



## Advanced Engineering Days

aed.mersin.edu.tr



### Investigation of Molla Hari (Halil) Süleyman Paşa Mosque's material deteriorations

Lale Karataş<sup>1</sup>, Aydın Alptekin<sup>2</sup>, Murat Yakar<sup>3</sup>

<sup>1</sup>Mardin Artuklu University, Department of Architecture and Urban Planning, Türkiye, karataslale@gmail.com

<sup>2</sup>Mersin University, Geological Engineering Department, Türkiye, aydinalptekin@mersin.edu.tr

<sup>3</sup>Mersin University, Geomatics Engineering Department, Türkiye, myakar@mersin.edu.tr

Cite this study: Karataş, L., Alptekin, A., & Yakar, M. (2022). Investigation of Molla Hari (Halil) Süleyman Paşa Mosque's material deteriorations. 4<sup>th</sup> Advanced Engineering Days, 55-57

#### Keywords

Cultural Heritage  
Historical Buildings  
Material Deterioration  
Sustainability  
Mardin

#### Abstract

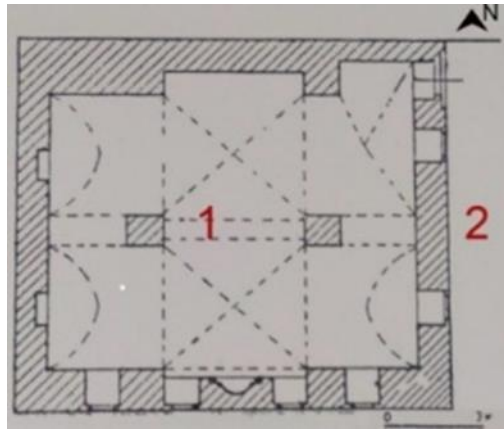
Molla Hari (Halil) Süleyman Paşa Mosque, which is located within the Mardin urban archaeological site and of which the conservation has importance due to reflecting the traditional monumental characteristics of the geography in terms of the architectural characteristics, has been exposed to material deterioration with the effects of various conditions and the building has encountered the risk of being destroyed. Within this context, the aim of the study is to investigate the types and causes of the material deteriorations of Molla Hari (Halil) Süleyman Paşa Mosque, which is located within the Mardin urban archaeological site and of which the conservation has importance for the region. Within the scope of the study, literature review, determination of the building on-site, and determination of current material deteriorations visually, and documentation with photographs were adopted as the methods. It was determined in the findings that most frequent material deterioration seen on the building is the use of cement arising from the faulty repairs. This result demonstrates that human-originated material deteriorations must be prevented immediately on the monumental structure.

#### Introduction

Factors such as air pollution, climate changes, etc. increasing with the development of the industry and technology, have caused negative effects on the stone structures in the world. When the deterioration factors of the stone structures in the world are considered, it is seen that the most problems are air pollution, presence of the soluble saline, and biologic degradation. Cause of these problems is the exposure of the structure to water generally [1]. Types of the deteriorations on the stone materials can only be diagnosed correctly at the end of close monitoring process. For instance, a grey colour change on the stone may occur with the impact of air pollution or with the penetration of a pollution, which flows from the roof, into the stone. In order to diagnose these types of deteriorations correctly, not only some part of the building, but also the environmental conditions and deterioration factors that have effect on the whole must be assessed. Otherwise, the interventions to be made shall only be intended to save the moment, and the essential factor causing the material deterioration shall not be removed [2]. Within this context, the aim of the study is to investigate the types and causes of the material deteriorations of Molla Hari (Halil) Süleyman Paşa Mosque, which is located within the Mardin urban archaeological site and of which the conservation has importance for the region.

#### Location, History of the Building and Use of Material

Molla Halil Mosque, which was built in the 14<sup>th</sup> century, is located in Mardin Province, Şehidiye Neighbourhood, on Plot Nr. 64. Excluding the mosque, which has an old appearance and square plan, all of the other additional structures belong to the late period, and majority of the enclosure wall of the building was rebuilt with stone using concrete mortar. The building has a rectangular plan and the main venue and its attachments constitute the building body. Mosque section is single-storey [3-4] (Fig. 1).



**Figure 1.** ground floor scheme of Molla Hari Mosque [3]

Stone, wood, metal, and mortar are the other original materials that have been used, and wooden material has been used on the windows and doors. Metal material has been used on the door hinges – sashes, door locks and slides, and on the socket fences. Use of local “inkara” mortar (powder of limestone (fine sieve sand) + hydrated lime) is seen on the door as the binding mortar, and use of plaster is not seen [5].

### Material and Method

Within the scope of the study, literature review, determination of the structure on-site, observational determination of the current material deteriorations and documentation via photographs were adopted as method. Architectural design and deterioration of a cultural heritage has been frequently performed using point clouds in the last decade [6-17].

### Results

Use of face stone is seen on the structure. Discharge of jointing, colour change, and faulty repairs caused by the use of cement are the types of the material deterioration existing on the walls of the building, material deterioration is not seen on the flat flooring. Material loss in the plaster exists on the vaults [5].



