

Works on the Geographical Information System (GIS) in the Ancient Town Kelenderis in Turkey

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Key words: GIS, Archeology, Mapping, Ancient Town

SUMMARY

The ancient city of Kelenderis is located at the Mediterranean coast of Turkey in modern town of Aydıncık, which is in the province of Mersin. Scientific excavations have been undergoing for about 20 years and very interesting remains and finds were brought into light. Some of the important remains are fortification walls, theater, bath near the harbor and a part of a church and basilica of the Roman Period and other buildings dating to the 19th century AD.

In order to get databases connected with the circumstances of Geographical Information System (GIS), Geodetic and Photogrametric measurements have been taken on the area where the ancient town is placed and then the topographical structure of the site, the Photogrametric measurements of the architectural remains and their detailed reconstructions have been done; with this work some models have been created for the land usage and degradation in ancient and modern times in this area.

The methodology of GIS has not extensively been used in the excavated sites in Turkey. This work started with the collaborations of archaeologists and geodesists and it seems to be one of the good samples for this research topic. That is planned to reconstruct and simulate the numeric databases of the remains of the ancient town of Kelenderis with the use of the GIS. The result of this research will help to the study of preserving, preparing archives and restoration projects for historical sites.

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1. INTRODUCTION

In recent years, remnants which found arise in ancient city excavation, during the production of map for scientific and even advertisement purposes strengthen the of Geography Information System to benefit in variety of works. Formerly, maps of remnants of ancient cities, was the only method that was used, now Geography Information System is added. Thus, the new medium now show the of place remnants having functional, periodic and artistic specifications between found remnants and other remnants.

The town of Aydıncık (Kelenderis) is situated on the mediterranean coastline near Mersin, which is in the south of Turkey. Anamur is situated in the west while Silifke in the East of Aydıncık. It is by the highway between Antalya and Mersin. Gülnar and Ermenek towns are to the North of the town (Figure 1).

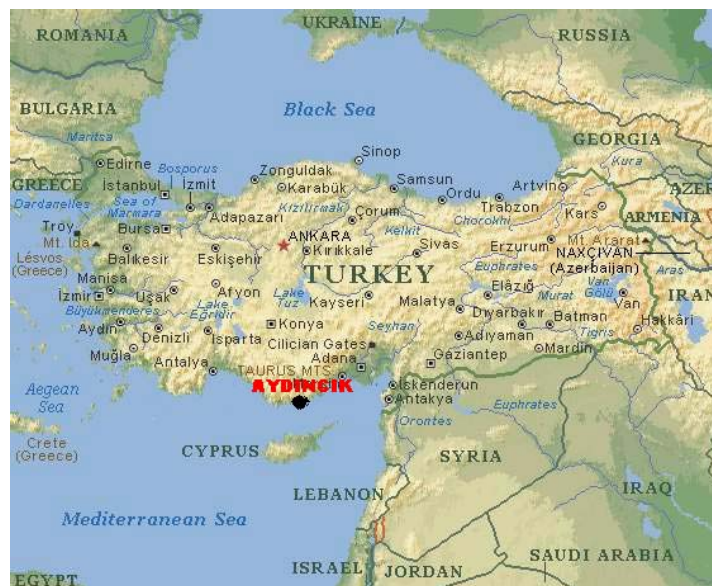


Figure 1: Aydıncık (Kelenderis) city

Sandokos who was one of the well-known local gods of Cilicians founded the city. Although there is no more suitable evidence on the first population of the city, the name must have been derived from Luwians, who were thought to be akin of the Hittites. Owing to the suitable location on the sea routes between East and West, and to the resources such as woods, mines, especially iron, lead etc. on the plateau nearby the city, Kelenderis was probably the metropolis of Hilakku region in the Iron Age and played an important role on the sea-trade.

The Phoenicians and Ionians must have also colonized the city at the end of the eight Century BC. Persians controlled the region in the fifth and fourth century BC. After the defeat of Persian by Alexander the Great, Kelenderis, probably became the city and established very close relations with the Ptolemaic Egyptians. After the dawn of this Ptolemaic patronage in the region around of 100 BC., Kelenderis seemed to be an alliance of the Romans against the Isaurian pirates. In the first half of the first Century AD, when Rough Cilicia was annexed to Kommagenian Kingdom, the city had probably lost its independence. The Parthians around of 260 AD had destroyed the city. In the late antiquity, the city became smaller, however losing importance as a harbour.

