ARTIFICIAL CAVITIES OF GAZIANTEP (SOUTHEASTERN TURKEY)

Ali Yamaç[1], Murat Eğrikavuk[2]
[1,2] OBRUK Cave Research Group; Acikhava Apt. 16/7, Nisantasi, Istanbul, Turkey, info@obruk.org

After Hagia Sophia and Topkapi Palace of Istanbul / Turkey underground structures project that we had carried in 2008-2009 as OBRUK Cave Research Group, we began to prepare "Gaziantep Underground Structures Inventory" offered us by Gaziantep Municipality and CEKUL Foundation in November 2011.

The aim of this project was to research, document, survey and making an inventory of all the underground structure heritage which are within the borders of Gaziantep city and which are disappearing day by day because of the new constructions. It has been long known that Gaziantep, possessing a continuous inhabitancy since 3.000 BC, has hundreds of underground structures which were carved in sandy limestone. Some of those underground structures were used as storage facilities or cisterns, while some others are as yarn ateliers today. Furthermore, despite forming a huge and complex system, underground water structures whose small part can be researched due to distortions are another important phase of that project.

This study will provide evaluation together with all the other structures available on the underground structures besides protecting this cultural heritage. Additionally, it is known that some of the caves dug mostly by soft limestone may collapse under weight of wet rock and ceiling weight. This inventory study will be a reference for the future for preventing such potential hazards.

The above mentioned project is basically to detect, measure, map and process all underground structures in the old settlement area on Gaziantep surface map, with an Autocad program. Thereby, it is estimated that the coherence among all the underground and aboveground structures would not be lost.

As a result of the studies carried up to date, 48 artificial caves and water structures were explored and mapped. The project is planned to be completed by the end of 2013.

1. Introduction

As OBRUK Cave Research Group, we had carried the project of surveying and mapping of Hagia Sophia and Topkapı Palace underground galleries and chambers within years 2008-2009, headed by Dr. Çigdem Aygun. It can be accepted as a milestone that those structures, having great historical importance and heritage, have been researched by the expert cavers without giving any harm and distortion through using SRT. Within the scope of this project, 32 underground cisterns have been measured and mapped in the region which is called Historical Peninsula of Istanbul - Turkey, and a total length of 2.000 m's of tunnels had been explored and measured.

After this project and another study carried in Hasankeyf , southeastern Turkey underground structures in March 2010, a project was offered to our group after the first meeting in October 2011, for the exploration of underground structures of Gaziantep. The basics of the project and how to apply it were shaped during the following meetings. After signing of the protocol between Gaziantep Municipality and CEKUL Foundation, the studies were launched in the city.

2. Execution of the Project

- At the beginning of the study, a main zone was selected in the city. This study zone was offered by Gaziantep Municipality and CEKUL Foundation together.
- In the first stage; all underground structures in that main zone, which had been already known, were detected and underground studies started.
- In the second stage, all detected underground structures in that speficif region were measured and processed into the main city plan. Water structures, on the other hand, were searched for bevel and directions besides architectural measurements and processed into a surface map accordingly by taking surface related points as reference.
- The local people were constantly communicated and all notifications were taken into consideration. As a result of those informations, the first detected fields were crossed and various studies in different regions were carried out occasionally.
- During the study; plans, features and photographs of each underground structure were recorded as separate tags. Structures and tunnels were processed into the map. So, it is provided to reach these tag-records from the main map.
- The project is coordinated by OBRUK Cave Research Group's architect-cavers.



Figure 1. Project area

3. Geology of Gaziantep

The geological units surfaced near and around Gaziantep can be classified in three groups:

3.1. Gaziantep Formation

This unit comprises limestone and chalk. The place where the most typical surfacing are seen is Gaziantep and around and it is mixed with Fırat Formation in the region. Although it is seen as argillaceous limestone and chalk limestone, which are mostly in soft condition, thicker layered massive limestones reveal instead of these limestones. Argillaceous limestones comprise whitish, gray, cream, dingy yellow, loose and thin-middle layered and chalky levels. The unit was sediment between the ages of Upper Eosen – Mid Eosen.

3.2. Fırat Formation

This formation is surfaced as discordance with Gaziantep Formation. The formation starts with a thick layered limestone with cream, white and dingy yellow in the below of formation and goes on with much fosiliferous limestone above. In the upper formation, it comprises thick layered limestone with white and soft yellow. Limestones are generally fractured and their fractures are of calcite filling. Fırat Formation, which is younger than Gaziantep Formation is Miocene.

