Available online at www.sciencedirect.com

ScienceDirect

Procedia Engineering 161 (2016) 1697 – 1703

Procedia Engineering

www.elsevier.com/locate/procedia

World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium 2016, WMCAUS 2016

Method for Assessment of the Historical Urban Landscape

Kaya Tanriverdi Aysegul[a,*]

[a] *Duzce University Faculty of Forestry, Department of Landscape Architecture, Duzce-Turkey*

Abstract

The city in Turkey now known as Konuralp was important during the Ottoman period, and is the site of the antique city of Prusias ad Hypium, with a rich historical past in the Hellenistic period. At present, the cultural landscape district of the ancient residential area of Prusias ad Hypium is threatened by growth of the university, and industrial plants are replacing surrounding farmlands. This study aimed to evaluate the natural and cultural resources of Konuralp, to assess the vulnerability of its urban legacy under socio-economic pressures, and to integrate urban heritage values using the historical urban landscape approach. For this study, urban conservation was regarded as the tool for the management of change by integrating it into the broader planning framework. This research examined the city's historical urban landscape by using survey methods and remote sensing to assess the landscape character exchange between the years 1982 and 2015.

Peer-review under responsibility of the organizing committee of WMCAUS 2016

Keywords: historical urban landscape; landscape character; landscape metrics; Konuralp;

1. Introduction

A historic urban landscape is defined by UNESCO as "*the urban area understood as a result of a historic layering of cultural and natural values and attributes, extending beyond the notion of historic centre or ensemble to include the broader urban context and setting*". The urban landscape is a distinctive feature of every city, the values of which must be preserved and enhanced through policies and public participation [1]. After the industrial revolution, due to

* Corresponding author. Tel.: +90 532 5049260;
E-mail address: aysegulkaya@duzce.edu.tr

Peer-review under responsibility of the organizing committee of WMCAUS 2016
doi:10.1016/j.proeng.2016.08.648

development and growth of transportation, communication and developing production techniques, the environmental values of cities were rapidly consumed. Spatial identity began to disappear due to the neglect of cultural heritage, and cities lost their unique qualities and thus, began to resemble one another. However, the historic fabric contains the diversity of cultural values, ways of life and social relationships. There is also a tension between globalization and local development. Unfortunately, urban growth is transforming the face of historic cities and their settings. Nowadays, urban conservation is the current approach to maintaining the sense of community, the identity, and indeed, all cultural heritages [2]. Since 2005, intensive discussions on the meaning, character and values embedded in the historic urban landscape (HUL) have resulted in the Vienna Memorandum. The UNESCO recommendation in 2011 about the historic urban landscape is the peak point for the conservation approach.

Landscape metrics is an important tool used to understand landscape structure and landscape changes, whereby numeric data relating to landscape structure is obtained from satellite images and air photos. Landscape metrics allows objective reviews to be conducted on landscape structure and also enables changes in the landscape over time to be determined. Landscape metrics tools are used to assess the vulnerability and development of the landscape emerging over time and to determine the relations among structural features, landscape function and landscape change [3].

The landscapes of today have been shaped by the powerful, ever-present forces of anthropogenic activities in space and time. Whenever people arrive in a location, they quickly start to change it. All these changes may be seen in the different spatial sizes and numbers of the mosaic structures, the shape and size of patches in the landscape [4,5].

Landscape character assessment has an important role in the managing and monitoring of change. It can describe characteristics that make a place distinctive and facilitate the understanding of key characteristics, the sense of place and special qualities of the landscapes [6].

