

Bahriye GÜLGÜN<sup>2\*</sup>  
Bahar TÜRKYILMAZ TAHTA<sup>2</sup>  
Mustafa Tolga ESETLİLİ<sup>3</sup>  
Erden AKTAŞ<sup>2</sup>

<sup>1</sup> Ege Üniversitesi Ziraat Fakültesi, Peyzaj Mimarlığı  
Bölümü, 35100 Bornova, İzmir,

\*e-posta: bahriye.gulgun@ege.edu.tr

<sup>2</sup> Ege Üniversitesi Ziraat Fakültesi, Toprak Bilimi ve  
Bitki Besleme Bölümü, 35100 Bornova, İzmir

## **İzmir Kent Örneğinde Bazı Kentsel Sitlerdeki Antropojenik Baskıların İrdelenmesi Üzerinde Bir Araştırma<sup>1</sup>**

A Research About Anthropogenic Pressures on Some Urban  
Sites in the Example of Izmir City

<sup>1</sup> Bu araştırma 2006-ZRF-010'nolu Ege Üniversitesi Bilimsel Araştırma Projesi verilerinden yararlanılarak hazırlanmıştır.

Alınış (Received):06.12.2011

Kabul tarihi (Accepted): 14.05.2012

### **Anahtar Sözcükler:**

Antropojenik etkiler, coğrafi bilgi sistemi,  
kentsel sit, tarihi alanlar

### **Key Words:**

Anthropogenic impacts, geographical  
information system, urban site, historical  
sites

### **ÖZET**

**B**u çalışmada İzmir ili Konak ilçesi sınırları içerisinde yer alan kentsel sitlerdeki antropojenik baskılar, farklı yıllar bazında ele alınarak karşılaştırılmalı olarak irdelenmiştir. Çalışmada, Kemeraltı, Konak meydanı ve yakın çevresinin mevcut durumu ve 1987, 1997 ve 2005 yılları arasındaki değişimler; hava fotoğrafları ve uydu görüntüleri kullanılarak belirlenmiştir. Elde edilen veriler CBS ortamında değerlendirilerek yapıcı öneriler getirilmeye çalışılmıştır. Çalışma sonucuna göre 1987-2005 yılları arasında tarihi Kemeraltı'nda değişim olmamakla beraber Konak Meydanı ve yakın çevresi alan kullanımında %41 oranında bir artış bulunmuştur.

### **ABSTRACT**

**I**n this study, anthropogenic pressures on the protected municipal sites within the boundary of Konak town in Izmir city are examined by comparing different years. The present status and changes in Kemeraltı, Konak Square and its vicinities between 1987, 1997 and 2005 were determined by using aerial photos and satellite images. The obtained data and results were used to form constructive proposals. According to study results, in the historical centre of Kemeraltı, no change was found while in Konak Square and its vicinity has expanded in area by approximately 41% in the years 1987-2005.

### **INTRODUCTION**

Historic environment is a potentially powerful driver for economic growth, as well as being identified as an important social and environmental asset. The benefits associated with historic buildings and places are often interrelated, with improvements to an area's image and sense of place helping to generate new economic activity and investment, which in turn can contribute towards enhancing the quality of life for all (AMION Consulting, 2010). Conserving historic urban environments is currently one of the most universally urgent and challenging cultural heritage conservation issues (The Getty Conservation Institute, 2009). However in cities where life continues there are

demands for change depending on the needs of society. In association with this, historical environments face various dangers such as neglect, abandonment, building activities and the pressures of profit speculation. It is for this reason that "site" rulings which will ensure protection in a legal scene are made (Ocak, 2003).

Like other cities in Turkey, Izmir has received a rapid migration since 1950's. This migrational movement, which has resulted in a change in the profile of the city's inhabitants, caused the separation of citizen ties. The situation which means the estrangement of citizens to the places where they used to live and not feel belong to their city is a

misfortune from the İzmir's point of view, as for all cities. This is because the fact that the accumulated culture produced by virtually every generation is unable to be passed on to the following generation is being experienced as an inevitable result. It would not be an exaggeration to tell that İzmir's historical buildup and the city identity will be totally destroyed if the rapid change in the composition of city population caused by the migration was considered (Yetkin and Yılmaz, 2006).

Urbanization has been the dominant demographic trend for the last few decades in İzmir. Towns and villages on the Aegean and Mediterranean coast have become some of today's most popular tourism centers (Bolca et al., 2007), It was pointed out that the changes on an important scale in the coastal landscape were a result of rapid urbanization (Chena et al., 2005). Also, tourism, rapid residential and commercial developments have massive effects on coastal changing (Allen et al., 1999). As in many other countries, today in Turkey also the problem of the urban and rural environment's loss of character due to intensive building activity is being experienced. In areas of historic interest which have not been designated as protected sites, it is very difficult to preserve the environmental standard with the building regime which the existing development plans bring about (Ocak, 2003).

