6).

Table 6: Examining, on a neighbourhood level, the green space of the Aksaray city in terms of accessibility indicator

Name of Neighborhood	Neighborhood Area (ha)	Children Playground Effected Area (ha)	Rate of Poor Area (%)	Total Park Effected Area (ha)	Rate of Poor Area (%)	Total Sport Facilities Effected Area (ha)	Rate of Poor Area (%)	City Park Effected Area (ha)	Rate of Poor Area (%)
Bahçeli	45.6126	16.6911	63.41	36.7089	19.52	39.6849	13.00	24.4119	46.48
Bayram Baba	16.6284	15.1807	8.71	16.6284	0.00	0.00	100.00	16.6284	0.00
Bedir Muhtar	18.4295	12.9167	29.91	18.4295	0.00	0.00	100.00	18.4295	0.00
B.Bölcek	74.1088	74.1088	0.00	74.1088	0.00	74.1088	0.00	74.1088	0.00
Çerdiğin	22.3311	22.3311	0.00	22.3311	0.00	2.4792	88.90	21.3565	4.36
Çiftlik	380.4734	177.1516	53.44	307.1738	19.27	75.0102	80.29	0.00	100.00
Çoğlakı	55.9947	53.8695	3.80	55.9947	0.00	55.9947	0.00	55.9947	0.00
Cumhuriyet	557.3864	4.2593	**99.24**	149.4073	**73.20**	12.2721	97.80	0.00	100.00
Dere	6.4575	6.4575	0.00	6.4575	0.00	0.1278	98.02	3.3690	47.83
Ereğlikapı	106.4081	106.1466	0.25	106.4081	0.00	104.1148	2.16	29.6078	72.18
Fatih	108.9460	106.2137	2.51	108.9460	0.00	108.9460	0.00	0.00	100.00
Hacı Hasanlı	13.2673	13.2673	0.00	13.2673	0.00	13.2673	0.00	12.5959	5.06
H.Harmanı	397.3372	69.2250	**82.58**	274.6345	30.88	14.3175	96.40	55.6711	85.99
Hamidiye	10.8502	10.8502	0.00	10.8502	0.00	10.8502	0.00	1.7795	83.60
Hasas	171.6299	115.7022	32.59	123.3991	28.10	0.5162	99.70	2.8069	98.36
Hürriyet	381.1605	125.7839	67.00	137.3387	63.97	0.2252	99.94	0.00	100.00
İstiklal	235.1802	66.1881	71.86	170.4218	27.54	150.8196	35.87	0.00	100.00
Kalanlar	28.2953	16.6561	41.13	28.2953	0.00	4.1449	85.35	28.2953	0.00
Kılıçaslan	56.1278	56.1278	0.00	56.1278	0.00	56.1278	0.00	22.0741	60.67
K. Bölcek	143.6758	140.1271	2.47	143.6758	0.00	121.3615	15.53	80.6867	43.84
Kurtuluş	120.4043	73.7077	38.78	64.1162	46.75	75.3118	37.45	0.00	100.00
Laleli	849.4761	31.2847	**96.32**	137.3795	**83.83**	48.2634	94.32	0.00	100.00
M.Akif Ersoy	208.3428	119.9374	42.43	108.1712	48.08	6.3580	96.95	0.00	100.00
Meydan	31.5199	31.5199	0.00	31.5199	0.00	0.8124	97.42	17.4283	44.71
Minarecik	5.6627	5.6627	0.00	5.6627	0.00	2.8168	50.26	1.9291	65.93
Muhsin çelebi	2.5880	2.5880	0.00	2.5880	0.00	0.0927	96.42	2.5880	0.00
Nakkaş	99.6326	99.4178	0.22	90.9379	8.73	61.8146	37.96	21.5970	78.32
Pamucak	13.1196	13.1196	0.00	13.1196	0.00	12.6584	3.51	13.1196	0.00
Paşacık	97.4888	90.4959	7.17	97.4888	0.00	38.0091	61.01	82.2557	15.63
Pınar	45.6779	45.1676	1.12	45.6779	0.00	45.6779	0.00	0.00	100.00
Şamlı	14.8708	14.8708	0.00	14.8708	0.00	0.00	100.00	10.4375	29.82
Sanayi	408.1124	144.0725	64.70	161.5357	60.42	31.1588	92.37	30.5292	92.52
Selçuklu	156.8362	55.0891	64.87	39.2102	75.00	0.00	100.00	15.1215	90.36
Şeyh Hamit	45.9515	44.0012	4.24	45.9515	0.00	10.3705	77.43	45.9037	0.10
Şifahane	129.7501	107.0560	17.49	129.7501	0.00	0.00	100.00	7.8967	93.91
Sofular	9.7322	9.7322	0.00	9.7322	0.00	9.5155	2.23	9.7322	0.00
Somuncu Baba	380.3324	1.0768	**99.72**	0.6605	**99.83**	0.00	100.00	0.00	100.00
Tacin	291.3033	50.9590	82.51	125.7939	56.82	53.2026	81.74	89.615	69.24