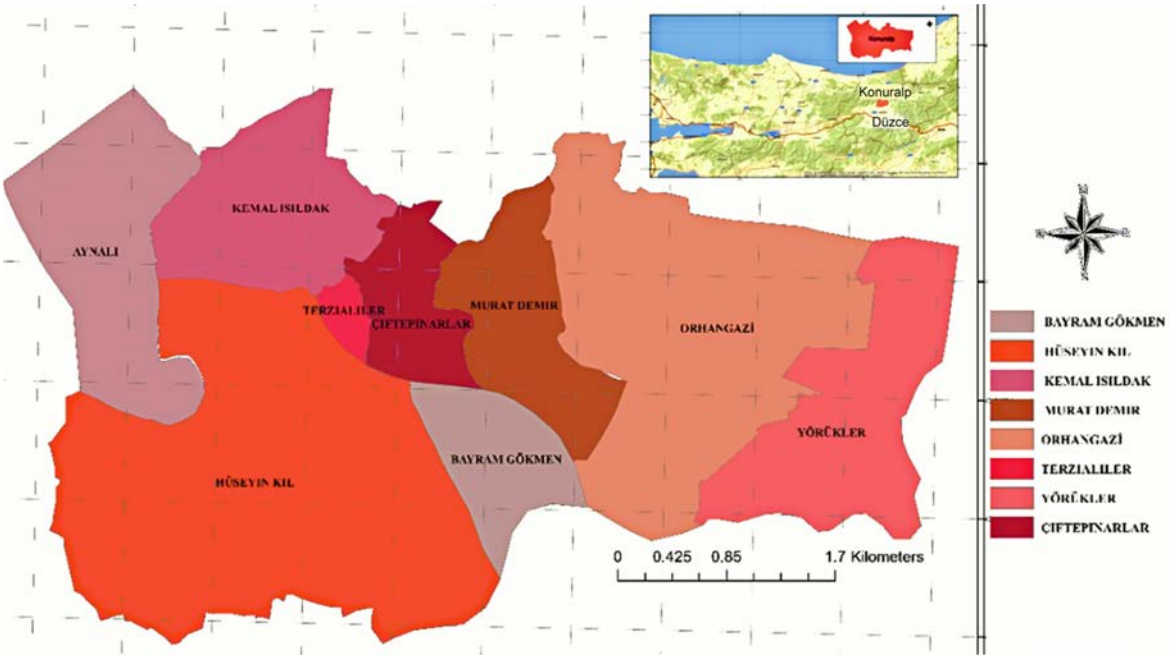

Fig. 1. Map of study area.

The city now known as Konuralp (and formerly as Kieros and Üsküb ü) is the site of the ancient city of Prusias ad Hypium. It is located in the Black Sea Region of Turkey, 8 km north of the provincial capital of Düzce. The first known information about the ancient city goes back to the 3rd century BC [7]. Some researchers have mentioned Heracles as the mythological founder of the city. On one of the coins found in the area there is a standing figure of Heracles with a Greek inscription stating “Founder of Prusias”. That Prusias ad Hypium was a colonial city connected to Heracleia was documented by the historian Memnon. After the second half of the 3rd century AD, however, the

city became smaller and poorer due to the economic difficulties in Rome. When the Byzantine Empire started to lose power, they left Anatolia to the Turks, and the Ottoman rule began in 1323 [8]. According to the topographic structure and some characteristics of the plan, it can be seen that the ancient city rests on and below a hillside. The excavations and inscriptions in Prusias ad Hypium have revealed the presence of the main characteristics of every Hellenistic city, which include a theater, a gymnasium, and an agora. Konuralp was the site of a Hellenistic city and also has the legacy of the historical Ottoman city fabric in its vernacular architecture and old plot and street patterns. All of these features constitute the historical urban landscape of Konuralp [7].

2. Study area

Düzce Province (2,593 km^2) is located between 400 37' - 410 07' N and 300 49' – 310 50' E in the Western Black Sea Region of Turkey (Fig. 1). Konuralp was recently incorporated into the Central District of the provincial capital of Düzce. The neighbourhood settlements of Kemal Işıldak, Hüseyin Kıl, Bayram Gökmen, Terzialiler, Çiftepınarlar, Orhangazi, and Murat Demir, located within Konuralp, constituted the main study area of 15.76 km^2.

3. Method

Changes in the landscape characteristics of the seven neighbourhoods between 1982 and 2015 were detected and examined based on the material list which can be seen in Table 1. Changes of settlement, green areas and roads were determined by digitizing them via ArcGIS 10 software. The year of 2014 data's which were obtained from satellite images were updated via field survey studies. Land settlement maps were generated from the data in the table under the categories of settlement (trade, industry, chicken farms), roads, and green areas (hazelnut groves, farms, poplar wood stands, rice paddies, woodlands). The patch seen as the smallest unit possible to map was regarded as the key element. Research areas with the same characteristics were digitized with the help of polygons. The polygon representing the smallest unit was defined as a patch.

Table 1. Datasets used to define the landscape character types.

