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# EARTHQUAKES AND ARCHAEOLOGICAL HERITAGE SITES: THE CASE OF FEBRUARY 6 EARTHQUAKES IN TURKEY

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**Abstract**

Earthquakes are among the most destructive disasters worldwide, and they have had aserious impact on many civilizations and cultural heritage sites throughout history. Archaeological sites, in particular, are highly vulnerable to the effects of earthquakes, which could threaten their integrity. Turkey is a home to numerous important archaeological heritage sites, but as being one of the countries with a high earthquake risk, these sites are also at risk of earthquake damage. The recent earthquake that occurred on February 6, 2023, was one of the most significant earthquakes to hit Turkey. The affected region has a long history of cultural continuity, and its archaeological sites have also damaged from the earthquake. In this study, the effects of earthquakes on archaeological heritage sites are examined through open source data and it is aimed to evaluate the situation of archaeological heritage sites in the earthquake zone in the case of the February 06, 2023 Earthquakes.

**Keywords:** Archaeological Heritage Sites, Cultural Heritage, Disaster, Earthquake, Turkey.

**DEPREMLER VE ARKEOLOJİK MİRAS ALANLARI: TÜRKİYE'DE 6 ŞUBAT DEPREMİ ÖRNEĞİ**

**Özet**

Depremler dünya çapında en yıkıcı afetler arasındadır ve tarih boyunca birçok medeniyet ve kültürel miras alanı üzerinde ciddi etkileri olmuştur. Özellikle arkeolojik alanlar, bütünlüklerini tehdit edebilecek depremlerin etkilerine karşı son derece savunmasızdır. Çok sayıda önemli arkeolojik miras alanına ev sahipliği yapan Türkiye, deprem riskinin yüksek olduğu ülkelerden biri olarak bu alanların depremden zarar görme riskiyle de karşı karşıyadır. Son olarak 6 Şubat 2023 tarihinde meydana gelen deprem, Türkiye'yi vuran en önemli depremlerden biri olmuştur. Depremden etkilenen bölge uzun bir kültürel süreklilik geçmişine sahiptir ve arkeolojik alanları da depremden zarar görmüştür. Bu çalışmada, depremlerin arkeolojik miras alanları üzerindeki etkileri açık kaynak veriler üzerinden incelenmiş ve 06 Şubat 2023 Depremleri özelinde deprem bölgesindeki arkeolojik miras alanlarının durumunun değerlendirilmesi amaçlanmıştır.

**Anahtar Kelimeler:** Afet, Arkeolojik Miras Alanları, Deprem, Kültürel Miras, Türkiye.

## Introduction

"Cultural heritage" or simply "heritage" is a concept that referes to the entities created by previous generations and considered to possess universal values. It encompasses all tangible and intangible assets that reflect the ever-changing values, beliefs, knowledge, and traditions of people, which have been passed down from the past to the present. According to UNESCO, heritage

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constitutes our legacy and cultural identity that we transmit to future generations (Vecco, 2010).

Cultural heritage can broadly categorized into two major branches: Tangible Cultural Heritage and Intangible Cultural Heritage. Tangible Cultural Heritage includes various assets of cultural and natural heritage, such as monuments, symbolic, historical, artistic, aesthetic, ethnological, anthropological, scientific, and social significance, as well as groups of buildings, sites, museums, caves, and industrial heritage (UNESCO, 2020; Bellet, 2020). Cultural heritage is not only limited to monuments, structures, and architectural ensembles but is also recognized as an important means for contemporary societies to form their cultural potential, contribute to the reevaluation of cultures and identities, and facilitate the transmission of experiences, skills, and knowledge between generations. Archaeological heritage constitutes a significant component of cultural heritage.

Archaeological heritage sites are cultural assets that bear the traces of the past and allow people to understand the respective periods and cultures through the interpretation of these traces. According to the International Council on Monuments and Sites (ICOMOS) Charter for the Protection and Management of the Archaeological Heritage (1990), "Archaeological Heritage" encompasses all material remains, including abandoned structures, sites on land and underwater, obtained through archaeological methods, which encompass every type of trace of human presence and reflect all forms of human activities, as well as associated cultural materials (ICOMOS, 1990).

UNESCO, an organization dedicated to the preservation of cultural heritage, adopted the Convention concerning the Protection of the World Cultural and Natural Heritage during its General Conference in 1972. With this Convention, the creation of the World Heritage List, which enables the identification and protection of sites of cultural and/or natural significance worldwide, was initiated (UNESCO, 1972). Since 1972, entries have been recorded in the list. As of May 2023, the World Heritage List includes 1,157 cultural heritage sites from 167 countries (UNESCO, 2023a).