Taşpazarı	102.8188	102.8188	0.00	102.8188	0.00	99.8067	2.93	98.0428	4.65
Y.Sultan Selim	265.7413	0.00	**100.00**	123.1119	53.67	0.00	100.00	0.00	100.00
Yeni Mahalle	436.8060	59.9074	86.29	0.0	**100.00**	0.00	100.00	0.00	100.00
Yunus Emre	432.9327	87.6445	79.76	158.6649	63.35	177.9819	58.89	0.00	100.00
Zafer	123.8385	71.9011	41.94	119.6811	3.36	0.00	100.00	48.3940	60.92
Zincirli	2.8783	2.8783	0.00	2.8783	0.00	1.5687	45.50	0.8972	68.83
TOTAL	7106.1200	247.41654	65.18	3491.9282	50.86	**1519.7902**	78.61	**943.30448**	86.73

Especially in neighbourhoods located in the city centre where the urban population is dense, these services can be accessed within walking distance. When these urban green spaces are approached according to their functions, they differ. For example, when the children's playgrounds are examined, it is alarming that 99.24% of the Cumhuriyet Neighborhood boundaries, 96.32% of Laleli Neighborhood , 99.72% of Somuncu Baba Neighborhood and all of Yavuz Sultan Selim Neighborhood , all located within the city's boundraies, are not able to access green space. The distance to the closest children's playground for the residents of these neighbourhoods is as far as 4 km in some regions. As for the entire city, 65.18% of the total neighbourhood boundaries are outside the accessibility distance that is indicated for the children's playgrounds.

A similar situation is also observed for both neighbourhood and city parks. While the accessibility level in the neighbourhoods located in the city centre is high, more than 90% of the area in regions such as Cumhuriyet, Laleli, Somuncu Baba and Yeni Mahalle, have poor access to green space. The distance to the closest neighbourhood and quarter park in some regions of the Yeni Mahalle and Laleli Mahalle is over 4 km. When the distribution of the neighbourhood and vicinity parks throughout the city is evaluated, it is observed that 50.86% of the neighbourhood boundaries are outside the ideal maximum accessibility distance.

When the sports area facilities throughout the city are examined in terms of accessibility, it is observed that 78.61% of the neighbourhoods are located outside the impact area.With regard to the perimeter neighbourhoods located at the southwest, west and north-west of the city, it is seen that 7 of the neighbourhoods are deprived of urban sports activity areas. The closest distance to the nearest urban sports facility for these neighbourhoods is up to 4,000 meters (Figure 2).
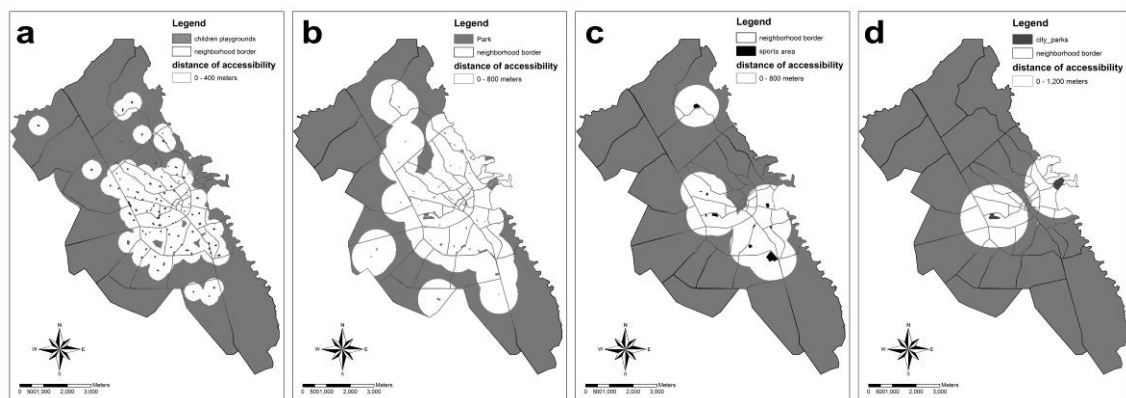
Figure 2 - Acessibility maps of urban green areas a) Children playground b) Neighborhood-quarter Parks c) Sport area d) City park