(a) Discharge of jointing, Colour change



(b) Use of cement

**Figure 2.** Deteriorations on façade nr. 1



**Figure 3.** Colour change, use of cement on the wall of façade nr. 2



**Figure 4.** Material loss in the plaster on vaults

Use of lancet arch is seen interior the mosque and round arches are seen above the windows on the façade. Faulty repairs were determined on the arches.

## Conclusion

Within the scope of the study, types and causes of material deteriorations of Molla Hari (Halil) Süleyman Paşa Mosque, which is located within the Mardin urban archaeological site and of which the conservation has importance due to reflecting the traditional monumental characteristics of the geography in terms of the architectural characteristics, were documented with the methods of literature review, investigation on-site, observational determination of current material deteriorations, and photographing. In the findings, it was determined that the material deterioration most frequently seen on the building was the use of cement caused by the faulty repairs. This result demonstrates that human-originated material deteriorations must be prevented immediately on the monumental structure.

As a result of the investigations conducted within the scope of the study, it was concluded that the building must be subjected to a general maintenance and repair process as soon as possible. Preventing damage to the current structure must be essential in the selection of the materials and methods to be applied in cleaning, strengthening and conservation. For this, the necessary analyses must be conducted on the original materials before the application.

## References

1. Charola, A. E., Wendler, E. (2015). An overview of the water-porous building materials interactions. *Restoration of Buildings and Monuments*, 21(2-3), 55-65.
2. Charola, A.E. (2017). Stone Deterioration Characterization for Its Conservation. *Geonomos*. <https://doi.org/10.18285/geonomos.v24i2.836>
3. Altun, A. (1971). *Architecture of Turkish Period in Mardin*. Acar Basım, İstanbul, 168 s.
4. Altun, A. (2006). Notes on the Plan Schemes of the Madrasah's of Artuquids Age in Anatolia. *Journal of Foundations*, 10(), 231.
5. Karataş, L. (2016). A Research on the Use of Material and Problems on the Praying Structures Within the Urban Archaeological Site of Mardin. Master's Thesis, Uludağ University, Institute of Science, Bursa, 340p.
6. Karataş, L., Alptekin, A., Kanun, E., & Yakar, M. (2022). Tarihi kârgir yapılarda taş malzeme bozulmalarının İHA fotogrametrisi kullanarak tespiti ve belgelenmesi: Mersin Kanlıdivane ören yeri vaka çalışması. *İçel Dergisi*, 2(2), 41-49.
7. Alptekin, A., & Yakar, M. (2021). 3D model of Üçayak Ruins obtained from point clouds. *Mersin Photogrammetry Journal*, 3(2), 37-40.
8. Kanun, E., Alptekin, A., & Yakar, M. (2021). Cultural heritage modelling using UAV photogrammetric methods: a case study of Kanlıdivane archeological site. *Advanced UAV*, 1(1), 24-33.
9. Doğan, Y., & Yakar, M. (2018). GIS and three-dimensional modeling for cultural heritages. *International Journal of Engineering and Geosciences*, 3(2), 50-55.
10. Mirdan, O., & Yakar, M. (2017). Tarihi eserlerin İnsansız Hava Aracı ile modellenmesinde karşılaşılan sorunlar. *Geomatik*, 2(3), 118-125.
11. Alptekin, A., Çelik, M. Ö., & Yakar, M. (2019). Anıtmezarın yersel lazer tarayıcı kullanarak 3B modellenmesi. *Türkiye Lidar Dergisi*, 1(1), 1-4.
12. Alptekin, A., Fidan, Ş., Karabacak, A., Çelik, M. Ö., & Yakar, M. (2019). Üçayak Örenyeri'nin yersel lazer tarayıcı kullanılarak modellenmesi. *Türkiye Lidar Dergisi*, 1(1), 16-20.
13. Alyılmaz, C., Yakar, M., & Yılmaz, H. M. (2010). Drawing of petroglyphs in Mongolia by close range photogrammetry. *Scientific Research and Essays*, 5(11), 1216-1222.
14. Yakar, M., & Doğan, Y. (2017). Silifke Aşağı Dünya Obuğunun İHA Kullanılarak Üç Boyutlu Modellenmesi. *Afyon Kocatepe Üniversitesi Fen ve Mühendislik Bilimleri Dergisi*, 17(4), 94-101.
15. Şasi, A., & Yakar, M. (2017). Photogrammetric modelling of sakahane masjid using an unmanned aerial vehicle. *Turkish Journal of Engineering*, 1(2), 82-87.
16. Kanun, E., Alptekin, A., & Yakar, M. (2021). Documentation of cultural heritage by photogrammetric methods: a case study of Aba's Monumental Tomb. *Intercontinental Geoinformation Days*, 3, 168-171.
17. Yılmaz, H. M., Karabork, H., Yakar, M. (2000). Yersel Fotogrametrinin Kullanım Alanları, Niğde Üniversitesi Mühendislik Bilimleri Dergisi, 4(1), 18-28