In accordance with Article 11(4) of the Convention, UNESCO began the creation of the List of World Heritage in Danger in 1978. The List of World Heritage in Danger is recognized as a list that emphasizes the at-risk status and the need for international conservation measures of cultural and natural heritage sites. This list serves as a significant tool for the preservation and sustainability of world heritage. The list is a part of the World Heritage Convention adopted in 1972. Its purpose is to identify cultural and natural areas under threat, promote conservation efforts worldwide, enhance international cooperation, and ensure the sustainability of these areas. For a site

to be included in the List of World Heritage in Danger, it must meet one or more of the criteria for inscription on the World Heritage List. These criteria include the site's exceptional cultural or natural value, its vulnerability, the risk of irreversible loss, and the need for international cooperation in its protection. The process of inclusion in the List of World Heritage in Danger is conducted by the national commissions of member states and UNESCO. To be considered for inclusion, a site must be nominated by the state and undergo a detailed application process. This process involves the evaluation of the site's value, the nature of the threats it faces, and the conservation efforts implemented. Sites included in the List of World Heritage in Danger are exposed to various threats, including natural disasters, climate change, urban development, armed conflicts, tourism pressures, and human impacts. To protect these areas, various conservation measures are taken, such as international cooperation, resource allocation, education, and awareness campaigns. The List of World Heritage in Danger plays a crucial role in identifying and safeguarding at-risk cultural and natural heritage sites, ensuring their preservation for future generations (UNESCO, 2019). The number of properties included in the List of World Heritage in Danger has been increasing steadily since the 1970s, and as of May 2023, it includes 55 cultural heritage sites, including 39 archaeological heritage sites (Fig.1), ( UNESCO, 2023b).

Archaeological heritage sites, like other cultural heritage sites, are increasingly at risk of being lost forever (ICOMOS, 2000). The excavation and subsequent preservation of archaeological heritage sites involve certain challenges. The creation of a "future for the past" in archaeological heritage sites is threatened by factors such as inadequate identification, lack of documentation and inventory, insufficient registration, illegal excavations, illicit trafficking of antiquities, issues with securing financial resources, lack of education, awareness, and consciousness, insufficient expert personnel, and more (Topaloğlu Uzunel, 2023).

| Registration Date | Country | Archaeological Heritage Sites |
|---|---|---|
| 1986 | Peru | Chan Chan Archaeological Zone |
| 2001 | Egypt | Abu Mena |
| 2002 | Afghanistan | Jam Minaret and Archaeological Remains |
| 2003 | Afghanistan | Cultural Landscape and Archaeological Remains of the Bamiyan Valley |
| 2003 | Iraq | Ashur (Qal'at Sherqat) |
| 2007 | Iraq | Samarra Archaeological City |
| 2013 | Syria | Ancient City of Aleppo |
| 2013 | Syria | Ancient City of Bosra |
| 2013 | Syria | Ancient City of Damascus |
| 2013 | Syria | Palmyra |
| 2013 | Syria | Ancient Villages of Northern Syria |
| 2015 | Iraq | Hatra |
| 2016 | Libya | Archaeological Site of Cyrene |
| 2016 | Libya | Archaeological Site of Leptis Magna |
| 2016 | Libya | Archaeological Site of Sabratha |
| 2016 | Libya | Rock Art Sites of Tadart Acacus |
| 2023 | Yemen | Landmarks of the Ancient Kingdom of Saba, Marib |

**Fig. 1.** Archaeological heritage sites included in the List of World Heritage in Danger (UNESCO, 2023c; Topaloğlu Uzunel, 2023, Şek3.4).

Turkey adheres to the definitions of cultural heritage and archaeological heritage in the international conventions, guidelines, and regulations it has accepted. Moreover, national laws in Turkey also define cultural and archaeological heritage. In the decision "No. 658 Archaeological Sites, Conservation and Usage Conditions (1999)" of the High Council for the Conservation of Cultural and Natural Assets, which is affiliated with the Ministry of Culture and Tourism, an archaeological site is defined as "settlements and areas containing all types of cultural assets that reflect the underground, aboveground, and underwater products of ancient civilizations that have existed from the beginning of humanity to the present, as well as the social, economic, and cultural characteristics of the eras they lived in" (KTB, 1999). The same decision also specifies the conservation and usage conditions for archaeological sites. Archaeological sites are classified into three degrees of protection (KTB, 1999); I. Degree Archaeological Site, II. Degree Archaeological Site, and III. Degree Archaeological Site, based on their importance and characteristics. According to the statistical data of the Ministry of Culture and Tourism on archaeological sites, as of 2023, there are a total of 23,632 registered sites in our country, including 22,898 archaeological sites (KTB, 2020)[1]. Archaeological sites constitute the largest percentage, accounting for 97% of the registered sites.

[1] Within these protected areas there are 80 sites categorized as archaeological-urban sites, archaeological-historical sites, and archaeological-historical-urban sites, forming a group known as Mixed Heritage Sites.