GIS systems; highly-developed technology in the planning and protection process is the most effective means of producing more accurate data, rapid and right decisions (Erdem et al., 2003, Gülgün et al., 2009). Using high resolution/multicolour/temporal dimensions of satellite imaging quickly help to establish the regions of fast deviations where more attention and control can be paid (Yıldırım et al., 2002). The increasing volume of satellite data having multiple spatial, spectral, and temporal resolutions presents researchers with opportunities to study these problems over large areas (Dwyer, 1996).

## MATERIAL AND METHOD

### Material

The research areas are Kemeraltı and Konak Square and its vicinity (latitudes 38° 25' 25" N – 38° 24' 56" N and longitudes 27° 7' 18" E – 27° 8' 10" E) (Figure 1).

Kemeraltı (226112.77m<sup>2</sup>) which is an urban site and Konak Square and its vicinity (267992.50 m<sup>2</sup>) which is a historical site are chosen to exemplify two different protected area types in İzmir. Also their location in city center and their importance for city image since the beginning of urban development are the other reasons to be chosen as research areas.



Figure 1. Location of study area (Anonymous, 2007; Google Earth Image, 2010)

Right along with the main research material (study area), 1/25.000 scaled topographic and 1/5.000 scaled cadastral maps, KVR-1000 satellite image (1 m spatial resolution) taken in 1987, 1/10.000 scaled aerial photos taken in 1997 and IKONOS (4 m spatial resolution) satellite image taken in 2005 were used as research material during the study. Also the software Image Analyst (Intergraph, 2009), PCI Geomatics (Geomatica, 2002), Geomedia Professional 6.1 (Geomedia 2010), and İzmir City Guide 2.0 (I.M.M., 2009) were used in the study.

### Kemeraltı

Kemeraltı is a historical commercial zone which encompasses a broad area stretching from the Mezarlıkbaşı neighborhood to Konak Square. In Figure 2 the present day view of the entrance to Kemeraltı from Konak Square is seen. Anafartalar Street, which today constitutes the main street of the bazaar in which it is situated, runs in a wide curve. This curve results from the fact that the street ran around the inner harbor which used to be here in past centuries. As the harbour over time began to fill up towards its mouth, new settlement and trading areas were opened up and these were used for new buildings (T.C. İzmir Valiliği, 2006).



Figure 2. Entrance to Kemeraltı from Konak Square

In its first years this bazaar, with its in parts vaulted, tile-roofed, side streets and its 'arasta's where craftsmen of the same branch were grouped together, had the appearance of a covered bazaar. As it used to be in the past, today also Kemeraltı bazaar is İzmir's most important traditional shopping center (Figure 3). Even though the number of mystical vaulted and domed shops of the past has dwindled, with its modern business centers, stores, cinemas and cafeterias its streets have the appearance of a location which is vibrant at every hour of the day and where all types of shopping can be done (T.C. İzmir Valiliği, 2006).



Figure 3. General view of Kemeraltı

### Konak Square and its vicinity

The reverberation of the Ottoman Empire's modernization process, which began in the XVIII th century, on its cities started to be felt in the early part of the XIX th century and this transformation formed the basis for the emergence of a new urban configuration in İzmir's physical structure. For this reason, as in the empire's other cities, it is not possible for there to have been a public centre in İzmir previous to the XIX th century. Thus, the emergence of such a centre became possible as the state entered upon the route towards becoming a modern monarchy (Yetkin and Yılmaz, 2006). In Figure 4, some areas which lie within the boundary of the borough of Konak and which are of importance particularly from perspective of change have been marked. The Yalı (Konak) Mosque, Clock Tower and Katipoğlu Mansion are some of the historical works still present in Konak Square today.



Figure 4. General view of Konak Square and its vicinity

### Method

With the aim of determining the present status and changes occurring during the period between the years 1987-2005 at certain urban sites in the neighborhood of the Konak and Kemeraltı, which are situated within the boundaries of the Konak district of the city of İzmir, 1/25.000 scaled topographic maps, aerial photographs belonging to the year 1997 and satellite images belonging to the years 1987 and 2005 were used (Table 1).

