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Interaction with Geosciences in the Modern Museum Approach: The Case of the Batman-Hasankeyf Museum

Modern Müzecilik Yaklaşımında Yer Bilimleri ile Etkileşim: Batman-Hasankeyf Müzesi Örneği

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ABSTRACT:

The modern museology approach increasingly emphasizes the integration of earth sciences with archaeology to provide a holistic understanding of natural and cultural heritage. While traditional museums often isolate artifacts from their environmental contexts, contextualizing them within geological, geomorphological, and paleogeographical frameworks fosters scientific literacy, environmental awareness, and critical thinking. Addressing the gap in holistic heritage presentation, this study examines the newly opened Batman-Hasankeyf Museum as a pioneering model in Turkey that seamlessly merges geosciences with archaeology. Designed as a qualitative case study, the research employs on-site observations, content analysis of exhibition techniques, and comprehensive field surveys. The findings reveal that the museum's dedicated Earth Sciences Hall effectively utilizes interactive technologies, 3D block diagrams, and geological time scales to illustrate the dynamic relationship between ancient human settlements and their paleogeographical environment in Upper Mesopotamia. Ultimately, the study concludes that this multidisciplinary integration represents a significant paradigm shift in Turkish museology, transforming static artifact displays into a dynamic geoarchaeological narrative. Enhancing the promotion of such integrated models and adopting advanced immersive technologies in future practices will be crucial for engaging diverse global audiences and preserving unique cultural and geological heritages.

KEYWORDS: Modern Museology, Batman-Hasankeyf Museum, Geoarchaeology, Earth Sciences, Cultural Heritage

Öz:

Modern müzecilik yaklaşımı, doğal ve kültürel mirasın bütüncül bir şekilde anlaşılmasını sağlamak amacıyla yer bilimlerinin arkeoloji ile entegrasyonunu giderek daha fazla vurgulamaktadır. Geleneksel müzeler eserleri genellikle çevresel bağlamlarından soyutlarken; bu eserleri jeolojik, jeomorfolojik ve paleocoğrafik çerçevelerde bağlamsallaştırmak bilimsel okuryazarlığı, çevre bilincini ve eleştirel düşünmeyi teşvik etmektedir. Bütüncül miras sunumundaki bu eksikliği ele alan bu çalışma, yer bilimleri ile arkeolojiyi kusursuz bir şekilde birleştiren Türkiye'deki öncü bir model olarak yeni açılan Batman-Hasankeyf Müzesi'ni incelemektedir. Nitel bir vaka çalışması olarak tasarlanan araştırma; yerinde gözlemler, sergileme tekniklerinin içerik analizi ve kapsamlı saha araştırmalarından yararlanmaktadır. Elde edilen bulgular, müzenin özel Yer Bilimleri Salonu'nun, Yukarı Mezopotamya'daki antik insan yerleşimleri ile onların paleocoğrafik çevreleri arasındaki dinamik ilişkiyi göstermek için interaktif teknolojileri, 3B blok diyagramları ve jeolojik zaman çizelgelerini etkili bir şekilde kullandığını ortaya koymaktadır. Sonuç olarak çalışma, bu multidisipliner entegrasyonun statik eser sergilemelerini dinamik bir jeoarkeolojik anlatıya dönüştürerek Türk müzeciliğinde önemli bir paradigma değişimini temsil ettiği yargısına varmaktadır. Bu tür bütüncül modellerin tanıtımının artırılması ve gelecekteki uygulamalarda gelişmiş sürükleyici dijital teknolojilerin benimsenmesi, küresel düzeyde farklı kitlelerin ilgisini çekmek ve eşsiz kültürel ve jeolojik mirasları korumak için kritik bir öneme sahip olacaktır.

Anahtar Kelimeler: Batman-Hasankeyf Müzesi, Jeoarkeoloji, Kültürel Miras, Modern Müzecilik, Yer Bilimleri.

