

Geopark Potential of Osmaniye Province

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Abstract

Osmaniye province is a city with limited economic opportunities, which was heavily damaged by the earthquakes centered in Kahramanmaraş on February 6, 2023, and where the rural population is predominant. Natural, cultural and geoarchaeological sites with potential for establishing a geopark in the province Identifying geosites , protecting them and bringing them into geotourism will make significant economic, social and cultural contributions to the region. The landforms, caves, hot springs, castles and especially the current view of the Lalegölü volcano found in Osmaniye also reflect information about the creation of the world and the change it has undergone. These and similar features increase the potential of a UNESCO-tagged geopark area in the province. Projecting this potential and opening it to geotourism is important for the protection of the geoheritage in the region.

1. Introduction

Typical localities that explain the evolution of the earth's crust are geological elements with a great visual aspect, beautiful representatives of well-known events or processes, very rare formations, and pieces of "geological heritage" that need to be protected. Important fossil bed, tectonic structure, type section, landform, mineral assemblage, mineral deposit, rock, etc. They may be. These are always necessary for both

learning about the earth and earth science education. If they disappear, a part, a record, of geological evolution is erased. How can future generations know the earth without them? Türkiye is like a "geological park" with its wide variety of formations. If we can protect the elements of this GeoPark and promote them well, we will have dozens of regions similar to Cappadocia and Pamukkale that attract many visitors. We can evaluate this great potential for professional tourism (URL_1, URL_2).

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Geoparks are specially planned, managed nature conservation areas where different or the same types of geological heritage examples of international importance coexist. Elements that explain the formation of the earth's crust, representatives of a known event, rare or very large formations are defined as geological heritage. Fossil beds, mineral assemblages, tectonic structure, interesting landforms, rocks and mineral deposits are examples of geological heritage. These elements, which are parts of geological evolution, are important in understanding and learning the earth through earth science education. Pamukkale travertines and fairy chimneys are known pieces of geological heritage in Turkey.

Geoparks; It is an area of disaster preparedness and geological awareness for geological hazards such as volcanoes, tsunamis and earthquakes. They are places where climate change information is stored. Geoparks are areas where geological and natural beauties are preserved and transferred to future generations, and where the history of the earth is learned through geotourism in these areas. Geopark: Geographic areas with defined borders that are of international importance in terms of landforms and geological features, where conservation, education and sustainable development activities are carried out and managed from a holistic perspective. Geoparks, which host many geosites, are conservation areas that aim to protect these geosites and transfer them to future generations; They are also sustainable development areas that aim for the social and cultural development of the local people. In addition to protecting geoheritage, Geoparks also aim to raise public awareness on issues such as sustainable use of natural resources, mitigating the effects of climate change and reducing risks related to natural disasters.

Association for the Protection of Geological Heritage (JEMİRKO) proposes the establishment of the following geoparks in Turkey (URL_1):

Nemrut Volcano and Lake Van Geopark

Lake Van is unique with its formation and has the distinction of being the largest soda lake in the whole world. Nemrut is an active, giant stratovolcano that smokes. Lake Van is an archive where water levels rise and fall like seas, thus keeping records of past climate changes. Many international projects are being carried out in the region on these issues.

Kula Geopark

They are the best examples of explosive volcanism that developed within extensional tectonics. There are various volcanic landforms with many volcanic cones. It contains human and animal footprints that are rare in the world.

Salt Lake Geopark

It is the largest Salt Lake in all of Europe and is a rare natural formation with salt layers that are renewed every year.

It reflects a period of closure of the basin that lasted approximately 10,000,000 years. There are old salt domes underneath.

Cappadocia Geopark

This region is already on the World Cultural Heritage List. However, this is due to the large number of

settlements, underground cities and 362 churches in the region.

The landforms of the region provide a unique geopark quality for erosion-related events.

Karapınar Geopark

Meke with eight to ten different geological features It contains geological heritage such as Acıgöl Cave. Old and new sinkholes, the lake, wind dunes, thick peat under the lake, carbon dioxide sources and numerous cinder cones enrich the region extraordinarily.