Table 1. Aerialphoto and Satellite Imagery Used in Analysis

Source of Images	Acq. Date
KVR-1000	12.07.1987
Aerial Photo	15.05.1997
IKONOS	05.04.2005

The research method is based on the geographical correction and digitalization of topographic maps, aerial photos and satellite images by using Geomedia, Image Analyst and PCI Geomatics softwares, and the determination of anthropogenic impacts on the protected sites arising as a result of the changes undergone (Figure 5).

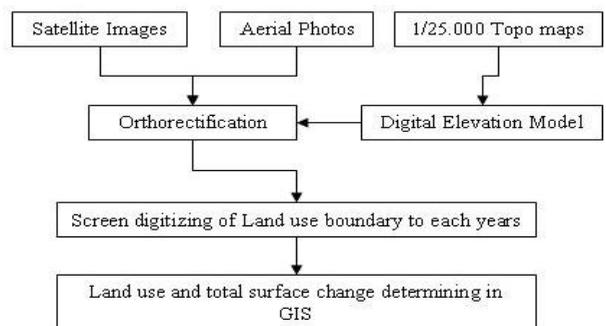


Figure 5. Flow chart of method

In order to determine to a high level of accuracy of the boundaries of the protected sites, which are the main material of the study, high-resolution images from the IKONOS and KVR-1000 satellite and aerial photos were used for orthorectification of these images, a digital elevation model (DEM) on a 1/25.000 scale formed from digital contours was used. This model was formed using the PCI Geomatics software. In addition, field work was used as support to increase the accuracy of the orthorectification. In the fieldwork, ground control points collect by using Trimble GeoExplorer 2005 GPS. In order to form a digital base map of the study area, all data such as roads, water courses and settlement areas was converted to digital form using GeoMedia software from 1/5.000 land registry maps and 1/25.000 topographical maps.

Kemeraltı and Konak Square's total surface area in each year and also the land use types were digitized by using satellite images for the years 1987 and 2005 and aerial photos for the year 1997. And also, the quantity of building types were examined depending on the program Izmir City Guide 2.0 constituted by Izmir Metropolitan Municipality.

In order to establish the changes in surface area that occurred between the years 1987, 1997 and 2005, spatial intersection method in GIS was used.

The distribution of green area and building areas within Kemeraltı and Konak Square in 2005 were determined by using satellite image and the percentages were calculated.

The increment of building types determined and depending on the finding the dominant type of use in the protected area were analyzed.

## FINDINGS

### Kemeraltı

In Kemeraltı, no change was found in the total surface area between the years 1987 – 1997 – 2005 caused by anthropogenic impacts (Table 2). Total surface area of Kemeraltı was found to be 226112.77 m<sup>2</sup> and there was not any green space in this protected area. The area taken up by buildings was determined as 195741.75 m<sup>2</sup> (86.57%) in 2005.

Table 2. Total areas at Kemeraltı in each examined year

Total protected area (m <sup>2</sup> )		
1987	1997	2005
226112.77	226112.77	226112.77

In Figure 6, a KVR-1000 satellite image pertaining to years 1987; in Figure 7, an aerial photos pertaining to the year 1997 and in Figure 8, an IKONOS image from the year 2005 of Kemeraltı and its vicinity are to

be seen. On examining the types of structures in this area, of a total 1211 buildings 28% (339) were found to be ancient structures, 23% (282) business premises, 48% (575) residential buildings and 1% (15) public buildings (Figure 9). While no change was seen in Kemeraltı between the years 1987-2005, housing was observed to exert the greatest structural area pressure. Meanwhile, the structures constituting ancient edifices come second. It has been seen that the preservation of Kemeraltı's historical fabric will only be possible with the restoration of these works and with the landscaping of the surrounding area in harmony with the historical fabric.



The boundary of research area

Figure 6. A KVR-1000 satellite image of Kemeraltı and its vicinity from the year 1987



The boundary of research area

Figure 7. An aerial Orthophoto of Kemeraltı and its vicinity from the year 1997



Figure 8. A IKONOS image of Kemeraltı and its vicinity from the year 2005

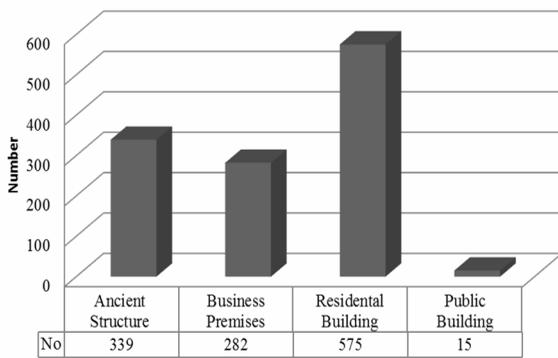


Figure 9. Building Types at Kemeraltı Historical Centre

### Konak Square and its vicinity

In Konak Square and its vicinity, which lies within protected historical site boundaries, the structural area was found to have expanded as a result of work carried out to fill in areas towards the sea. The increase seen in this area between the years 1987 - 2005 was determined as being 78654.60 m<sup>2</sup> (Table 3).