As of November 2022, Turkey has 19 properties listed on the World Heritage List, which was decided upon and put into practice in 1972 (UNESCO, 2020b). Out of these properties, 12 are archaeological heritage sites, and two are mixed (archaeological + natural) heritage sites. In addition to these heritage sites included in the UNESCO World Heritage List by the World Heritage Committee, there is also a Tentative List consisting of heritage sites that are proposed for the nomination but have not yet completed the candidacy process. Turkey's Tentative List includes a total of 84 candidate heritage sites, of which 77 are cultural, 4 are mixed, and 3 are natural (UNESCO, 2020c). There are no cultural heritage sites from Turkey on the List of World Heritage in Danger.

The protection of cultural heritage sites and cultural assets in our country is regulated and monitored through legal arrangements. Cultural assets are considered state property. Article 63 of the Constitution (Protection of Historical, Cultural, and Natural Assets) defines the preservation of historical, cultural, and natural assets and values as the responsibility of the state (1982 Constitution, Article 63). In this context, the official responsibility for the preservation of cultural assets is assumed by the Ministry of Culture and Tourism of the Republic of Turkey. The Ministry is stated to take protective, supportive, and incentive measures for the preservation of cultural assets (Law No. 2863, Article 10). The Ministry carries out the tasks of identification, registration, and protection of existing cultural assets in our country through its central and provincial organizations. As the first stage of cultural heritage conservation, cultural assets are documented, registered, and declared as protected areas. The primary law that is currently in effect regarding this matter is the Law on the Protection of Cultural and Natural Assets, numbered 2863[2].

Archaeological heritage sites are evidence of the identity, diversity, and social and cultural life of the places where they are located. They were formed over thousands or hundreds of years. Throughout this long historical process, they have been exposed to numerous disasters. The disasters experienced by archaeological heritage sites can be categorized into two groups: *"disasters experienced during their respective periods"* and *"disasters experienced after being transformed into archaeological heritage sites"*.

[2] With the Decree Law No. 648 dated August 17, 2011, the Law No. 2863 on the Protection of Cultural and Natural Assets was amended and natural protected areas were taken from the authority of the Ministry of Culture and Tourism and given to the authority of the Ministry of Environment and Urbanization (Yazman 2012; Official Gazette 2011). The name of the Ministry of Environment and Urbanization was changed to 'Ministry of Environment, Urbanization and Climate Change' by Presidential Decree No. 85 published in the Official Gazette No. 31643 dated October 29, 2021 (ÇŞB, 2023).

*Disasters experienced during the respective periods* of archaeological heritage sites refer to disasters that negatively affected the settlements and their inhabitants during that period. Natural disasters such as earthquakes, fires, floods, and human-induced disasters such as wars, conflicts, and invasions have caused various damages to the areas we now define as archaeological heritage sites. Disasters such as the complete or partial abandonment of settlements, the end or interruption of cultural layers in settlements, or the relocation of settlements have led to different reactions in the settlements (Topaloğlu Uzunel, 2023).

It is known from inscribed sources that the authorities of the respective emperors or rulers and/or benefactors provided assistance to settlements after disasters, particularly earthquakes, and supported the return of settlements to their daily lives. The Byzantine writer Procopius criticizes emperors who did not act in this manner, mentioning that some emperors exempted settlements from taxes after disasters (Prokopios, 2019).

When past disasters in archaeological heritage sites are examined from a contemporary scientific approach, it is understood that these disasters have a *"Disaster Documentation Value"*. When the disasters experienced by archaeological heritage sites are evaluated in terms of their Disaster Documentation Value, it is apparent that disasters have been the most influential factor in the formation of archaeological remains. H. Stovel (1998) explains the connection between archaeological heritage sites and disasters as follows: "*Archaeological sites may best be understood to be in their present condition as the result of past disasters or neglect, and so their care should be seen in a long-term perspective* (Stovel, 1998)". The Disaster Documentation Value signifies that the disasters experienced by settlements constitute a turning point in the chronological process of the settlements. The traces of the encountered disasters are evaluated scientifically and serve as reference points in the establishment of the historical process of the settlements, including the concepts of "Terminus Postquem" and "Terminus Antequem"[3]. After disasters occur in settlements, the abandoned or forcibly abandoned remains are unearthed through excavations.

Just like in the past, *archaeological heritage sites continue to experience disasters even after being transformed into archaeological heritage sites.* Anatolia, which has been home to many civilizations, has a high number and diversity of cultural assets. With the advancements of the modern world, archaeological heritage sites are increasingly affected by a growing number of natural and

[3] It is a method of dating artifacts whose date of inscription or construction is not known by utilizing events whose time and date are known. Terminus Antequem (taq) is used to indicate that it cannot be dated before a certain event and Terminus Postquem (tpq) is used to indicate that it cannot be dated after a certain event.

human-induced disasters. Protecting archaeological heritage from the threat of extinction is more challenging than ever in today's world. In our country, like in the rest of the world, in addition to natural disasters, infrastructure projects such as road and bridge construction, dam construction, metro lines, and other projects required by contemporary life pose a significant threat to cultural assets and archaeological sites that may not even be known to exist yet (Ahunbay, 2010). Archaeological heritage sites are vulnerable to damage in the present day due to natural disasters such as earthquakes, fires, floods, as well as human-induced disasters such as wars, conflicts, and invasions. Among these disasters, earthquakes can be considered the most devastating for archaeological heritage sites located on or near fault lines.