Narman Happiness Valley Geopark

Mysterious landforms that develop due to the different resistance of coarse clastics to abrasion are rare. The red color of the region creates harmony with the environment and the sky and increases its attractiveness. The diversity of geological formations and processes attracts attention.

Pamukkale Travertine Geopark

This region of ours, which is on the World Heritage List, is distinguished by the richness of both old and current travertines. Hot and cold-water travertines occur together. The first Homo erectus skull in Anatolia and the Middle East was found in these travertines. Animal and plant fossils are abundant and provide information about the climate and ecology of the last two million years.

Mut Geopark

An extraordinary variety of landforms. Its more important feature is that it is located in an extremely folded / fractured region within the Alpine- Himalayan system, protected from tectonism, with all layers lying horizontally, and containing sediments from the last 12-4 million years of the Mediterranean, spread between 0-1800 meters. It is the ideal example of Gulf sedimentation.

a UNESCO Global Geopark?

UNESCO Global Geoparks are single, unified geographical areas where areas and landscapes of international geological importance are managed with a holistic concept of conservation, education and sustainable development. The UNESCO Global Geopark uses its geological heritage, in conjunction with all other aspects of the natural and cultural heritage of the region, to raise awareness and understanding of the key issues facing society, such as the sustainable use of our world's resources, mitigation of the effects of climate change, and mitigation of the effects of climate change (URL_3).

UNESCO Global Geoparks empower local communities and give them the opportunity to develop harmonious partnerships with the common goal of promoting important geological processes, features, time periods, historical themes linked to geology or outstanding geological beauty of the region. UNESCO Global Geoparks are established through a bottom-up process involving all relevant local and regional stakeholders and authorities in the region (e.g. landowners, community groups, tourism providers, indigenous people and local organisations). This process requires firm commitment from local communities, a strong local multi-partnership with long-term public and political support, and the development of a comprehensive strategy that will meet the objectives of all communities while showcasing and preserving the geological heritage of the region (URL_3).

UNESCO started working with geoparks in 2001, and in 2004 the Global Geopark Network (GGN) came together in Paris (Figure 1). In 2015, at the 38th General Conference of UNESCO, it was decided that the status of geoparks changed and became a UNESCO Program with international registration by UNESCO. By adopting the International Geosciences and Geoparks Program (IGGP) Regulation, the concept of UNESCO Global Geopark was formed. There are 177 Geoparks from 46 countries in the UNESCO Global Geopark Network as of 2021 (URL_4).



Figure 1. the European Geoparks Network today (URL_4).

2. Method

Geosciences hold important answers to the challenges we must overcome to protect and sustainably develop our environment. Geosciences are important for understanding current global change, helping sustain the Earth, and increasing countries' capacity to manage their mineral resources. The International Geosciences and Geoparks Program promotes international cooperation in geosciences, with a special emphasis on projects and geoscientists from developing countries. It promotes concrete projects with a clear social orientation for sustainable development, including natural disaster mitigation, medical geology, mineral and groundwater resource extraction.

Since its inception in 1972, it has contributed to knowledge about geological resources and processes and to the creation of networks among scientists on Earth resources and processes through more than 340 international collaboration projects on Earth's geology in approximately 150 countries. UNESCO Global Geoparks promote areas of international geological value and form the basis of local sustainable development (URL_3).

International Geosciences and Geoparks Program (IGGP): Geosciences give us very important information about the Earth, its systems and its 4.6 billion-year history. This information is necessary to respond to the challenge's humanity faces today, such as reducing the effects of global warming and reducing the risks of geological hazards, and to protect the resources of our world for future generations. To more closely reflect today's societal challenges in the geosciences and to provide an international status to areas in the previous network of geological importance, the International Geosciences and Geoparks Program (IGGP) was

established by the General Conference of UNESCO on 17 November 2015. For over 40 years, the International Geosciences and Geoparks Program has brought together geoscientists from around the world to study the Earth and geological processes under themes of increasing social importance, and to promote UNESCO Global Geoparks of international geological significance and the basis for local sustainable development (URL_3).