Table 3. Total areas at Konak Square and its vicinity in each examined year

Total protected area (m <sup>2</sup> )		
1987	1997	2005
18933.90	267992.50	267992.50

In Konak Square and its vicinity the historical site boundary has expanded in area by approximately 41% over the years. On looking at the aerial photo, KVR-1000 satellite image and IKONOS image it can be said that the greatest factor in this expansion is the filling-in of the sea and that there has been no change in the structural areas. However, the square has constantly been used and landscaped in different ways over the years. In Figure 10, a KVR-1000 satellite image, in figure 11, an aerial photo of Konak Square and its vicinity and in Figure 12, an IKONOS image of the same area are given.

On examining the usage types in the protected historical sites in Konak Square and its vicinity, which have a surface area for 76797.18 m<sup>2</sup> (28.66%) were open green spaces and 38,799.20 m<sup>2</sup> (14.48%) was taken up by buildings in 2005.

On examining the building types found within the boundaries of the protected historical sites, 12% (5) were found to be ancient structure, 20% (8) business premises, 56% (23) public buildings, and 12% (5) military premises (Figure 13).



Figure 10. A KVR-1000 satellite image of Konak Square and its Vicinity from the year 1987



The boundary of research area  
 Figure 11. An aerial Orthophoto of Konak Square and its vicinity from the year 1997



The boundary of research area  
 Figure 12. A IKONOS image of Konak Square and its vicinity from the year 2005

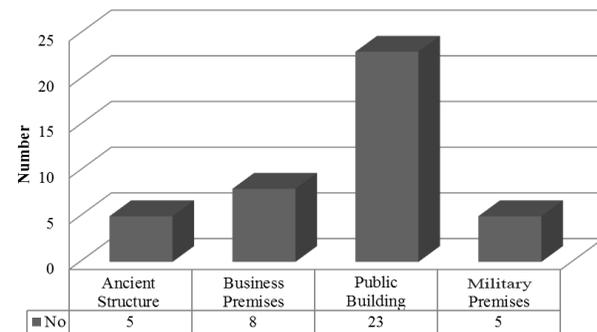


Figure 13. Building Types at Konak Square and its vicinity

## RESULTS AND SUGGESTION

The point reached as a result of the plunder and neglect which has continued for years in regard of the preservation and transmission to future generations of historical and cultural entities which have come into being over thousands of years in our country is that of losing a large portion of these entities, even if not completely (Tuncer, 2006). However in Izmir with the conservation studies at least it can be said that the historical structure is under protection but these remain in sufficient. It can be observed that according to determination of changes in years the deterioration is stopped.

Also observations relating to this study have shown the same consequences. It couldn't find any changes in the Kemeralti historical center, according to results of change detection related anthropogenic pressure between years of 1987-2005. 86.6% of the total area is building area which is shown that the area is lack and deficient of green areas. It is observed in the study area related building types 28% of them are ancient structure, 23% are commercial, while 48% are residential; naturally residential building types have the biggest pressure on site.

The preservation of Kemeralti's historical structure will only be possible with the restoration of these works and with the landscaping of the surrounding area in harmony with the historical structure.

According to results for Konak square and its vicinity shows that in 1987-2005, the most significant increasing of the area is because of backfilling works to the seawards to get new constructional lands. Meanwhile the total area was 18934 m<sup>2</sup> in 1987 and between 1997-2005 it's reached to 29799 m<sup>2</sup>. 29% of the area determined as open spaces and green areas. According to determination about building types on the historical sites; public buildings have the highest degree with 56%, commercial buildings take the second heights degree with 20% and 3rd and 4th largest buildings types are with both 12% of the area ancient works and military premises.

Shunt the sociological and economic development duration in countries, historical buildings and worth's should be conserved and renewed as its original structure. Therewithal surrounding the historical buildings should be arranged in conjunction with a harmony to their historical values. Educating the community will increase the cultural knowledge and also help to prevent historical structures on site. With collaborating conscious people and local governments works all the historical structures could reach to future. Also this ensures to have successfully implemented conservation development plans on historical sites. The aim should be having a beautiful and livable environment in a harmony with its history to leave them to the future generation.