Scale	Year	Material Quality	Layout
1/25 000	1982	Photometric Map	G26a1-2,
1/25 000	1997	Photometric Map	G26a1-2
*	2003.01.15	Quickbird Orthoready. resolution 50 cm 3 band , 16 bit	G26a1-2
*	2013.04.05	GE1: Orthoready. resolution 50 cm, 3 band, 16 bit	G26a1-2
*	2014.05.27	PL –PNP: Pleiades. resolution 50 cm, 3 band, 16 bit	G26a1-2

Changes in landscape character of the study area between 1982 and 2015 were represented in maps based on the study of Eetvelde and Antrop, (2009) [5]. Settlements, roads and green areas were mapped thematically by using the Arc GIS 10 software. As shown in Table 2, based on the patches, landscape metrics were determined for each time period according to the number of patches, proportion of types, mean patch area and patch density calculated per the different landscape character types. The number of patches gives an indication of the fragmentation of the area [3].

Table 2. Landscape metrics as expected indicators of landscape character [4].

Acronym	Landscape Metrics	Indicator for landscape character
P LCT	Proportion of landscape character type (%)	Dominance of character types, diversity, types that become exceptional.
NP	Number of patches	Degree of spatial fragmentation of character type or landscape; complexity.
AREA MN	Mean patch area	Geometric complexity, variation, landscape scale.
D	Patch density	size of landscape elements.

4. Results and Discussion

After detection of the changes by using ArcGıs software were obtained the 'Settlement', '*Green Areas*' and '*Roads*' thematic maps and relevant attribute tables of landscape characters of the research area between 1982 and 2015. The tables were scrutinized and interpreted by means of the landscape character changes. Hüseyin Kıl neighbourhood had 93 % green areas of the area consisted in 1982, this rate withdrew to 88 % in 2015 which were consist of 29 patches (Table 3). The number of settlement patches were 102 in 2003 and the mean patch area was 0.002 km^2, the rate of landscape character type of settlements had reached to % 2. With the increment of the land settlements, the number of fragmented patches has also increased ın green areas but the size of them has decreased. The rate of the landscape character type of land settlements was 5 % in 2015 (Table 3). Orhangazi and Murat Demir neighbourhoods had low settlement landscape character type and green areas were dominant in neighbourhood in 1982. But the number of the land settlement patches and settlement landscape character type increased dramatically in 2015. Land settlements, which consist of small scattered patches in recent years, have formed bigger patches by expanding. Green areas landscape character rate was withdrawing to 60% in Orhangazi, % 70 in Murat Demir neighbourhoods (Table 3).

Table 3. Rates of the change of the landscape character types between 1982-2015.

	Landscape Character Type /Green Areas					Landscape Character Type /Settlement			
District Year	**District Area km^2**	**Patch Density %**	**Mean Patch Area km^2**	**Number of Patches**	**Landscape Character Type %**	**Patch Density %**	**Mean Patch Area km^2**	**Number of Patches**	**Landscape Character Type %**
K.Işıldak1982	1.87	7.5	0.12	14	86	16	0.004	30	6
M.Demir	1.5	10	0.09	15	87	17	0.002	26	4
Orhangazi	4.58	4.8	0.18	22	90	7.9	0.003	36	2
B.Gökmen	1.02	9.8	0.09	10	88	17.6	0.002	18	3
Terzialiler	0.18	5.6	0.05	1	28	61	0.01	11	50
Çiftepınarlar	1.08	16	0.03	17	54	39	0.004	42	14
H.Kıl	6.53	5	0.2	29	88	3.6	0.004	20	1
K.Işıldak1997	1.87	3.20	0.3	6	83	11.8	0.009	22	11
M.Demir	1.5	6.66	0.06	22	83	30	0.001	45	5
Orhangazi	4.58	3.3	0.25	15	85	9.17	0.002	42	2
B.Gökmen	1.02	2.94	0.28	3	82	19.6	0.002	20	4
Terzialiler	0.18	38,9	0.007	7	28	61	0.01	11	50
Çiftepınarlar	1.08	16	0.03	17	54	43	0.002	46	10
H.Kıl	6.53	1.23	0.75	8	92	3.52	0.005	23	2
K.Işıldak2003	1.87	2.1	0.34	4	73	9.1	0.003	17	24
M.Demir	1.5	31	0.03	47	83	51	0.003	77	15
Orhangazi	4.58	11	0.08	50	84	28	0.004	127	11
B.Gökmen	1.02	20	0.04	20	80	53	0.001	54	6
Terzialiler	0.18	38.9	0.007	7	28	61	0.01	11	50
Çiftepınarlar	1.08	24	0.02	26	51	65.8	0.003	71	17
H.Kıl	6.53	3.21	0.3	21	89	15.6	0.002	102	2
K.Işıldak2015	1.87	2.1	0.34	4	73	9.1	0.003	17	24
M.Demir	1.5	6.66	0.06	22	70	53	0.004	80	23
Orhangazi	4.58	8	0.09	35	60	29	0.013	132	32
B.Gökmen	1.02	18	0.13	18	78	25	0.008	25	14
Terzialiler	0.18	38,9	0.007	7	28	61	0.002	11	50
Çiftepınarlar	1.08	16	0.02	17	45	76	0.003	82	25
H.Kıl	6.53	1.23	0.75	8	92	17.6	0.003	115	5