**Effects of Earthquakes on Archaeological Heritage Sites**

Earthquakes pose a significant threat to a large number of archaeological heritage sites across the globe. Countries such as Turkey, Greece, Italy, Iran, Iraq, Syria, Israel, Egypt, Georgia, Azerbaijan, the Philippines, Indonesia, China, Mexico, Caribbean countries, Chile, Peru, Venezuela, Bolivia, Haiti, and many others possess a rich cultural heritage and are characterized by high seismicity (Fig.2), (Palumbo 2000). Therefore, cultural assets in these countries are also at risk from earthquakes (Fig.3), (Neykova 2018).

Earthquakes result in loss of life and injuries in the areas where they occur and have adverse impacts on social, economic, and cultural aspects of life. They can also cause damage to the living spaces of communities and cultural heritage sites/assets, which are the collective memory of society. The effects of earthquakes on cultural heritage can be evaluated directly or indirectly. The damages that earthquakes can cause to cultural heritage structures are categorized as structural and non-structural damage.

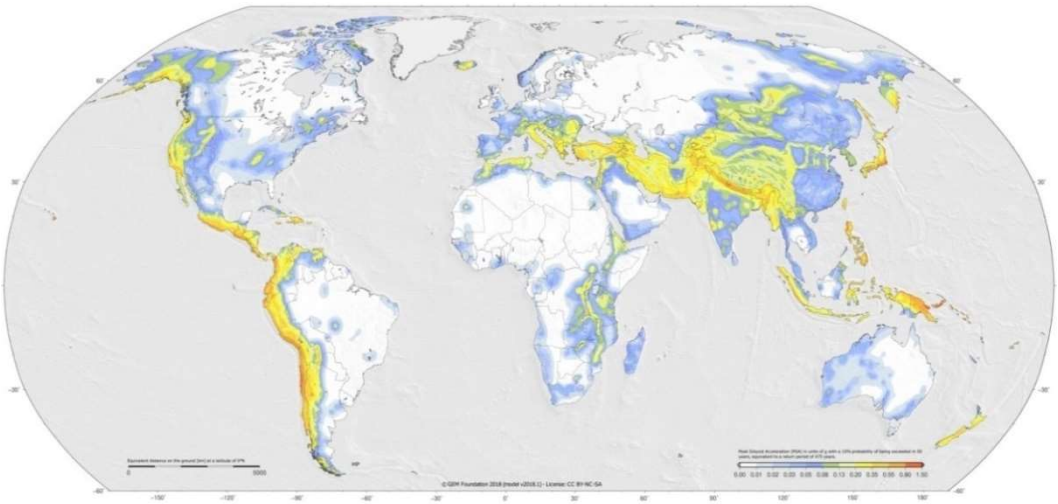

**Fig. 2.** World Earthquake risk map. Earthquake risk map of the world

(GEM Foundation 2022).

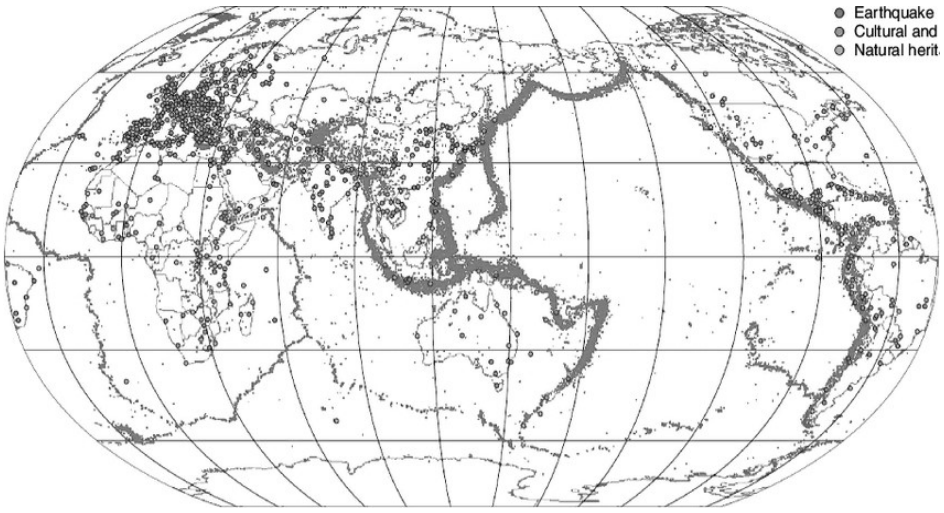


**Fig. 3**. Earthquake risk map of UNESCO World Heritage Sites (GEM Foundation 2022).

Structural damages may include:

- Collapse of walls and unreinforced vertical components.
- Disconnection and detachment of horizontal and vertical connection elements.
- Lateral and permanent displacement of structural components.
- Formation of structural cracks in elements that absorb lateral forces.
- Decreased resistance to aftershocks.