There are very scanty remains standing in the city today. Fortification walls from the Middle Age which encircles peninsula on the southern part of harbour and a few rows of classical foundations can still be seen. The cavea of the theatre is filled almost completely with earth. Remains of a bath placed near the harbour. In the necropolis of the city there are various types of tombs from the Classical, Hellenistic and Roman periods.

Excavations at Kelenderis that was begun in 1987 revealed various remains from the archaic period to the late antiquity. (Zoroğlu, 1994)

2. MAPPING AND GIS APPLICATIONS

By determining the locations of cultural and historical assets, especially historical graves remained and obtaining Digital Elevation Model (DEM) and having information about city structures of an antique age. A map of archaeological sites is made to achieve their appearance and sizes in digital form.

The data obtained by Geodetic and Photogrametric methods were processed in Geographic Information System (GIS). Layers of the excavation site and its environment were then obtained after analysing the data collected (Figure 2).

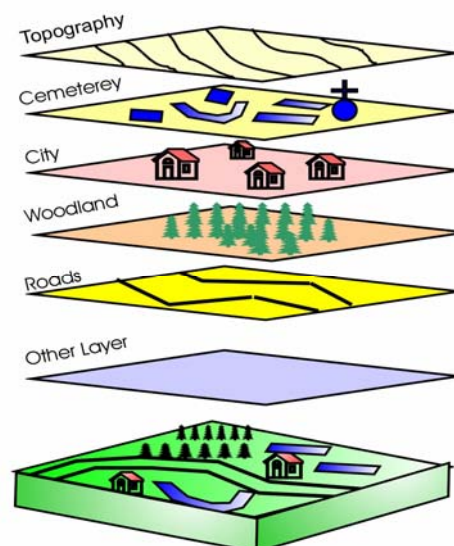


Figure 2: Layers of Excavation Site in Kelenderis

2.1 Mapping Applications

All the works done to produce the map of Aydınçık's (Kelenderis) ancient city includes Geodetic and Photogrametric works. These works are given in two titles.

2.1.1 Geodetic Measuring Works

Geodetic studies of the historical details of Kelenderis excavation site were achieved using electronic measuring distance instruments and polar measuring methods (Figure 3). The assistance of an archaeologist was benefited in recognizing the historical structure of the site during the measurement process.

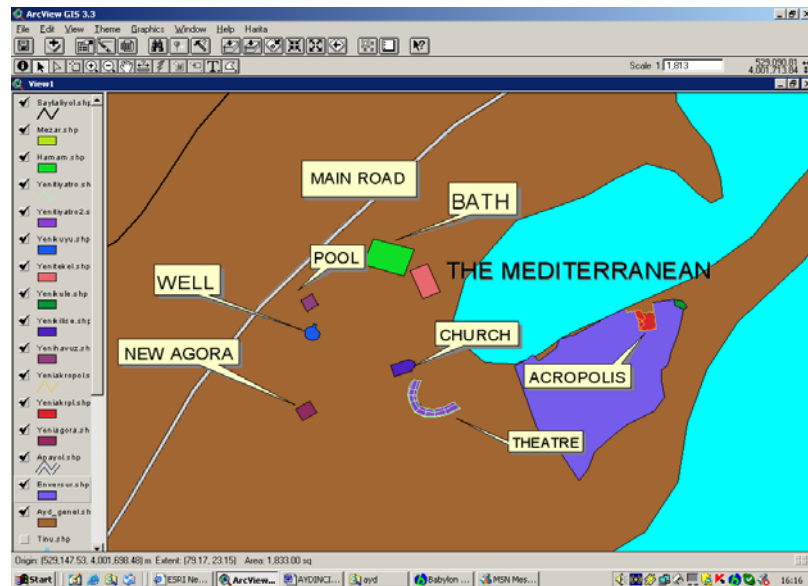


Figure 3: Applications of Geodetic Works in Antique Kelenderis Akropol

Considering the historical features of the objects, the surface and the limit points the geodetic measurements were carried out. The altitude data that would enable to draw three-dimensional (3D) map of the area were taken into account in measuring and these data were stored digitally (Figure 4).