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INTRODUCTION

The origins of museology can be traced back to the practice of collecting objects discovered in nature and works of art. Over time, however, it has evolved into a comprehensive discipline focused on the preservation, exhibition, and public dissemination of natural and cultural assets. The International Council of Museums (ICOM) has periodically redefined the concept of the "museum" to reflect changing global paradigms. In its earlier sessions (1946, 1951, 1961, and 1974), ICOM primarily emphasized the relationship between museums and tangible collections, highlighting functions such as collecting, researching, exhibiting, and preserving for the educational and aesthetic benefit of humanity. However, during ICOM's 2007 General Assembly, this definition underwent a fundamental shift. Museums were redefined as institutions that holistically embrace both the tangible and intangible cultural heritage of humanity, taking on new roles to safeguard this heritage collectively. With this shift, the traditionally accepted view of museums as exclusive spaces for historical or artistic objects expanded to recognize the dynamic and living nature of intangible cultural heritage. Nevertheless, while this updated definition stresses the importance of preserving intangible heritage, it often falls short of addressing the specific protection mechanisms outlined in the Convention for the Safeguarding of the Intangible Cultural Heritage, leaving a gap in how such heritage should be distinctly preserved within museum settings (Nalcioğlu, 2021).

Fundamentally, museums are institutions that reflect the scientific and cultural heritage of a society (Atagök, 1999, p. 70). In Turkey, museology operates under a centralized system administered by the Ministry of Culture and Tourism, with museums assuming the responsibility of preserving, exhibiting, and researching historical, cultural, and natural assets (Tüzün, 2010, p. 16). Contemporary museology in Turkey and globally emphasizes collecting relevant artifacts, making them publicly accessible, examining them according to academic standards, and ensuring their transmission to future generations (Selçuk, 2018, p. 8).

In recent years, the relationship between museums and their audiences has undergone a significant transformation. The traditional model, wherein visitors passively observed relics of the past, is gradually being replaced by interactive and participatory experiences. Modern museums are now conceived as dynamic mediators that prompt reflection on the past, encourage interpretation of the present, and inspire critical thinking about the future. This shift is evident in the increasing use of digital tools, interactive technologies, and interdisciplinary approaches designed to engage diverse segments of society.

Integrating Earth Sciences into Museology

Within this contemporary framework, modern museology increasingly recognizes the complementary role of earth sciences in interpreting natural and cultural heritage. Integrating geosciences into museum practice involves incorporating geological and environmental concepts into exhibitions and educational programs, establishing a paleogeographic context that parallels human history (Van Geert, 2019). By showcasing geographical content—such as rocks, minerals, fossils, and natural landscapes—museums offer visitors a profound understanding of Earth's history, natural processes, and the environmental impacts of human activity. This multidisciplinary approach bridges the gap between science and culture, fostering environmental awareness, conservation, and sustainable practices.

Through such exhibitions, museums highlight the interconnectedness of human societies and their environments, allowing visitors to engage with the rich geological and cultural heritage of a region. Exhibiting geological and geomorphological formations—including unique landforms and morphogenetic systems shaped over millions of years—significantly enhances scientific literacy. Furthermore, museums serve as key platforms for raising public awareness about the necessity of preserving geoheritage at both local and global levels (Reis et al., 2014). A notable example of this innovative approach is the newly opened Batman-Hasankeyf Museum, which deviates from Turkey's conventional archaeological museum model. By seamlessly integrating geosciences with archaeology, the museum offers a comprehensive understanding of the region's historical and environmental transformations, fully embodying the principles of modern museology.

Despite the increasing awareness of modern museology, traditional archaeological museums often isolate cultural artifacts from their environmental, geological, and paleogeographical contexts. This disconnect creates a significant problem in understanding the deep-rooted relationship between past human societies and their natural surroundings. Addressing this gap, the primary purpose of this study is to examine the integration of earth sciences into archaeological exhibitions to foster a holistic understanding of cultural and natural heritage. Specifically, it aims to highlight the Batman-Hasankeyf Museum as a pioneering model in Turkey that successfully merges geology, geomorphology, and archaeology.