Non-structural damages may include:

- Objects and collections being crushed by collapsing structural components.
- Toppling of unsecured objects.
- Displacement of freestanding objects.
- Damage to suspended items.
- Blockage or disruption of service supply lines (water, sewage, electricity, telephone, fuel, etc.), which can increase the risk of secondary damage from fire or water.
- Damage to alarms, early warning systems, and communication systems, causing delays in effective intervention.
- Damage or loss of humidity and temperature monitoring and control systems in museums, collections, and galleries.
- Obstruction of access routes, entrance gates, and areas due to fallen trees and damaged landscape elements.
- Prevention of access by emergency intervention vehicles to threatened or damaged areas.

— Hindrance or delay of effective intervention due to all these effects (Topaloğlu Uzunel, 2023).

In addition to the mentioned structural and non-structural damages, the following damage risks should also be included in the list of damages caused by earthquakes to archaeological heritage sites:

— Soil liquefaction, which can occur under certain conditions and lead to soil instability and settlement of structures, resulting in collapse and failure.
— The risk of secondary damage from flooding due to dam failures during earthquakes can increase.
— Unstable elements such as loose wall fragments can topple or get damaged.
— Landscape elements such as trees, fences, and informative signs, warning boards, etc., can fall onto the ruins.
— Access roads within the site or connecting the site to other areas can be damaged.
— Previously unidentified archaeological areas can be exposed after an earthquake.
— Previously known/registered archaeological sites can be buried under soil, structures, or debris after an earthquake (Stovel, 1998), (Topaloğlu Uzunel, 2023).

In addition to the aforementioned risks, the occurrence of earthquake-induced damages in the vicinity or within the settlement where the archaeological heritage site is located will increase secondary risks. Damage to infrastructure systems and transportation infrastructure will hinder emergency communication, effective mobility, and access of emergency response vehicles to threatened or damaged areas (Stovel, 1998).

In the 21st century, it is observed that earthquake disasters are occurring more frequently and with a wider impact (EM-DAT 2019; EM-DAT 2020; EM-DAT&CRED 2021). Recent disasters have caused significant damage to cultural heritage assets of earthquake-prone societies. The Kobe earthquake in Japan on January 17, 1995, with a magnitude of 7.3 JMA, resulted in the destruction and severe damage to the region's lightly constructed buildings made of wood and bamboo with thin plaster. The 1997 Assisi earthquake in Italy, the earthquake in the ancient city of Bam in Iran in 2003, and the earthquakes that affected the Prambanan Temple in Indonesia in 2006 are examples of recent disasters that have caused damage to cultural heritage. The L'Aquila earthquake in Italy on April 6, 2009, with a magnitude of 6.3, resulted in 308 injuries, the displacement of 25,000 people from their homes, and damage to more than 10,000 buildings. Serious damages and collapses were observed in the region's rubble-cut stone

and brick masonry structures due to seismic shaking (Rota & Castrillion, 2015). In the Nepal earthquake on April 25, 2015, with a magnitude of 7.8, there were 8,844 fatalities, more than 22,000 injuries, and 8 million people affected. Many historic monuments, tempearthqles, libraries, archive buildings, and collections in the Kathmandu Valley, listed as a World Heritage site, were damaged.

**Turkey - February 6, 2023 Earthquakes**

Anatolia, which is known as the land of ancient civilizations and possesses a rich cultural heritage, is located at the intersection of three tectonic plates and has been prone to strong and influential earthquakes throughout history. The intersection of the Eurasian, African, and Arabian Plates corresponds to the southeastern part of Anatolia. Following the Ölüdeniz Fault, which is formed by the movements of the African and Arabian Plates, there are the Eastern Anatolian and Northern Anatolian Fault Lines. Anatolia is situated in a highly active seismic zone in terms of seismology (Engin, 2023). This seismic activity has caused major earthquakes and shaped the region over geological timescales.