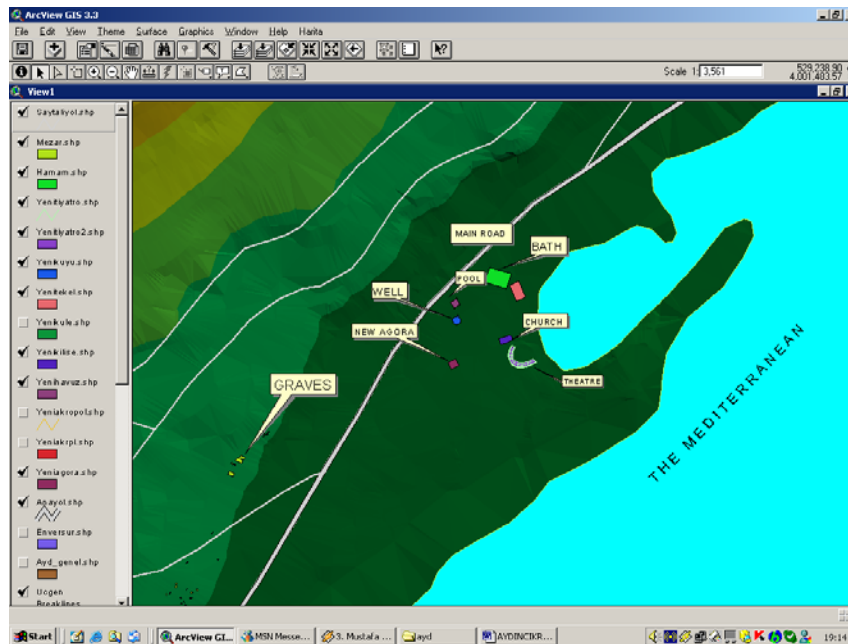


Figure 4: A View of The Lowland of Kelenderis City Site

2.1.2 Photogrametric Measuring Works

Historical graves in the excavation site were measured and evaluated by using Close-Range Photogrametric methods.

A polygon network was established around the mausoleum to obtain the Photogrametric measurements of the pyramidal roofed mausoleum. About 20 points on the surface of the mausoleum were determined with the aid of the polygons and these points were coordinated by the method of estimation. The Sokkisha Powerset 2000 instrument was used in measuring the mausoleum. The pictures were taken with a digital camera (Nikon Coolpix-950) from five or six points to form a model. These pictures were stored into the computer and they were evaluated by Photomodeler 3.0 software and then the drawings were obtained in DXF format (Yıldız and et al., 2001).

The mausoleums and structures in the Kelenderis excavation site and their relation to Geographic Information System were done (Figure 5).