When the Aksaray city's city parks are evaluated within the framework of accessibility criteria, it is observed that 86.73% of the city is outside the city park impact area. While the large part of the centre neighbourhoods where the city population is dense is located within the 1200 meters walking distance specified for the city parks, the distance for the outlying neighbourhoods of the city reaches to 4000 meters Figure 3.
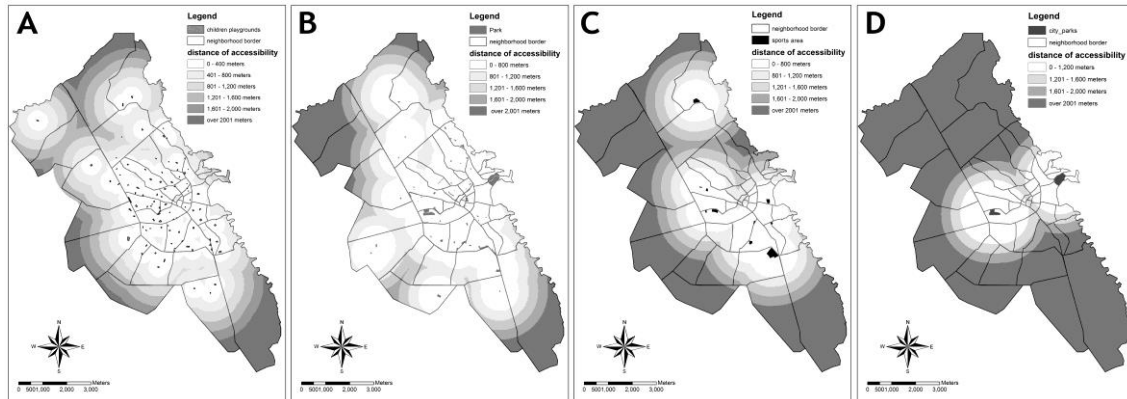
Figure 3- Acessibility distance for urban green areas a)Children playground b)Neighborhood-quarter parks c) Sport area d) City park

4. Conclusion

This study emphasizes the need to include the value of the urban green space per capita along with the spatial size and accessibility level of the green spaces when measuring the urban green area adequacy. The findings obtained in this study as a result of the examinations run within the scope of area size per capita, spatial/parcel size and accessibility indicators, and the developed analytical solutions are listed below:
- In terms of Aksaray's green space presence values per capita, it is relatively low when compared to the cities of the European Union. At the same time, these values do not meet the requirements of Turkish Zoning law.
- In terms of surface area, the children's playground areas, neighbourhood- quarter parks, city parks and sports facility areas, which make up the presence of the green space in the Aksaray city, are much less than both the ideal criteria values and the amounts mentioned by Westmacott (1991) and Burke and Ewan (1999) and not large enough to be a habitat for wildlife.
- In terms of accessibility indicator of the presence of urban green space, the city of Aksaray shows an uneven distribution within the city.

The findings obtained from the study points to the need for a system that makes effective use of urban green space, and the need for the planning strategies that will create this. In this context, a new spatial organization should be constructed to make big enough and close enough to the population. In fact, in the studies focusing on the effectiveness of green space within the urban land-use pattern; it was observed that a spatial organization was set up which is made up of compact urban pieces or urban sub-settlement units surrounded by green areas, their population varying between 10,000 to 30,000, and consist of social, economic and cultural activity areas, and based the walking time and distance (Frey, 1999; Beatley, 2000). However, only the principle-based adjustments may result in developing partitive/point resolution for the city as a whole, far from the system setup. As for the structure of the small, partitive and disorganized green space; it is possible to state that it contains some negativity from increasing the maintenance and operating costs to containing insufficient plant tissue, and from the inability to provide the opportunity for the development of wildlife to being insufficient in terms of