On February 6, 2023, at 04:17 local time, a magnitude 7.7 earthquake with its epicenter in Sofalaca-Şehitkamil-Gaziantep occurred, followed by a second earthquake with a magnitude of 7.6 and its epicenter in Ekinözü-Kahramanmaraş at 13:24 on the same day. According to the Disaster and Emergency Management Authority (AFAD), the depths of these earthquakes were measured as 8.6 km and 7 km, respectively (AFAD 2023; Tanırcan-Eken 2023). Post-earthquake investigations conducted through geophysical, seismological, and geodetic research, based on earthquake records obtained from national and international seismic centers and relevant institutions, as well as Global Navigation Satellite Systems (GNSS) and Global Positioning System (GPS) data, revealed that three different fault segments moved consecutively during the earthquake with a magnitude of 7.7 (Mw). It was observed that displacement (throw) of up to 7 meters occurred along the fault during these movements (Eyioğan, 2023). On February 8, 2023, a state of emergency was declared for a period of three months in the provinces of Adana, Adıyaman, Diyarbakır, Gaziantep, Hatay, Kahramanmaraş, Kilis, Malatya, Osmaniye, and Şanlıurfa under the Extraordinary State of Emergency Law No. 2935, due to the natural disaster (Official Gazette, 2023). With the addition of Elazığ to the state of emergency decision, the number of affected cities reached 11 (Laleoğlu 2023). The widespread catastrophe affected a vast geographical area, resulting in 50,783 fatalities, the destruction of 57,029 homes, damage to 24,921 homes (Bianet 12 Şubat 2023), and the displacement of a significant portion of the population, with 14 million people being affected and forced to leave their homes (Wikipedia, 2023; İTÜ, 2023; Strateji ve Bütçe Başkanlığı, 2023). More

than 2,400 aftershocks occurred in the earthquake zone. Among the initial aftershocks was a magnitude 6.4 earthquake with its epicenter in Nurdağı-Gaziantep (Oyguç, 2023), and the Hatay Earthquake with a magnitude of 6.4 on February 20, 2023 (Mimarlar Odası, 2023), which further exacerbated the destruction in the disaster-stricken area (Tanırcan- Eken, 2023).

The earthquakes on February 6 affected a wide area encompassing Southeastern Anatolia, Eastern Anatolia, Central Anatolia, and the Mediterranean regions, which are rich in cultural heritage (AFAD, 2023) (Fig. 4). A total of 11 cities in these regions have been affected. Within the extensive area covering Adana, Adıyaman, Diyarbakır, Gaziantep, Hatay, Kahramanmaraş, Kilis, Malatya, Osmaniye, Şanlıurfa, and Elazığ, many cultural assets have suffered damage or been destroyed (Mimarlar Odası, 2023). Four World Heritage Sites are located within the impact area: Mount Nemrut, Göbeklitepe, Diyarbakır Fortress and Hevsel Gardens Cultural Landscape, and Arslantepe Mound (UNESCO, 2020c). Additionally, there are 3,715 archaeological sites and 7,987 registered immovable cultural properties within the affected area (ICOMOS, 2023). The report prepared by ICOMOS Turkey National Committee emphasizes the presence of numerous unregistered but culturally significant structures, examples of the rural and urban fabric, landscape areas, and archaeological sites requiring protection, in addition to officially registered sites. It highlights that monumental structures and some examples of civil architecture have suffered severe damage, partial or complete collapse, and significant losses in their components. It is noted that "previously covered archaeological layers have become visible as a result of the collapse of structures built on top of them." In multi-layered settlement centers affected by the earthquake, it is stated that new discoveries and assessments will be necessary within the scope of urban archaeology (ICOMOS, 2023).

Following the earthquake disaster, the Ministry of Culture and Tourism was the first to gain access to the area and oversee museums and monumental structures. In statements made by officials from the Ministry of Culture and Tourism, it was emphasized that the ministry is an old and established institution, and Turkish museology has been tested multiple times by natural disasters, invasions, and wars. It was noted that during the First and Second World Wars, artifacts were removed from museums and stored in various locations in Turkey to protect them from bombings. The year 2019 witnessed the testing of the field of museology with the COVID-19 pandemic, followed by fires and earthquakes. It was stated that in the 21st century, museums have been renovated with state-of-the-art technology and smart systems. Storage facilities, exhibition halls, and display cases have been constructed and

reinforced to withstand disasters, and artworks have been securely fastened in exhibition cases (Coskun 2023a; Coskun 2023b).