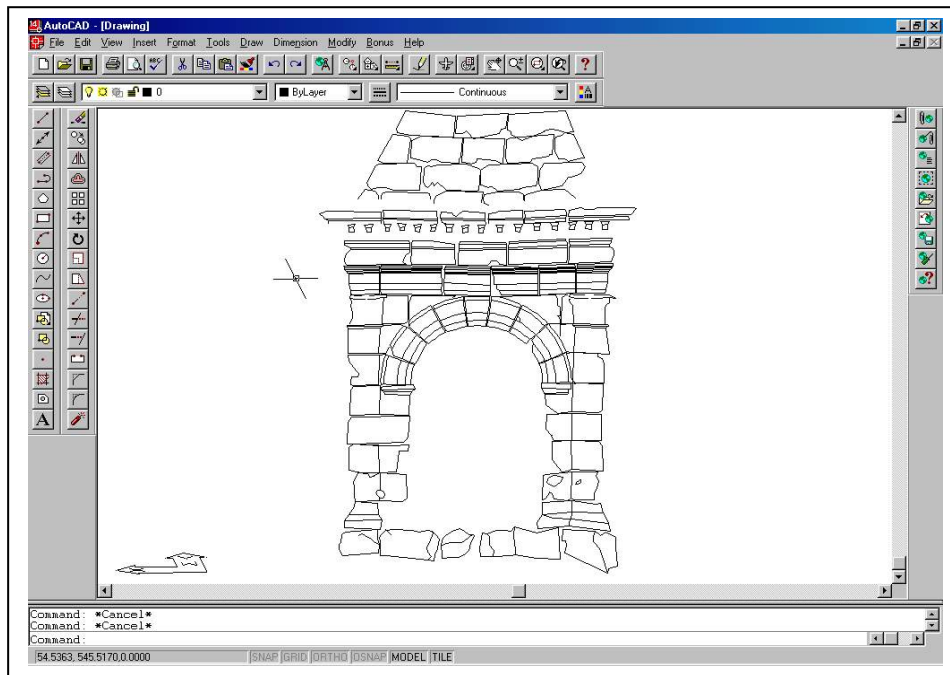


Figure 5: The Photogrammetric Evaluation of Pyramidal Roofed Mausoleum

2.2 Geographic Information System Works:

After the production of maps of the Aydıncık ancient city, the following works has been done to transfer them into GIS software.

1. First, the values of X, Y and Z detail points, which were obtained during the site measuring, were calculated. The rough measurements of the site were obtained in DXF form and then they were transformed into ArcView 3.3 software. Thus the spatial structure of the site was obtained.
2. Then, the scripts, which were written using a special Avenue Software Language, were added to ArcView 3.3 to obtain point-based data. The spatial data are being related to non-spatial data (Figure 6).
3. And then, 7 pieces of the developments maps of the area in 1/1000 scale including the excavation site were scanned in JPEG form and stored (Durduran, et al., 2002). These maps were desktop digitised in ArcView3.3 and 3D Digital Terrain Model (DTM) was obtained. The historical structural details obtained in geodetic measurements are being added to this digital terrain model to DTM.

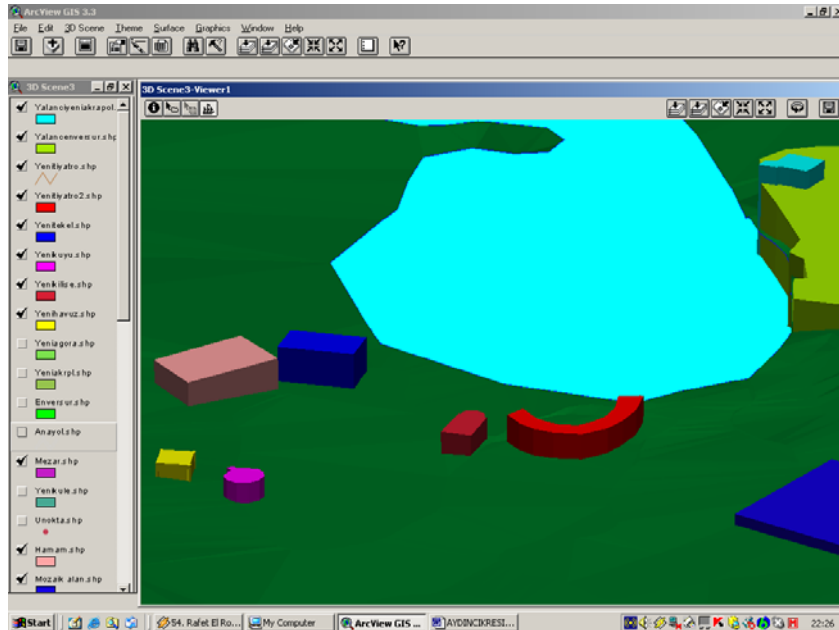


Figure 6: The Graves Found in Lowland of Antique Kelenderis Site

4. Later, it is planned to visit the excavation site and revise the details and drawings.
5. Then, in this stage, archaeological information sub-structure will be formed and then the geodetic studies will be completed.
6. Finally, it will be tried to form the Kelenderis Archaeological Information System of historical structure of Aydınçık (Figure 7).