## REFERENCES

- Allen J. S., K. S. Lu and T. D. Potts. 1999. A Gis-based analysis and prediction of parcel land-use change in a coastal tourism destination area. Paper presented at the 1999 World Congress on Coastal and Marine Tourism, Vancouver, British Columbia, Canada. (26-29 April 1999, Vancouver, BC, Canada).
- AMION Consulting. 2010. English Heritage Impact of Historic Environment Regeneration, Final Report. AMION Consulting, Liverpool. <http://www.ciq.org.uk/>. Access Date: February 2012.
- Anonymous. 2007. "İzmir Haritası". <http://www.turkiyehberi.gen.tr/sehirler/izmir-haritasi> Access Date: January 2012.
- Bolca, M., B. Türkyılmaz, Y. Kurucu, U. Altınbas, M. T. Esetlili and B. Gülgün. 2007. Determination of impact of urbanization on agricultural land and wetland land use in Balçova delta by remote sensing and gis technique. *Environmental Monitoring and Assessment*. 131(1-3), pp. 409-419.
- Chena, S., L. Chena, Q. Liua, X. Lib, and Q. Tanb. 2005. Remote sensing and gis-based integrated analysis of coastal changes and their environmental impacts in Lingding Bay, Pearl River estuary, South China. *Ocean & Coastal Management* 48, pp. 65-83.
- Dwyer, J.L., K.L. Sayler, G.J. Zylstra. 1996. Landsat Pathfinder data sets for landscape change analysis. *Geoscience and Remote Sensing Symposium, IGARSS '96. 'Remote Sensing for a Sustainable Future.'*, International. (27-31 May 1996), Lincoln, NE , USA. vol.1, Page(s): 547 – 550.
- Erdem, R., S. Durduran, T. Cay, O. N. Dülgerler and H. H. Yıldırım. 2003. An experimental study of gis-aided conversation development plan; the case of Sille-Konya. CIPA 2003 XIXth International Symposium, 30 September – 04 October, 2003, Antalya, Turkey.
- Geomatica-OrthoEngine, 8.2 ed: PCI Geomatics, 2002.
- Geomedia (2010). Professional Version 6.1.. Copyright Huntsville, AL, 35813, USA, Intergraph Corporation.
- Google Earth Image. 2010. Image Date:24.08.2010. Google Earth Version 6.1.0.5001. 2011 Google Inc. Access Date: February 2012.
- Gülgün B., B. Türkyılmaz, M. Bolca, F. Özen. 2009. An examination of the effects of land use changes on nature conservation rulings in Çeşme peninsula, Turkey. *Environmental Monitoring and Assessment*. (2009) 151:457–476.
- I.M.M., 2009. City Guide 2.0, Izmir Metropolitan Municipality Production, Cumhuriyet Bulvarı No:1 Konak/İZMİR.
- Intergraph, 2009. Image Analyst Software, Huntsville, AL, 35813, USA, Intergraph Corporation.
- Ocak, E. 2003. İzmir ve Çevresinde Tarihi Mekanlarda Peyzaj Düzenleme Çalışmalarının İrdelenmesi, (Basılmamış) Lisans Tezi, Ege Üniversitesi Ziraat Fakültesi Peyzaj Mimarlığı Bölümü, İzmir. 105 sf.
- T.C. İzmir Valiliği. 2006. Kültür ve Turizm Değerlerimiz. <http://www.izmir.gov.tr/turizm/default.aspx>, Access Date: October 2006.
- The Getty Conservation Institute. 2009. Historic Urban Environment Conservation Challenges and Priorities for Action, Experts Meeting, Meeting Report. The Getty Conservation Institute. [http://www.getty.edu/conservation/publications\\_resources/pdf\\_publications/index.html](http://www.getty.edu/conservation/publications_resources/pdf_publications/index.html). Access Date: February 2012.
- Tuncer M. 2006. Türkiye'de Tarihsel ve Kültürel Çevreleri Koruma Olgusu. [http://www.haberbilgi.com/bilim/cevre/mehmet\\_tuncer/cevrekorumam.htm](http://www.haberbilgi.com/bilim/cevre/mehmet_tuncer/cevrekorumam.htm) l, Access Date: October 2006.
- Yetkin, S. ve F. Yılmaz. 2006. İzmir'in Tarihi. Available: <http://www.izmir.bel.tr/StandartPages.asp?menuID=824&MenuName=İzmir'in%20Tarihi>, İzmir Büyükşehir Belediyesi. Access Date: October 2006.
- Yıldırım H., M. E. Özel, N. J. Divan and A. Akça. 2002. Satellite monitoring of land cover / land use change over 15 years and its impact on the environment in Gebze / Kocaeli- Turkey. *Turkish Journal of Agricultural Forestry* 26(2002), pp.161-170.