UNESCO Global Geoparks: UNESCO Global Geoparks are areas that are increasingly recognized in the world because they are areas where conservation, sustainable development and community participation can be implemented jointly. These areas of international importance are managed with an integrated approach to conservation, education and sustainable development. UNESCO started working with geoparks in 2001, and in 2004 the Global Geopark Network came together in Paris. In 2015, at the 38th General Conference of UNESCO, it was decided that the status of geoparks changed and became a UNESCO Program with international registration by UNESCO. By accepting the International Geosciences and Geoparks Program (IGGP) Regulation, the concept of UNESCO Global Geopark was formed and the UNESCO Geopark logo was designed for areas with this status (URL_3; URL_4).

Geopark area applications that are deemed to meet the criteria are forwarded to UNESCO through National Geopark Committees, National Commissions or the UNESCO-related executive body, as deemed appropriate by the party states. The nomination files are submitted by the UNESCO Secretariat to the International Union of Geological Sciences, which is the advisory body on geological heritage. Sciences, IUGS) and the result of the evaluation is forwarded to the UNESCO Global Geopark Council. Nomination applications for geopark areas are evaluated by the UNESCO Global Geopark Council according to the implementation directive, and the final decision is made by submitting the recommendation to the UNESCO Executive Board. In addition to the determination of geopark areas, re-evaluation and change in area size processes are also carried out by the Council (URL_3).

Turkey's first and only UNESCO geopark is Kula UNESCO Global Geopark located in Manisa . As of 2019, there are 147 Geoparks from 41 countries in the UNESCO Global Geopark Network. The priority issues that geopark areas focus on include natural resources, geological hazards, climate change, education, science, culture, women and gender equality, sustainable development, preservation of local knowledge and geological protection (URL_4).

2.1. Kula Salihli Geopark

Kula-Salihli UNESCO Global Geopark is located in the middle part of the Gediz Graben and the western part of the Inner Western Anatolian Plateaus. The Geopark covers the entire administrative borders of Kula and Salihli districts of Manisa province. The total area of Kula Salihli Geopark is 2320 km². Kula-Salihli Geopark, located in a region where crustal movements are frequently seen and effective, shows a geologically and tectonically complex and geomorphologically rich

structure. The Geopark contains evidence of more than 300 million years of history of the earth, from Paleozoic metamorphic rocks (schist, gneiss) to prehistoric volcanic eruptions, and in this respect, it hosts a very rich geodiversity. Kula Salihli UNESCO Global Geopark is one of the youngest volcanic areas in Turkey. Volcanism, which started in the region approximately 15 million years ago, continued until ancient times. The traces of volcanism in Kula (Katakekaumene) are as fresh as if it happened yesterday.

Kula Salihli UNESCO Global Geopark is one of the rare areas in the world where human footprints are found on volcanic tuffs in Salihli. Geological and geomorphological features in the region have led to the development of intensive agriculture, trade and culture since the earliest times of history. For this reason, the geopark area has hosted many civilizations. Sardes, the capital of the Lydian state, where money was first printed and used under state guarantee. It is located within the borders of the geopark. The Geopark is Turkey's most important area in terms of geotourism due to its geological, cultural and archaeological richness (Figure 2). Kula-Salihli UNESCO Global Geopark is the first and only UNESCO-labeled geopark of Turkey and the Turkish World. Some photos from <https://kulasalihligeopark.com/> (URL_5).



Figure 2. Kula-Salihli UNESCO Global Geopark (URL_5).