In the aftermath of the earthquakes on February 6, 2023, the Ministry of Culture and Tourism successfully implemented the Emergency Action Plan for Disasters. It was stated that within the framework of the action plan, the responsibilities of each team member and their assigned locations were predetermined, and the teams ensuring safety arrived at the earthquake-stricken area. Damage assessment activities began on the first day of the earthquakes, and on the second day, areas and archaeological sites listed on the UNESCO World Heritage List were inspected. It was reported that damage occurred at the Malatya Aslantepe Mound, a UNESCO World Heritage site, with sliding of some adobe walls and collapse of the upper roof structure (Fig. 5), (Ersoy, 2023). Partial crumbling was detected in the bastions of Diyarbakır Fortress (Fig. 6a-b). While it was noted that Adıyaman Nemrut Tumulus remained undamaged (TRT Haber 2023; Coskun 2023b), it was mentioned that a column toppled at Karakuş Tumulus in Adıyaman (Fig. 7a-b), (Arkeolojik Haber, 2023a; Coskun 2023b). The relief block known as the "Handshake Scene," located on the fallen column, was immediately protected at the Adıyaman Museum in the early days after the earthquake. Partial collapses occurred on the walls of Gaziantep Castle (Fig. 8a-b), (Arkeolojik Haber, 2023b). Adıyaman Kahta Castle and Arsemia archaeological site suffered partial damage, and the bastions of Ravanda Castle in Kilis-Polateli collapsed (Engin, 2023). The gate of the Kale (Castle) on Örtülü Höyük in Gaziantep-Islahiye was destroyed (Başgelen, 2023). It was stated that among the 29 museums in the earthquake-stricken region, only Hatay Archaeology Museum experienced structural damage to one of its blocks (Coskun, 2023b).

On February 24, 2023, a meeting of the Scientific Advisory Board for the Hatay Cultural Heritage Conservation Project was held. The decisions made during this meeting included the mobilization of experts in their respective fields, the establishment of a "Disaster Excavation Directorate" to carry out rescue operations in the debris of collapsed cultural assets, the safe removal of debris from cultural assets to clear pathways, the relocation and preservation of remains belonging to the cultural assets that constitute the debris, to be used in future restoration projects, the development of a roadmap and the determination of principles to be implemented within this roadmap, the establishment of a joint operation center between the General Directorate of Cultural Heritage and Museums and the General Directorate of Foundations, and the gathering of the Advisory Board and the Scientific Board at the operation center. Due to the multi-layered cultural structure of Hatay, it was emphasized that a new regulation and roadmap should be implemented for

Hatay archaeology and excavation works would be conducted in newly discovered archaeological sites (Kültür ve Turizm Bakanlığı, 2023). On March 1, 2023, a consultation meeting was held between the Ministry of Culture and Tourism and representatives of ICOMOS TR, ICORP, TMMOB, and professional chambers regarding immovable cultural assets in the earthquake-affected provinces (Kültür Varlıkları ve Müzeler Genel Müdürlüğü, 2023). To generate financial resources for the maintenance, repair, and other requirements of cultural assets in the disaster-stricken area, a call was made to increase donations and assistance, stating that "any and all in-kind and cash donations and expenses made for the maintenance, repair, preservation, surveying, restoration, and restitutions of immovable cultural assets covered under Law No. 2863 will be 100% tax-deductible" (Vakıflar Genel Müdürlüğü, 2023).

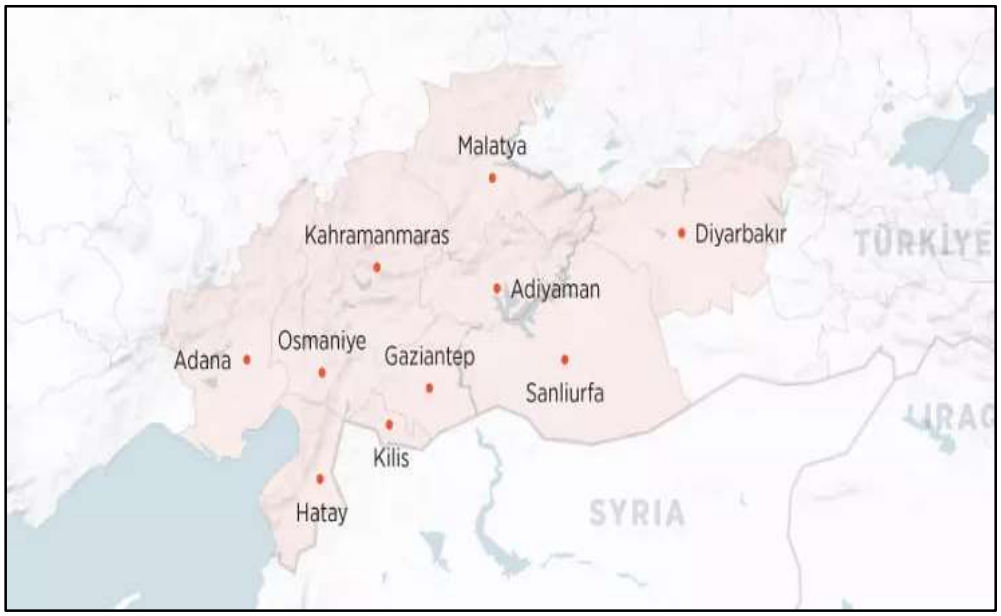


**Fig. 4.** Provinces affected by the February 06, 2023 earthquakes (Euronews, 2023).

**Fig. 5.** Arslantepe mound (Arkeolojik Haber, 2023).

**Fig. 6.** a-b. Diyarbakır Castle, after the February 06, 2023 earthquake (Arkeofili, 2023).

**Fig. 7**. a-b. Adiyaman-Karakus Tumulus before and after the February 06, 2023 earthquake (Arkeolojik Haber, 2023b).

**Fig. 8.** a-b. Gaziantep Castle, after the February 06, 2023 earthquake (Arkeolojik Haber, 2023).

**Evaluation and Suggestions**

Cultural heritage has encountered numerous disasters over an extended period, profoundly impacting its formation. Similarly, archaeological heritage