To achieve this objective, the research was designed as a qualitative case study. The methodological framework relies on on-site observations within the Batman-Hasankeyf Museum and a content analysis of its Earth Sciences hall, focusing on the exhibition techniques, digital visuals, and artifact displays. Furthermore, the study is grounded in comprehensive field surveys, sample collections, and continuous expert consultations regarding the geomorphological structure of the region. By evaluating the museum's spatial and thematic design through this qualitative approach, the study reveals how modern museology can effectively communicate the complex dynamics of geoarchaeology to the public.

Integrated and Innovative Exhibition Approaches in Global Museology Literature

An analysis of global museology literature reveals that the traditional, object-centric exhibition approach is increasingly being replaced by interactive and interdisciplinary methods that seamlessly integrate natural history and human culture (Chatsiopoulou & Michailidis, 2025). When evaluated within a thematic framework rather than through isolated institutional profiles, it becomes evident that this transformation is driven by "mega-museum" models, the integration of digital technologies, and the blending of earth sciences with archaeology.

In the context of collection richness and interdisciplinary narratives, mega-museums in the United States, such as the American Museum of Natural History (AMNH) and the Chicago Field Museum, exhibit archaeological and anthropological artifacts by contextualizing them within regional geology and natural history (Brown, 2014). Similarly, the Museum of Nature and Humankind (Museo della Natura e dell'Uomo) at the University of Padua in Italy successfully synthesizes academic heritage by uniting its mineralogy, geology, paleontology, zoology, and anthropology collections around a single, integrated narrative of planetary evolution (Carrara & Scaggion, 2016). Europe's long-established institutions, such as the National Museum of Natural History (MNHN) in Paris and the Natural History Museum in London, bring together concepts of paleontology, comparative anatomy, and deep time to convey the interaction between earth systems and humanity to their visitors (Deligeorges, Gady, & Labalette, 2004). Meanwhile, the Museum of the Earth (Muzeum Ziemi) in Poland merges geological sciences and fossil collections with historical and social memory.

Another prominent theme in contemporary literature is the integration of technological and digital innovations into exhibition practices. Institutions like the Museum of Human Evolution in Burgos, Spain, and the Neanderthal Museum in Germany move beyond the mere display of fossils or bones; they utilize Augmented Reality (AR), Virtual Reality (VR), and interactive storytelling to immerse visitors in ancient landscapes and the daily lives of early hominins. Furthermore, the application of 3D visualization and VR technologies at archaeological sites such as Çatalhöyük (Lercari, Forte, & Kopper, 2017), or the presentation of complex geoarchaeological and stratigraphic data through digital replicas of the Lascaux Cave in France, demonstrates how such information can be communicated to the public in an interactive and comprehensible manner (Jiang et al., 2025).

This global paradigm shift also resonates deeply within exhibition practices in Turkey. The tradition of scientific documentation and preservation pioneered by the Istanbul Archaeology Museums (Cengiz, 2010) is today being blended with digital interaction and modern exhibition technologies in institutions like the Zeugma Mosaic Museum (Akçaova & Köse Doğan, 2020). Institutions such as the Ankara MTA Natural History Museum make fundamental contributions to earth science education by presenting Turkey's geological, paleontological, and mineralogical wealth (Dilli, 2014). Moreover, current academic evaluations regarding world heritage sites like Göbekli Tepe emphasize the necessity of moving beyond traditional information boards to employ AR, VR, and gamified interactive simulations for the holistic transmission of cultural heritage (Gürbüz & Özdere, 2025).

In conclusion, these examples from the literature demonstrate that the most successful contemporary museum models are those that present earth sciences, paleontology, and archaeology not as isolated disciplines, but as components of a dynamic, complementary narrative. This global and national vision further underscores the significance of the Batman-Hasankeyf Museum's modern design, which integrates geology and archaeology, highlighting its pioneering role in Turkey's contemporary museology approach.