2.2. General Geographical Characteristics of the study area

The situation of urbanism will be discussed within the scope of our changing and transforming cities, and Osmaniye, which was a district of Adana Province until 1997 and was transformed into a province. Cities are structures that are a whole with their demographic, social and economic structure within their geographical integrity. Along with the changes in the population structure, the development of the Socio-Economic structure in accordance with this situation is among the distinctive features of cities. In this respect, the status of being a province reveals the administrative structure of cities. Thus, it is possible to talk about a region that includes both urban and rural areas. Essentially, it is

understood from the research that Osmaniye constitutes a significant part of its population after it became a province in 1997. For example, according to the 2020 study conducted by Penbecioğlu and Erbaş, "In the case of Osmaniye, people who were born and raised in the city and those who came later indicate two different profiles. According to 2019 ADKS data, the total population of Osmaniye Province is 538,759 people and 387,357 of them were born in Osmaniye Province (TUIK, 2020). This shows that those born and raised in Osmaniye correspond to approximately 72% of the total population. According to the results of TÜİK, Address Based Population Registration System (ADNKS) conducted in 2022, the total population of Osmaniye province was 559405.

Another determination is that Osmaniye's net migration rate is negative in all-time series except 2008 and 2016 (TUIK, 2020). A negative value of the net migration rate means that the number of immigrants the city receives is less than the number of immigrants it gives out. According to the determination made regarding migration, for Osmaniye, "The majority of people who migrated to Osmaniye later (82%) settled in the city due to the job situation of themselves or someone else in their family. Likewise, with the emergence of the civil war in Syria in 2011, it is seen that refugees chose the southeastern and southern provinces, and Osmaniye was among them. "According to current figures, approximately 47,000 Syrian immigrants are registered under temporary protection in Osmaniye province.

When the city is evaluated in terms of economic structure, it is seen that agriculture and agriculture-based industry are dominant. After the administrative status change, public investments in the city also increased. In parallel with the increase in public investments, the economic volume of the city is increasing (Erdem, 2016). However, considering the connection between public investments and employment, it has been determined that unemployment rates are above the Turkey average despite increasing public employment.

In Nuri Erdem's article published in 2016, the value increases in real estate in the region through large-scale public investments were investigated in the Osmaniye example, and the intensity of public investments in Osmaniye depends on the advantages in the agriculture, animal husbandry, tourism, energy and mining sectors, especially in the industry. Experience in the industrial sector, qualified and cheap labor force, proximity to emerging markets (Middle East etc.), presence of organized industry, proximity to main transportation networks, government supports and incentives, financial support programs carried out by the Eastern Mediterranean Development Agency (DOĞAKA) on a regional basis and Osmaniye Korkut The existence of Ata University makes great contributions to the provincial economy.

Location and Boundaries of the work area: In terms of its mathematical location, Osmaniye city is located between 37° 02' north latitude and 36° 16' east longitude. Osmaniye is in the Adana section of the Mediterranean region; It has strategic importance among regions, countries and cities. The city is neighbors with

Adana in the west, Gaziantep in the east, Hatay in the south, Kahramanmaraş in the north and the provincial capital cities. The administrative areas in question are settlements with metropolitan status. Osmaniye, located 20 km northeast of the Gulf of Iskenderun, one of the important strategic points of the Mediterranean, is located to the west of the Nur (Amanos) Mountains and to the east of Çukurova. It is on the transition route between the Mediterranean and Southeastern Anatolia regions. Osmaniye city, located in the central district of the province with the same name in the Adana section of the Mediterranean region, is located in an area of approximately 8500 ha within the boundaries of the municipality's jurisdiction. The settlement is within the borders of the Central district and consists of 37 neighborhoods. Osmaniye city, which also has an administrative function as the provincial center, provides various services to 7 districts including the Central district, 163 village settlements, 36 of which are in the Central district, and 9 town municipalities, 2 of which are located in the Central district (Osmaniye Local Administrations Directorate, 2020). provides. These increase the importance of the city, expand its sphere of influence and contribute to the development of the city. The administrative area of Osmaniye Municipality is surrounded by village administrative units. The closest administrative units surrounding the city are; It is surrounded by Çardak village in the east, Toprakkale district border in the west, Alhanlı village in the northwest, Nohuttepe village and Cevdetiye town municipality in the north, Dervişkiye village in the northeast, Karacalar village in the south and Dereobası village in the southwest. In the south, the municipality border also borders Erzin / Hatay municipality (Demir, 2023).