Kemal Işıldak neighbourhood settlement landscape character type was 6%, green areas were 14 patches and landscape character type was % 86 in 1982 and decreased to %73 in 2015. There was not any increment in land settlements in Kemal Işıldak neighbourhood between 2003 and 2015. Bayram Gökmen neighbourhood had 18 patches and 3 % landscape character type in the land settlements in 1982, green areas had 10 patches with 88 % landscape character type. However, in 2015 the number of the patches are 25 and the mean patch area is 0.008 km^2. Land settlements, which consist of small scattered patches in recent years, have formed bigger patches by expanding. There are 18 patches and the rate of the landscape character type is %78 in green areas in 2015. Terzialiler neighbourhood had 11 patches and 50 % landscape character type in the land settlements from 1982 to 2015.

From 1997 to 2015 landscape character type of green areas have been % 28 but green land patches have been increased 1 to 7 item and mean patch area of those green land patches were smaller from 0.05 km^2 to 0.007 km^2.
The increment of number of the patches and decrease of the mean patch area shows the fragmentation of the green areas. Çiftepınarlar neighbourhood had 42 patches and % 14 landscape character type in the land settlements in 1982. But there was seen a decrease of landscape character of land settlement in 1997 then ıt was showed increment in 1997-2015. Assumed that due to increment of the roads length was caused the increment of the green areas and settlement patches' number (Fig.2).
From 1982 to 1997 landscape character type of green areas wasn't change but landscape character type in the land of settlement was decreased from % 14 to % 10.2 (Table 3). When the changes of the roads length examined was seen that there was a parallel increase with the settlement growth in Murat Demir and Orhangazi neighbourhoods but seen a dramatic increase also in Hüseyin Kıl neighbourhood that has dominant landscape character type was green areas which includes the agricultural lands (Fig. 2).

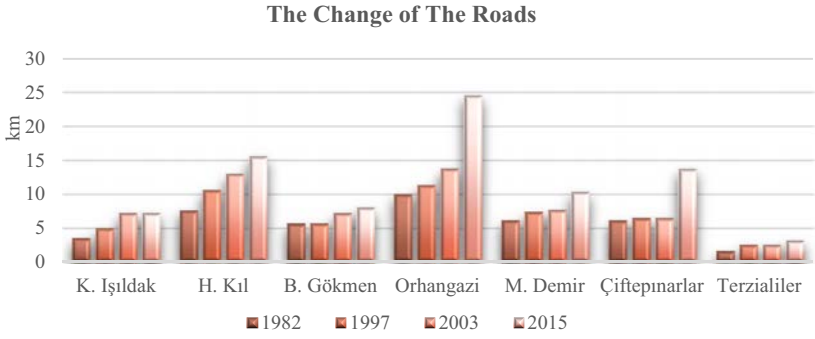

Figure 2. Graphic of change of the roads 1982-2015.