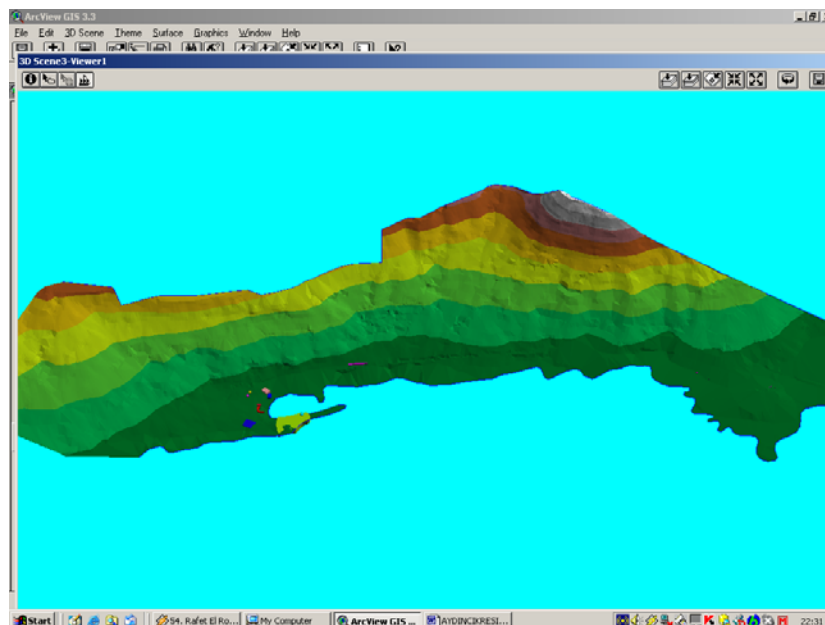


Figure 7: 3D Image of Kelenderis Excavation Site

3. CONCLUSION

The digital map of the historical structure of Kelenderis excavation site has been obtained with the aid of map applications. DEM of Kelenderis excavation site has been formed. By establishing the historical graves and remains on this model, slope and aspect maps have been obtained and a 3D map of the site has been formed (Figure 8).

Two or three-dimensional maps were formed for the archaeologists and users in the Kelenderis excavation site. Historical remains were stored into the computers in their real sizes and volumes with the assistance of numerical coordinates. (Erdi and et al., 2003)

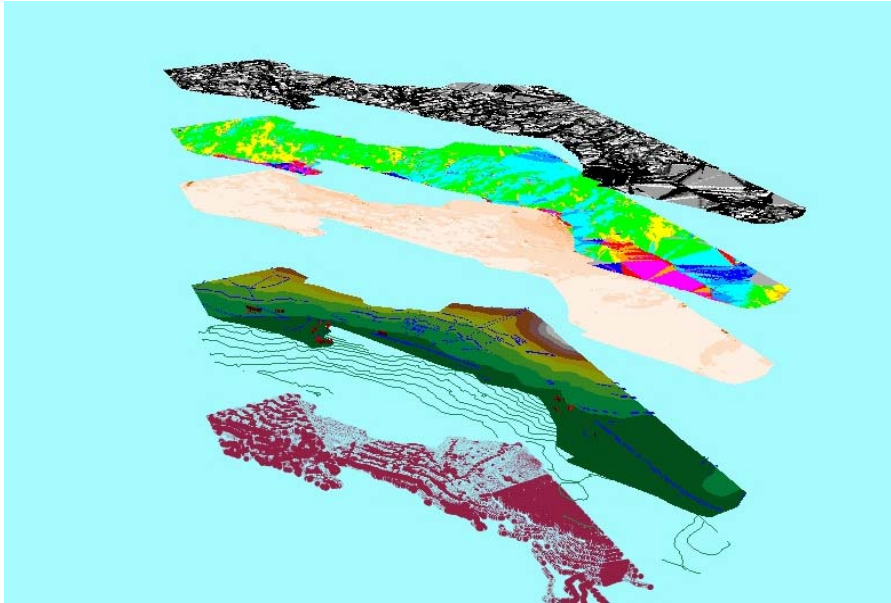


Figure 8: Dijital Elevation, Slope, Aspect, Counters and 3D Maps of The Excavation Site

In this study, the site of graveyard may help to understand the social and cultural structure of the city. It will be tried to in point whether there is a relation between the old Kelenderis and the town of Aydıncık today. When the excavation process has been completed, historical graves, baths, ancient remains will have been under earthed. The map applications of Kelenderis (Aydıncık) including the excavation site and images will help city planners, designers and architects to gain different viewpoints and thus the new developing areas of the city can be determined well with the use of GIS.

A view of the city, location of the land and a slope map have been formed with the help of the maps have been obtained from GIS. In fact, all the studies with GIS will lead us to see the differences and similarities of choice by analysing the historical structure formed in Kelenderis in the past and present situation of Kelenderis today.

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BIOGRAPHICAL NOTES

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