BATMAN-HASANKEYF MUSEUM

The Hasankeyf Museum Complex and Archaeological Park, established in the new settlement area and comprising the museum building, entrance structure, halls for phases 1, 2 and 3, stage-open-air theatre, backstage structure, greenhouse, park and greenhouse repair building, cultural park area and island interior, The Hasankeyf Museum Complex and Archaeological Park, whose construction, including infrastructure and landscaping, began in 2012,

opened in 2018 as a unit affiliated with the Batman Museum Directorate and was established under the name 'Hasankeyf Museum Directorate' on 10/05/2019 (Figure: 1; T.C. Kültür ve Turizm Bakanlığı, 2024).

The museum displays artefacts excavated from the provinces of Batman, Diyarbakır, Siirt and Mardin as part of the cultural heritage preservation and rescue efforts related to the Ilisu Dam Hydroelectric Power Plant (HES) Project, as well as artefacts acquired through purchase and donation from other museums in the surrounding region. The museum also houses many artefacts from the Hasankeyf Mound and castle, which were submerged under the waters of the Ilisu Dam Lake and obtained as a result of rescue excavations that began in 1985 and continued until 2019 (Akça, 2020).

As a museum complex that is a candidate to become the region's most important tourist attraction, the Hasankeyf Museum, built on a large area of 96,323.26 m², also includes significant structures from the Hasankeyf archaeological site in the cultural park area, such as the Zeynel Bey Tomb, the fountain gate and minaret belonging to the Süleyman Han structure, the architectural elements and minaret of the Er-Rızk Mosque, Eyyubi Girls Mosque (tombs and gravestones belonging to the Eyyubi kings), Artuklu Bathhouse (the cold section of the bathhouse from the Ottoman period), Imam Abdullah Tomb and Zawiya, and the monumental Middle Gate from the Eyyubids period, which provides access to the Inner Castle, have been relocated and positioned (Figure 1; Turkish Museums, 2024).

The museum exhibits roughly 1,450 artefacts, including obsidian and flint tools, bone, glass, metal, and pottery, excavated from mounds in the surrounding provinces. These artefacts date from various historical periods, including the Palaeolithic, Neolithic, Chalcolithic, Bronze Age, Iron Age, Middle Ages, Roman, Artukid, and Ottoman periods. However, with the addition of artefacts stored in the museum's depots but not yet on display due to ongoing restoration work, the total number of artefacts is approximately 4,000 (Akça, 2020).

As part of the Hasankeyf Museum display and arrangement work, 1,791 artefacts were transferred from the Batman, Diyarbakır and Mardin Museums. In addition to the Hasankeyf excavations, artefacts from around 20 rescue excavations in Batman, Mardin, Siirt and Diyarbakır, as well as artefacts acquired through purchase and donation to the Batman, Diyarbakır and Mardin museums, comprise the museum's richest collection of 1,466 artefacts from the Palaeolithic, Neolithic, Chalcolithic, Bronze, Iron, Medieval, Roman, Artuklu, and Ottoman periods. The museum's richest collection consists of archaeological, coin, and ethnographic artefacts.



Figure 1. Cultural Assets Located in and Around the Hasankeyf Museum Complex, Covering an Area of 96,323.26 m².

In addition to the rock, mineral and fossil collections comprising 19 display cases in the earth sciences section of the entrance hall, there are displays, diagrams and panels shedding light on the geological and geomorphological history of the country and the region. The exhibition halls on the lower and upper floors feature finds from the prehistoric period, as well as rich artefacts from the periods between 2000 and 2018, including reconstructions from almost every period, from the Neolithic, Chalcolithic, Bronze, Iron, Medieval, Early Modern, and early 20th-century periods, as well as reconstructions representing almost every period, are noteworthy (Kültür ve Turizm Bakanlığı, 2024).