3.3. Yavuzeli Basalt

This middle-upper Miocene formation is seen in the south of Gaziantep. It generally comprises lava flow, which is dark brown, dark gray, blackish, cellular. Despite its large surfacing, it presents very little thickness, which changes between 10 m to 50 m.

4. Tectonics of Region

East Anatolian Fault, one of the most important faults in Turkey and extends from 50 km north of Gaziantep to the west, and Dead Sea Rift, below this fault from the south to the north, still resumes their activities in Turkey. These main faults and all of the small faults between it are all active. It is known that the earthquakes in 1526, 1760 and 1822 destroyed most of the buildings in Gaziantep.

5. Artificial Underground Structures of Gaziantep

48 artificial cavities which were detected in Gaziantep up to now, can be classified in 2 separate groups:

The first group is the underground water structures which were widely used in the past of city. There are numerous water resources around the plateau where Gaziantep is located. Despite all these resources, there is no water table under the city. Therefore, long tunnels were dug in order to bring water to Gaziantep from those springs a long time ago.

To date, some 700 m of the total tunnel length have been explored and several shafts have been investigated. These tunnels, which are called "*livas*" locally and some of whose length we know as kilometres, is very image of ancient *"qanat"* or *"karez"* which was begun implementation 2000-3000 years ago in Iran and seen in many countries like Morocco, Algeria, Egypt and China today. Those *qanat*-like tunnels of Gaziantep some of which are known as longer than 7 kilometres, carried the water from the springs to the town. There are numerous shafts (or wells) opened from the surface on these tunnels which brings water to Gaziantep. Unfortunately, the modern settlements in Gaziantep seems to destroy most of these shafts and wells.



Photo 1. A typical livas under Gaziantep (Photo: AE Keskin)

Apart from these shafts; the underground pools which are connected to surface with stairs and where can be done the washing, and the public places with small baths and lavatories are structures completely peculiar to Gaziantep. These public water areas, locally called "*kastel*" were mostly built near mosques. Although there were at least 15 "*kastels*" until 50 years ago, there are only 5 examples remained now.

Yet, even the remaining makes us have the idea about the impressive architecture of these interesting underground structures. Pisirici; among these structures, apart from its

"*kastel*", is one of the oldest structures together with an underground mosque built in 1283. The "*livas"* bringing water to this structure cannot be precisely followed due to the subsidence. Among the other "*kastel"*s, only Ahmet Celebi Kastel fits for the purpose with a slight change. The remaining 3 kastels; İhsan Bey, Kozluca and Nadir Bey, are unprotected and have been the victim of wrong modifications.



Photo 2. Pisirici Kastel (photo AE Keskin)

Various water tunnels (*livas*) like the ones in Gaziantep War Museum Cave, Tutun Han Cave, Fethullah Mosque Kastel and Omer Ersoy Culture Centre are all connected to same underground water system. On the other hand, it is detected that many shafts searched during the Project are also connected to those water tunnels. For example, there are two different tunnel connections in the 20th meter of the shaft within the 44 metres of the American Hospital entry.

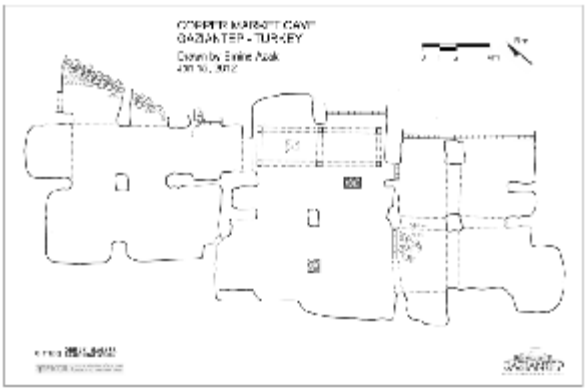


Figure 2. Plan of Copper Market Cave

Additionally, soft and easily processed limestone of Gaziantep both provides convenience for these tunnels and for building underground structures. Nearly all of the old houses have an underlying cave used as storage. The stones as a result of the excavation were used in the

there are some extraordinarily large structures which were excavated as quarries and then used as yarn or ceramic factories. For example; Akbulut Cave, which used as an underground ceramic factory for a long time, has a total area of 9.500 m^2 and one of the largest artificial cavities of Turkey. On the other hand, Uzumcu, Iplikci and Sulu caves are still being used as yarn ateliers.