2.3. Characteristics of the Study Area

The area where Osmaniye is located is shaped by the geological units in the collision area of the Eurasian and African-Arabian Platform and the tectonic lines separating these units (Karataş Fault, Yumurtalık Fault, Toprakkale Fault, Tehçi Fault, Düziçi-İskenderun Fault and EAF). The geological units called Çukurova, Adana and İskenderun Basin, in which the city is located, are bordered by the Toprakkale Fault, which cuts the flat hills and basalt units in the west and northwest. The geological units on which the city of Osmaniye is located are included in the İskenderun Basin (Demir, 2023).

Today, Osmaniye is one of the medium-sized cities of Turkey in terms of population. According to the 2020 Address-Based Population Registration System (ADNKS) data, the population living within the borders of Osmaniye province is 548,556. Of this population, 276,776 are male and 271,780 are female. To express it as a percentage, 50.53% of the population in question is male and 49.47% is female. The population density is 296 people / km². The population of Osmaniye increased by 4,344 people compared to the previous year. The total population within the borders of the central district is 268,647 people, of which 134,674 are male and 133,973 are female. Of the registered population within the borders of the central district, 237,476 reside in the city

of Osmaniye (in 36 neighborhoods), 27,782 reside in the villages within the borders of the central district, and 3,389 reside within the boundaries of Cevdetiye Town Municipality (<https://biruni.tuik.gov.tr/medas/?kn=95&locale=tr>). According to these data, approximately 44% of the provincial population resides in the city of Osmaniye, and 56% resides in districts and villages. Osmaniye received immigration from the east and southeast, especially after 1990, due to terrorism, and after 2010, due to the civil war in Syria due to the Arab spring (Demir, 2023).

Osmaniye, located in Upper Çukurova, on the east bank of the Ceyhan River, with its wide hinterland; It is a wetland area due to the Ceyhan River, Hamis, Karaçay, Kesiksuyu and Sabun Streams, and is in a busy area because it is at the junction of the roads connecting Çukurova to the east. It is a charming province with its rich agricultural lands and large forests unique to Çukurova. Osmaniye; Karatepe is an important tourism center with its Aslantaş Open Air Museum and ancient cities. Osmaniye, located in the east of the Mediterranean Region and Çukurova; It is located between 35 0 52'- 36 0 42' Eastern Meridians (longitudes) and 36 0 57'- 37 0 45' Northern Parallels (latitudes) (Figure 3). It has Gaziantep in the east, Hatay in the south, Adana in the west and Kahramanmaraş in the north. Its surface area is 3,279.9 km² and it is 121 m above sea level. height and 20 km from the Mediterranean. distance (URL_6).

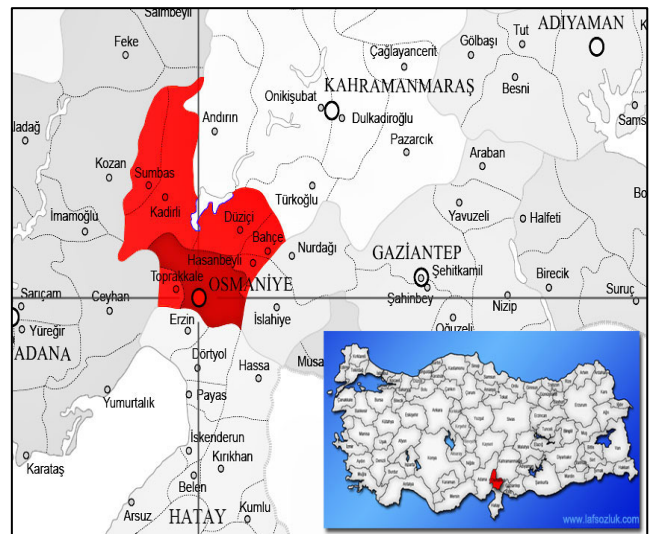


Figure 3. Location of Osmaniye province.