5. Conclusion

This study examined seven neighbourhoods of the ancient Hellenistic city Konuralp in terms of the changes in the historic urban landscape over the time period between 1982 and 2015. According to the research results, the number of green area patches had increased because they were fragmented, while the total extent of the green areas had decreased. Moreover, the mean patch area was smaller and the rate of land settlement had increased. In parallel with this increment, the length of the roads had also increased by 51% (Fig. 2). The Terzialiler neighbourhood was shown to exhibit landscape constancy. Through assessment of the street patterns and buılding lots, it was concluded that the historic character of the neighbourhood has been preserved over the years.
The Çiftepınarlar and Hüseyin Kıl neighbourhoods were also seen to have preserved historical bases; however, they are vulnerable to the challenges of land speculation. Since 2003, the Orhangazi and Murat Demir neighbourhoods have been popular settlement areas due to their proximity to the Düzce University campus (Figs. 3-4).
The Kemal Işıldak and Bayram Gökmen neighbourhoods have also experienced a steady increase of settlements along the thoroughfares. Except for the Terzialiler neighbourhood, the rate of green areas remains dominant, even though this rate is decreasing steadily (Fig. 5).
This shows that the neighbourhoods have the features of a rural area and that green areas have a role in defining the character and image of the city. However, urbanization is proceeding throughout Konuralp and driving settlement growth and fragmentation of urban land, both of which frequently result in drastic changes in the surrounding historical urban landscape.