Alongside these artefacts displayed in the museum's showcases, the museum hall also features a model village settlement and house models depicting the Neolithic period. These museum activities aim to give visitors the feeling of living in that period and to visually recreate the lifestyles of the people who lived in the region in past ages with wax figures. The area where the museum is located also houses a cafeteria, a video screening area, a conference hall, a children's educational workshop, a museum shop, a library, administrative units, a workshop used for the restoration of the museum's artefacts, and a laboratory (Akça, 2020).

Hasankeyf Museum Earth Sciences (Geology-Geomorphology-Mining-Petroleum) Hall:

The entrance to the museum's exhibition halls begins with the earth sciences (Geology-Geomorphology-Raman Petroleum) section on the lower floor. Alongside video presentations featuring rich, schematic 3D block diagrams, terrain photographs and animated reconstructions supported by scientific explanations, this hall also contains display cases featuring rock minerals and fossils from virtually every formation collected in the region (Figure: 2).

The geology section begins with a geological time scale. As the museum's exhibition halls and sections are arranged chronologically, visitors can see how small a part of Earth's history humanity's footprint on the planet represents. This section features three-dimensional diagrams showing the stratigraphic sequence and detailed characteristics of the geological formations in the region, as well as their tectonic position, and video presentations illustrating the tectonic development of the region.

The earth sciences hall continues with the 'Geomorphological Forms' section. The field around Batman and Hasankeyf has been shaped by many structural factors and morphogenetic processes such as tectonics, folded and horizontal structures, karstification, and fluvial processes (Karadoğan and Kozbe, 2017). Therefore, there is a wide variety and richness of relief associated with these processes in the area (fault relief, folded structure relief, horizontal and monoclinical structure relief, elements of river topography, karstic forms). Furthermore, as different climatic conditions prevailed in the past, landforms such as tafoni, lattice dissolution, witness and mushroom rocks, caliche formations, and travertine deposits formed during these climatic periods can also be found. All these rich landforms are presented to visitors in a structured and systematic manner in this section of the museum.

The 18 display cases in the earth sciences hall encompass minerals, rocks and fossils collected locally and representative of the geological formations. These include: nummulite coral fossils, limestone, calcite nodules in clay sandstone, siliceous samples, and gypsum samples (Figure: 3).

The information visuals and animations in the geomorphology section have been arranged taking into account the results of geomorphological studies conducted in the field (Kozbe and Karadoğan, 2018) and through continuous consultation. All these studies are the result of lengthy work carried out by a team of experts in the field and by us, travelling around the entire region, collecting samples and exchanging views. The exhibition hall organising team deserves praise for considering all details, their mastery of the regional earth sciences literature, and their meticulous approach to the subject.

The Geomorphology Section also features a video display explaining the extraction of Raman oil from Raman Mountain, located within the borders of Batman province. As is well known, oil was first discovered and extracted in Turkey in 1934 at Raman Mountain. The journey of oil in Turkey, from its formation to its extraction from wells, is narrated in this section of the museum through information panels and colourful visuals (Durmaz, 2020;81).



Figure 2. Hasankeyf Museum Geosciences Hall.



Figure 3. Samples of Rocks on Display in the Geology Hall of the Hasankeyf Museum.

DISCUSSION

The findings of this study demonstrate that the integration of earth sciences and archaeology within the Batman-Hasankeyf Museum significantly transforms the traditional paradigm of museology. Historically, archaeological museums have tended to exhibit cultural artifacts in isolation, stripped of their geological and environmental contexts. However, the Batman-Hasankeyf Museum addresses this fundamental gap by establishing a dedicated Earth Sciences Hall that seamlessly connects geomorphological formations, regional tectonic history, and human cultural evolution. This multidisciplinary framework aligns with global trends observed in prominent international institutions, such as the Museum of Human Evolution in Burgos, which utilizes interactive technologies and environmental contexts to place human history within a broader, dynamic ecological narrative (Frank Johnson, 2025).