Geologically, Osmaniye province is located on the western foothills of the Amanos Mountain (Nur Mountain) range and on alluvial units with poor engineering properties, where large agricultural areas known as Çukurova are located (URL_7; Özgül, 1976). This region is located in a geography where faults are abundant (Figure 4).

The main data sources of this research, which deals with landforms that have the potential to become geosites in Osmaniye, are primarily field studies, secondary data collected from various institutions and individuals, and satellite images.

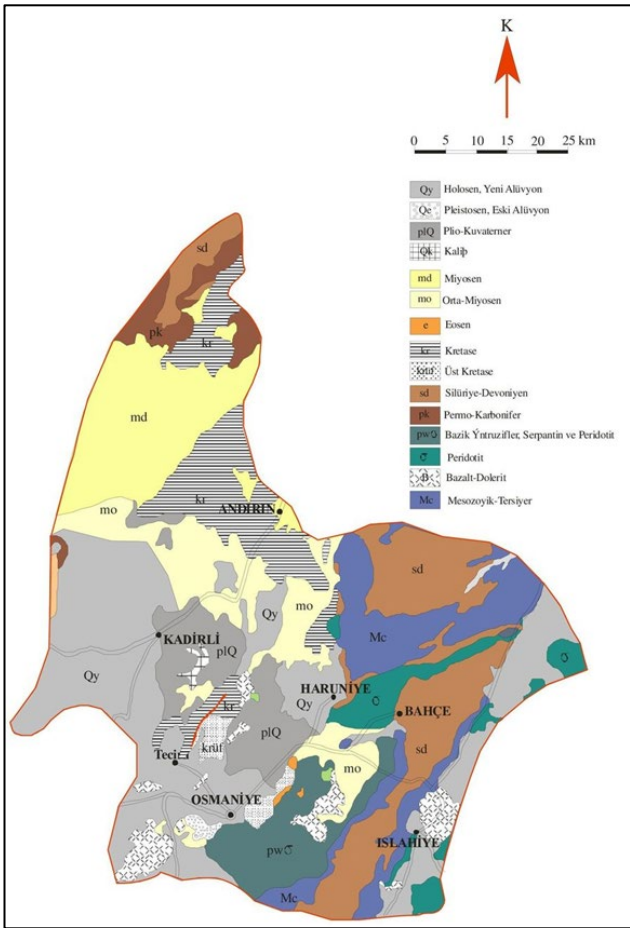


Figure 4. Geological map of Osmaniye province (URL_7).

2.4. Features of Osmaniye Province as A Geopark General Geographical

Lalegölü Volcano

Discovery of Lalegölü Volcano ... - It is thought that if the Lale Lake volcano becomes active again, there will be a significant climate change in Çukurova, and the cities of Osmaniye, Ceyhan and Erzin will probably be affected by this. -The current image of the Lale Lake volcano also reflects information about the creation of the world and the change it has undergone.

There have been years when those who enter the highway from Adana and go towards Ceyhan and Osmaniye, when they approach the Adana-Osmaniye border, if they raise their heads and look to the right, they can see the rising black-looking mountain peak. When they look a little more carefully, they notice the presence of an area of black stones on the shore of the highway. In popular parlance, this is the " Leçelik " area. If a person starts to research what he sees, he can find very different information. In today's terms, it also meant "Volcanic land". Although "Tulip Lake" reminded me of a flower at first glance, upon careful consideration, "Tulip" was thought of as a red-looking flower. And it meant volcano. Lalegölü means the hollow area within the volcano. The word Hairless, located in the same geography, means a place where grass never grows. This word explained that the volcanic land was not suitable for agriculture. All the preliminary information I received confirmed the view that there was a volcanic area in the middle of Çukurova

and that there was an extinct volcano there. It is thought that if the Lale Lake volcano becomes active again, there will be a significant climate change in Çukurova, and the cities of Osmaniye, Ceyhan and Erzin will probably be affected by this (Figure 5). The current image of the Lale Lake volcano also reflects information about the creation of the world and the change it has undergone. Those who enter the highway from Adana and go towards Ceyhan and Osmaniye can see the pitch-black mountain peak when they approach the Adana-Osmaniye border. When they look a little more carefully, they notice the presence of an area of black stones on the shore of the highway. In popular parlance, this is the " Leçelik " area. In today's parlance, it also means "Volcanic land" (URL_8).