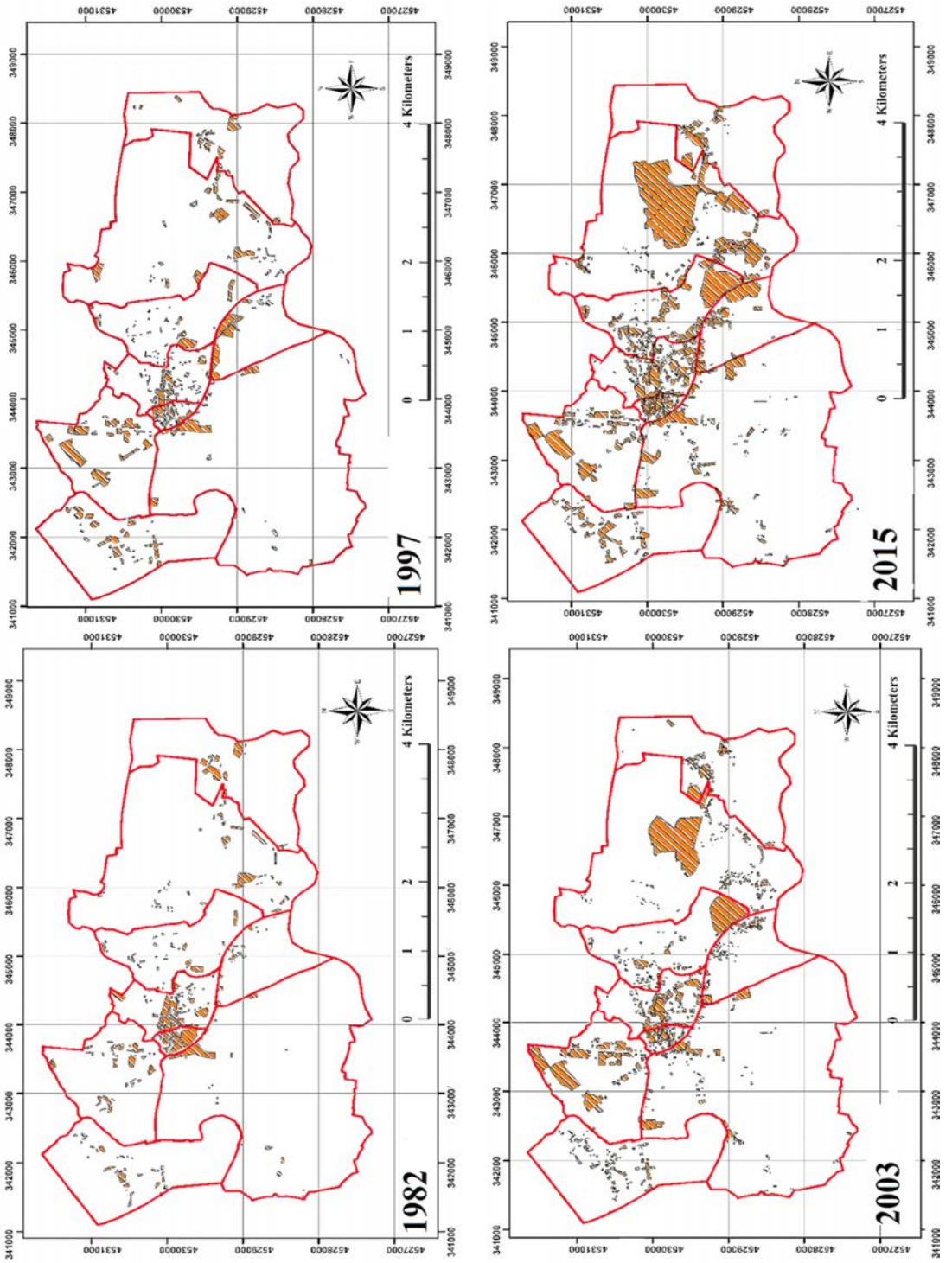

Figure 3. Thematic map of settlement change between 1982-2015.

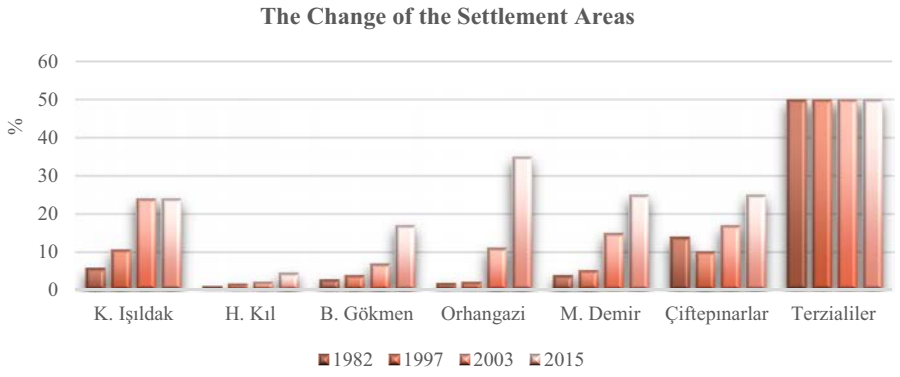

Figure 4. Graphic of change of the settlement areas between1982-2015.

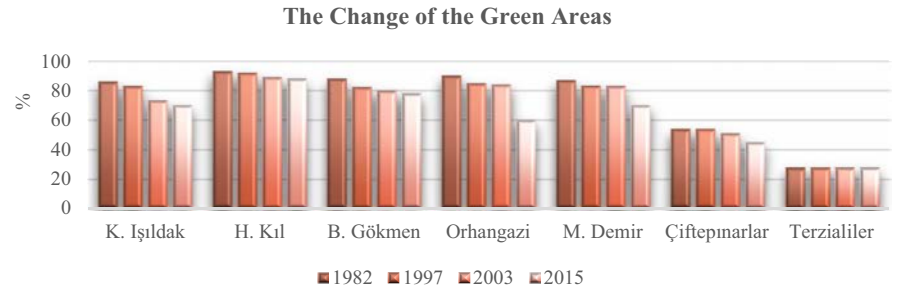

Figure 5. Graphic of change of the green areas between 1982-2015.

Acknowledgements

This project is supported by Düzce University Research Fund Project Number: 2014.02.01.280.

References

[1] Banderin F., Oers V.R.,The Historic Urban Landscape-managing heritage in an urban century, Wiley-Blackwell, 2012.

[2] Mitchell N., Rössler M., Tricaud, World Heritage Cultural Landscapes, A Handbook for conservation and management, UNESCO, 2009, http://whc.unesco.org.

[3]Gökyer E., Understanding landscape structure using landscape metrics; Ed. Murat Özyavuz, Advances in Landscape Architecture, July 2013, Intech, ISBN 978-958-51-1167-2.

[4] Antrop M. Why Landscapes of the past are important for the future, Landscape and Urban Planning, 70(2005), p21-34.

[5] Eetvelde V.V., Antrop M., Indicators for assessing changing landscape character of cultural landscape in Flanders (Belgium), Land Use Policy, 26(2009), p901-910.

[6] Tudor C., An Approach to Landscape Character Assessment, Natural England, 2014. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/396192/landscape-character-assessment.pdf

[7] Özlü Z., An ancient Ottoman city in the western Black Sea-Prusias ad Hypium, Italik press, İstanbul, 2009 (In Turkish).

[8] Zeyrek T., Çelik G.,. Prusias ad Hypium (Kieros), Ege Press, İstanbul, 2005 (In Turkish).