Furthermore, the museum's incorporation of 3D block diagrams, animations, and video presentations to illustrate morphogenetic processes and regional resource extraction—such as the Raman petroleum—represents a pioneering step in Turkish museology. Such technological integration strongly resonates with the Spatiotemporal Overlap Narrative Experience (SONE) model highlighted in recent literature, which argues that synchronizing physical museum spaces with virtual and digital narratives prevents visitor fatigue and deepens cultural comprehension (Hu et al., 2025).

By moving beyond static, object-centric displays, these visual and interactive tools facilitate a more profound emotional resonance and cultural connection for the visitors, allowing them to actively engage with the region's deep history.

The pedagogical and social implications of this integrated approach are profound. Presenting the public with tangible geoarchaeological evidence—such as diverse rock samples, fossils, and the structural features of the Tigris River Valley—significantly enhances scientific literacy and fosters public environmental awareness. It enables visitors to conceptualize the vast span of geological time alongside the relatively brief footprint of human existence, thereby encouraging critical reflection on contemporary issues like sustainability, human-environment interconnectedness, and the necessity of geoheritage conservation.

Despite these significant advancements, the continuous evolution of digital museology points toward potential areas for future development. While the Batman-Hasankeyf Museum currently utilizes screen-based digital visuals and physical reconstructions effectively, contemporary literature indicates that incorporating more advanced immersive technologies, such as Augmented Reality (AR), Virtual Reality (VR), or gamified interactive learning models, could further enrich the visitor experience (Chatsiopoulou & Michailidis, 2025).

Future research and curatorial practices should focus on expanding these participatory digital components to ensure that the rich geoarchaeological narrative of the Upper Mesopotamia region remains highly engaging and accessible for diverse, modern audiences.

CONCLUSION

This study examined the Batman-Hasankeyf Museum to evaluate the integration of earth sciences into archaeological museology. The findings demonstrate that the museum successfully transcends traditional, isolated artifact displays by establishing a dedicated Earth Sciences Hall. By structurally presenting the region's tectonic history, morphogenetic processes, and mineralogical wealth alongside archaeological artifacts, the museum creates a unified geoarchaeological narrative. The use of 3D block diagrams, geological time scales, and specific regional formations—such as karstification features, fluvial topographies, and Raman petroleum extraction—effectively illustrates the dynamic relationship between human settlements and their paleogeographical environment in Upper Mesopotamia.

The integration of geology and geomorphology into the museum's spatial narrative represents a significant paradigm shift in Turkish museology. Analytically, it proves that contextualizing cultural heritage within deep geological time not only enhances scientific literacy but also fosters public awareness regarding environmental sustainability and geoheritage conservation. Rather than viewing historical objects in a vacuum, visitors are encouraged to perceive human cultural evolution as a relatively brief footprint within a vast, evolving planetary system. This multidisciplinary approach effectively aligns with global contemporary museology standards, positioning the Batman-Hasankeyf Museum as a pioneering model for holistic heritage presentation.

To further advance the field of integrated museology, several concrete avenues for future research are recommended. First, empirical studies should be conducted to quantitatively and qualitatively measure visitor engagement and learning outcomes within geoarchaeological exhibitions. Utilizing advanced evaluation frameworks, such as behavioral tracking or the Spatiotemporal Overlap Narrative Experience (SONE) model, could provide critical data on how visitors interact with integrated geological and archaeological displays. Second, future research and curatorial practices should explore the incorporation of immersive digital technologies—such as Augmented Reality (AR), Virtual Reality (VR), and gamified learning platforms—to overlay complex geomorphological data directly onto physical artifacts, making abstract deep-time concepts more accessible. Finally, comparative analyses between the Batman-Hasankeyf Museum and prominent international institutions (e.g., the Museum of Human Evolution in Burgos or the Museum of the Earth in Warsaw) are recommended to establish universal guidelines for geoarchaeological exhibition design and to fully harness the educational potential of global natural and cultural heritage.

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