sites, a significant component of cultural heritage, have been adversely affected by disasters, especially earthquakes. The points at which archaeological sites can be affected by earthquakes, after they have transformed into heritage areas, can be categorized as follows:

— *Structural Damages:* Archaeological sites consist of structures built using construction techniques from historical periods. It is likely that the static condition of these structures has weakened over time. During an earthquake, significant damage can occur due to structural vulnerabilities. Walls may crack, ceilings may collapse, or stone blocks may fall. This situation can negatively impact the integrity and aesthetic value of the heritage sites.

— *Imminent Collapse:* Some archaeological structures may face the imminent danger of complete collapse during earthquakes. Works that have already had weakened structural integrity due to natural disasters and human interventions over the years can be permanently lost in the event of an earthquake. This situation can lead to an irretrievable loss for cultural and historical heritage.

— *Conservation and Restoration Efforts*: Conservation and restoration efforts are of great importance in protecting archaeological sites from earthquakes. It is necessary to strengthen and make the structures resilient against earthquake risks. Additionally, the repair and restoration of damaged areas are crucial. These efforts can better prepare heritage sites for future earthquakes.

— *New Archaeological Sites Revealed After the Earthquake:*
Archaeological sites that are entirely underground, undiscovered, undocumented, and lacking in information can be revealed following an earthquake disaster. In the aftermath of an earthquake, a previously unexplored archaeological site, which has suffered damage and increased fragility under challenging conditions, becomes a new situation that requires analysis and urgent intervention. Archaeological sites uncovered after earthquakes often sustain physical damage. Therefore, it is necessary to protect and document these sites under difficult post-disaster conditions. Additionally, when formulating post-disaster urban planning, consideration should be given to the archaeological sites unearthed after earthquakes in order to develop appropriate strategies.

— *Increasing Funding and Resources:* Sufficient funding and resources are crucial for the preservation of archaeological heritage. More resources need to be allocated at the national and international levels. These resources can be utilized for conservation and restoration projects,

ensuring long-term sustainable preservation of archaeological heritage for future generations.

— *Raising Awareness in the Community:* Increasing awareness among the public about the importance of archaeological heritage and earthquake risks is essential. Education and awareness campaigns can enhance the sensitivity of the community towards archaeological heritage and contribute to conservation efforts. It is particularly important to focus on awareness activities among youth and local communities.

Minimizing the adverse effects of earthquakes on archaeological heritage requires a comprehensive approach. Conservation efforts encompassing various stages, including robust restoration projects, adequate funding, and increasing public awareness, contribute to the sustainable preservation of archaeological heritage and its transmission to future generations.

Recommendations for future research directions for potential researchers interested in examining this research trend:

— *Assessing the Seismic Vulnerability of Archaeological Sites:* Research should be conducted to assess the seismic vulnerability of archaeological sites in earthquake-prone regions. Taking into account factors such as site location, geological conditions, structural stability, and previous earthquake impacts, such studies can provide valuable insights into understanding the susceptibility of archaeological heritage to seismic events.

— *Risk Management Studies:* Developing and improving risk management strategies for the conservation and management of archaeological sites in earthquake-prone areas is an important area of study. Research should focus on hazard mapping, emergency response planning, and the development of protocols for post-earthquake damage assessment and mitigation.

— *Advancement of Site Assessment Techniques:* Advanced non-destructive evaluation techniques should be explored and utilized for assessing the structural integrity and damage condition of archaeological structures and artifacts following earthquakes. These may include techniques such as ground-penetrating radar, laser scanning, and infrared thermography, which can provide detailed information without causing harm to the archaeological remains.

— *Collaboration:* Interdisciplinary collaboration among archaeologists, architects, seismologists, engineers, and other relevant professionals should be encouraged to develop comprehensive strategies for reducing earthquake risk and preserving heritage. Joint research initiatives can

contribute to the development of innovative methodologies and tools for assessing, monitoring, and safeguarding archaeological sites.

— *Community Engagement and Stakeholder Relations:* The role of community engagement and stakeholders in earthquake resilience and the preservation of archaeological heritage should be investigated. Research should focus on raising public awareness, promoting community participation, and exploring measures that encourage collaboration among local communities, heritage organizations, and academic institutions.

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