Figure 5. Lalegölü Volcano and Crater Photos (URL_8).

Toprakkale

Toprakkale Castle is within the borders of Toprakkale district and is at the intersection of Osmaniye, Adana and Iskenderun roads. The history of the castle dates back to 2000 BC. The castle was called Kınık Castle during the Ottoman Period. The castle, built on a masonry hill, was reconstructed with black stones in the 8th century during the time of Abbasid Caliph Harun Reşit (Figure 6). The rectangular planned castle has 12 bastions and outer courtyard walls (URL_9).



Figure 6. There is a lava flow under Toprakkale and the castle, there are cooling cracks on the surface.

Hemite Village Surface Fault Fracture

Hemite Village of Osmaniye center is being examined by scientists conducting academic studies in this field (Figure 7).



Figure 7. Hemite Village Surface Fault Fracture.

Culture and Tourism

The region where Osmaniye is located, to the east of Çukurova, has preserved its characteristics as a settlement since the earliest periods of history and has been under the influence of many civilizations, and is located in a geography with a significant amount of historical and cultural artifacts. The ruins in Domuztepe and the mounds in Osmaniye belong to the Neolithic, Chalcolithic and Bronze periods. Since ancient times, it has been the scene of the lives of states such as Hittite, Assyrian, Persian, Greek, Roman, Byzantine and some tribes. Later, Turkish tribes came to these lands, where Umayyad and Abbasid people lived, starting from the 1080s with the conquest of Anatolia by the Turks (URL_10).

You should see these:

Kastabala (Hierapolis) City, Zorkun Plateau, Karatepe-Aslantaş Open Air Museum, Kadirli Ala Mosque, Karatepe Rugs, Haruniye Thermal Springs, Kırmitlı Bird Sanctuary, Savrun Canyon, Hamite Castle, Toprakkale Castle, Hamite (Amuda) Castle, Kaypak (Savranda) Castle, Çardak Castle, Karafenk Castle, Babaoğlan Castle, Olukbaşı -Ürün Plateaus, Sumbas -Bağdaş Plateau, Kadirli- Maksutoğlu, Beyoğlu-Savrunközü -Dokurcun and Çığsar Plateaus, Hasanbeyli-Almanpınarı Plateau, Kırmitlı Bird Sanctuary are other important tourism values (Figure 8), (URL_10).



Figure 8. Important tourism values of Osmaniye (URL_10).

3. Conclusion

Osmaniye; Its location, geological features and landforms need to be preserved as geosites and geoheritage and transferred to future generations. Within the scope of the research, four waterfalls, many caves, two canyons, dialects and cliffs, 30 nearby castles, many 1st, 2nd and 3rd degree archaeological sites and intangible cultural geosites such as Karatepe rugs were identified. These geosites were discussed in terms of their accessibility, number, touristic and scientific features, and were evaluated to determine their geotourism potential. The results are summarized as follows:

- It is thought that these shapes, which are insufficient in terms of tourism on their own, will be important when taken together with other attractions.

- the geosites identified in the study area are valuable in terms of geotourism , most of them have not been the subject of academic studies yet. Conducting research on these geosites will contribute to the literature.

- The most important problems of geosites in Osmaniye are their lack of transportation, lack of promotion, lack of tourism investments in general and their lack of protection status. These deficiencies should be corrected as soon as possible. However, natural beauties can suffer great damage when opened to tourism. Great attention should be paid to this.

Author contributions

The manuscript of the single authors.

Conflicts of interest

There is no conflict of interest between the authors.

Statement of Research and Publication Ethics

Research and publication ethics were complied with in the study.

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