microclimate effect (Westmacott, 1991; Esbah, 2006). At this point, when both the structure of the Aksaray city's form and the research conducted on this subject are examined, it can be observed that, for the city as a whole, there is a main green corridor and a connected urban green system generated by the sub-corridors connected to this. In fact, while Jim and Chen (2006) specify that besides the contribution of the green areas that have a linear structure, in terms of the microclimate effects of green areas; Westmacott (1991) emphasizes that linear-formed landscape structures show more interaction and harmony with the urban texture. While Turner (1998) describes that this setup creates 'green routes' that provide possibilities for the walking trails and bicycle paths as well as containing a structure that enables the integration of open areas, Ozcan (2006) states that the green corridor system with differential and unifying features of the urban functional areas also creates ecological connectivity channels for the whole city. Based on the finding of this study, a secondary green corridor structure was set up which transmits sub-settlement units and a main green corridor that also consists of city centre to the main green door and eventually to the city centre including the east-west and north-south direction directed at the entire city (Figure 4).
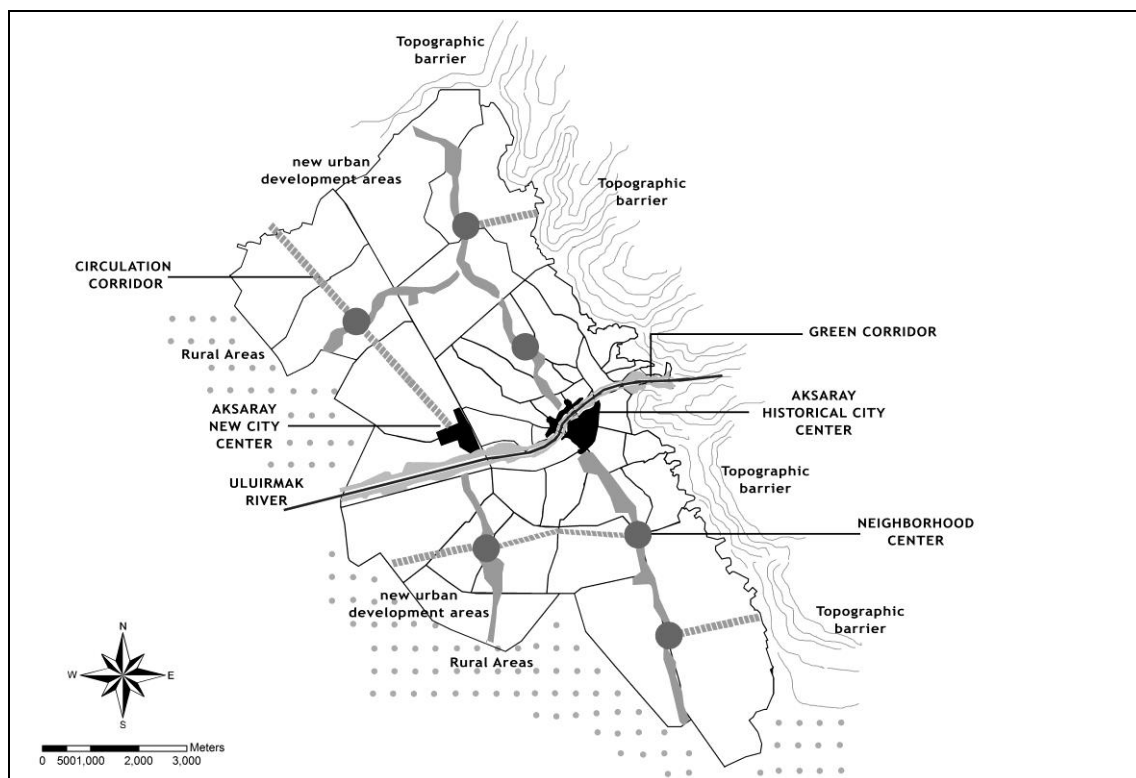
Figure 4- Urban green system proposal for Aksaray city

In terms of urban development dynamics of this system, aside from being flexible and open to improvement, it is thought that it also carries a connection feature that integrates the city centre with the neighbourhood perimeters by the riverside of the 'Uluirmak' river. Design-planning principles of this urban green system that is targeted for the future of Aksaray city are defined as follows:
- Ensuring the balanced distribution within the whole city in terms of spatial adequacy and accessibility of the urban green uses that have different functional structures;

- Setting up the green corridor with a connection feature that integrates the city centre, sub-settlement unit centres and the riverside of the Uluirmak River at the same time;
- Ensuring the pedestrian-bicycle access options in order to strengthen the connection feature of the green corridor structure,
- Increasing the appeal of the sub-settlement unit centres along with their social, economic and cultural activity opportunities and transforming them into centre of attention.
It is thought that this study, which examines the sufficiency of the urban green spaces according to their spatial adequacy and accessibility criteria, will contribute to the determination of the design-planning principles of the future-oriented urban green space system and benefiting from the neighbourhood-level green spaces of Aksaray, as well as contributing to the research studies aimed at measuring the adequacy of the green space uses in other cities of Turkey.

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