As to mention Cemetery Caves, it is a gigantic system located under the modern cemetery of Gaziantep, a total area of more than 60.000 m^2, with 14 entries and used as a yarn manufacture and barn previously. It can be accepted as the largest known artificial cavity of Turkey.

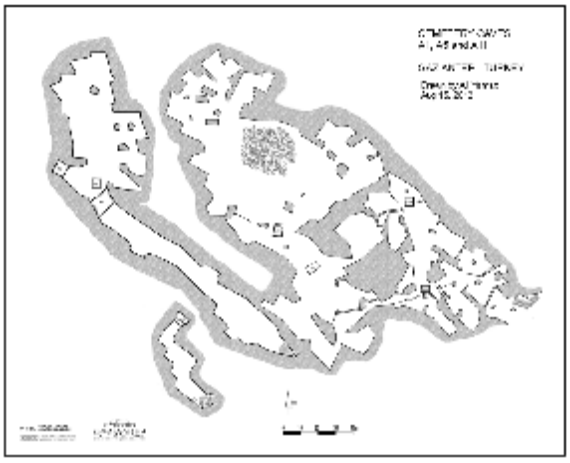


Figure 3. Plan of Cemetery Caves of Gaziantep

The unique example different from the two groups of underground structures mentioned above, is the tunnels located under the Gaziantep Castle. Those tunnels with a total lenght of 280 m, reaches the cisterns at the bottom. We believe that those tunnels whose date of building is yet unknown can be dated as a result of the archaeological researches which still continues on the castle.



Photo 3. Cemetery Cave A5Main Gallery (photo AE Keskin)

4. Future of Artificial Cavities in Gaziantep

Gaziantep is probably the richest region in terms of historical underground structures of Turkey after Cappadocia. Most of the structures that we surveyed during this project either continue to be used for its

restaurant. Yeni Han and Tutun Han caves are the beautiful examples of those underground structures which are used as cafes today.

Traditional yarn manufacturers still continue to work in some caves. It will be a preferable application that this branch of business, having an ancient tradition, would maintain its activities in the same places after the restoration of their caves.

Furthermore, Gaziantep Municipality is waiting the result of this project for the future usage of the empty Akbulut Cave, Copper Market Cave or Cemetery Caves.

On the other hand, some protected parts of underground water system, namely "*livas*" and "*kastel*"s will be restored and open to public.

Our main purpose is to make the available underground structures of Gaziantep completely protected and transferred to the next generations through this project.

References

Ambraseys NN, Finkel CF, 1995. The Seismicity of Turkey, Istanbul.

Bircan A.E. 2007. Stability Analysis of Caves in Gaziantep Region, Gaziantep University, Ph D Thesis, Gaziantep.

Castellani V, 2001. Acqua, acquedotti e qanat, Opera Ipogea 2, pp. 25-32

Çam N,1982. Gaziantep'te "Kastel" Adı Verilen Su Tesisleri (Waterworks called "Kastel" in Gaziantep), Milletlerarası Türkoloji Kongresi (International Turkology Congress), İstanbul.

Çam N, 2006. Türk Kültür Varlıkları Envanteri: Gaziantep (The Inventory of Turkish Cultural Proporties: Gaziantep), Ankara.

Çanakçı H, 2007. Collapse of Caves at Shallow Depth in Gaziantep City Center, Turkey: A Case Study, Environmental Geology, Volume 53 (4), pp. 915-922, Heidelberg.

Çanakçı H, Güllü H, 2004. Gaziantep İl Merkezindeki Mağaraların Geoteknik Açıdan Bir Ön Değerlendirmesi, Zemin Mekaniği ve Temel Mühendisliği 10. Ulusal Kongresi (Pre-Evaluation of Caves in Gaziantep Geotechnically, The 10th National Congress for the Soil Mechanics and Basic Engineering), İstanbul, pp. 232-237.

Marangoz L, 2005. Correlation of Geotechnical Properties of Limestone with Ultrasonic Velocity in Gaziantep Region, Gaziantep University, Ph D Thesis.

MTA (General Directorate of Mineral Research And Exploration), 1997. Geological Map of The Gaziantep-K24 Quadrangle, Ankara.

Wessels K, 2000. Renovating Qanats in a changing world, a case study in Syria. International Syposuim on Qanats, Yazd, Iran.