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Risk Management and Preventive Conservation of Cultural Heritage: the Case of Karaman Hatuniye Madrasa and Karaman City Museum

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Abstract Various methodologies have been developed to determine the risks of cultural properties that have been exposed to various risks since their construction and to make proposals for their preventive conservation. This study aims to protect the cultural, architectural, historical, and documentary values of historic buildings by identifying their threats and potential risks for risk management and preventive conservation studies and determining their risk levels considering the degree of vulnerability and frequency of occurrence in order to ensure their sustainability. Karaman Hatuniye Madrasa and Karaman City Museum were selected as case studies for cultural heritage risk management. The following standards were used to determine risk levels: the RE-ORG method for museum storage facilities, ICRROM's (2016) "Guide to Risk Management of Cultural Heritage" and ISO 31000 (2018) for risk analysis, and UNI EN 16096 (2012) standard for current condition assessment, risk priority, urgency class, and recommendation classification. The hazards and potential risks were identified and classified through field observations, literature review, archival research, oral interviews, and data from national (AFAD) and international (EM-DAT) databases. The results showed that Karaman Museum has a medium risk level and RE-ORG is required in the building and collections only, on the other hand, Hatuniye Madrasa has a high-risk level. In particular, abandonment/underuse and faulty restoration works are the main factors that increase the risk level. The study is important for the protection and conservation of Hatuniye Madrasa and Karaman Museum and their collections through risk management and preventive conservation measures and is an example of systematic assessment of risks in cultural properties.

Keywords: Cultural heritage; Risk management; Preventive conservation; Karaman Hatuniye Madrasa; Karaman Museum; RE-ORG; UNI EN 16096

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1. INTRODUCTION

Over time, historic buildings can lose their original function and be exposed to risks that threaten their integrity due to changes in society's way of life, population growth, wars, conquests, and so on. However, it is necessary to determine the possible risks for the sustainability of these cultural assets, which are exposed to various risks posed by nature, man, and technology, by preserving their originality and integrity, and implementing risk management against these risks. The concept of risk management is defined in the guide ISO 31000 (2018) as "any coordinated activity carried out with the aim to guide and control of actions concerning risks." The following are considered when defining risk criteria:

- The nature and type of uncertainties that may affect outcomes and objectives,
- The way outcomes (both positive and negative) and probabilities can be identified and measured,
- Time-dependent factors,
- Consistency in the application of measurements,
- How the level of risk is determined,
- How to account for multiple combinations and sequences of risks and,
- Capacity of the organization (ISO 31000 2018, p. 11).

ICCROM (2016, p. 14) defines risk management as "any action taken to understand and deal with potentially risky situations." When managing risk, it is important to first understand the context in which the cultural heritage is located. The context includes physical, administrative, legal, political, sociocultural, and economic. The second step is the identification phase. In this phase, all risks that threaten the collection, building, monument, or site should be identified. The factors of deterioration (physical factors, theft, fire, water, insects, pollutants, temperature, and UV, inappropriate temperature and relative humidity, lack of documentation) are defined in the layers object/support, fitting, room, building, site, and region. The type of risks might be rare (flooding, devastating earthquakes, wildfires, theft, visitors knocking over a private collection, etc.), frequent (water leaks, earthquakes, small fires, transportation accidents, theft, etc.), and cumulative (yellowing, black staining, discoloration, corrosion, erosion, loss of finish, wear of textiles, etc.). The process is completed with the phases of improvement and monitoring (ICCROM 2016, pp. 15-53). Thanks to preventive conservation and risk management, cultural assets and museum collections are protected and their sustainability and transmission to future generations are ensured.

Buildings that are no longer used in their original function or whose current functions no longer meet the needs of their users are threatened with extinction. To prevent the demolition of many historic buildings that serve a function other than their original function, reuse, and adaptation is a tool to protect historic buildings, which is a contemporary preservation approach (Ahunbay 2009, p. 97). In the Carta Del Restauro of 1931 (ICOMOS 2023a), it was proposed to protect buildings that have lost their original function by giving them new functions. In the Venice Charter of 1964 (ICOMOS 2023b), the protection of monuments that are historical documents was proposed and the basic approach is described in Article 5. Karaman Hatuniye Madrasa also lost its original function, received other functions over time, and was exposed to various risks caused by nature, technology, and people due to erroneous re-functioning and abandonment. Karaman Museum, similarly, was exposed to various risks.

The Karaman Hatuniye Madrasa, with its architecture from the Karamanoğulları period, is a remarkable building and has been the subject of many previous studies. Konyalı (1967) described the architectural features and the historical and cultural significance of the building in his work. However, he did not mention the potential risks and threats of the building at that time. Kuran (1969), on the other hand, in his work titled "Karamanlı Madrasas" conveyed the current condition of the building in the 1960s, and stated that many parts of the building were destroyed, but without a detailed analysis of condition assessment. Ögel (1957) mentioned in her work on the portal of Hatuniye Madrasa that it is a copy of the portal of Gök Madrasa except for the double minarets and the side wings attached to it, and focused mostly on the decoration features without any analytical assessment of the building. In their study on the reuse of Hatuniye Madrasa, Güleç Korumaz and Ayhan (2020) identified the strengths, weaknesses, opportunities, and threats (SWOT analysis) of the madrasa and proposed its reuse. Although their study has similar objectives to the present study, it lacks a detailed risk analysis and vulnerability assessment, but the current condition assessments are similar. The architecture and historical development of the building were also studied in detail by Akalın-Eryavuz (1997, p. 503) and Şaman-Doğan and Bilget-Fataha (2011, pp. 102-107), and Fidan and Baş (2022, pp. 208-210) provided detailed information about the building's portal. Although all these studies are important contributions to the understanding of the architecture and the art-historical significance of the building, they do not suggest preventive conservation measures that are important for the sustainable development of the building and its environmental context, as well. Dilay (2012, 1-4) also emphasized the contribution of the madrasa to the cultural and historical development of Karaman province.

Examining the studies conducted so far, one finds that although architectural and historical studies have been conducted on the madrasa, there has been no study on risk management and preventive conservation, and there is no literature on the city museum. Thus, the main novelty and versatility, as well as, new academic, methodological, and practical significance of this study are that, in contrast to the existing literature, it proposes the use of a simplified approach based on a combination of different internationally recognized guidelines and nationally accepted databases for the risk analysis of movable and immovable historic properties. In addition, it suggests a new perspective in terms of risk assessment of historic buildings with a comparative point of view. The main objectives of this study were to identify and analyse the existing risks of two important buildings, Karaman Hatuniye Madrasa and Karaman Museum, evaluate them in terms of risk management and preventive conservation measures in order to ensure their sustainability. There are also studies that directly address the risk management of historic buildings. For example, Bülbül Bahtiyar and Dişli (2022) studied the Karaday Madrasa, Dişli and Bacak (2022) studied the Archaeology Museum in Konya, and Kaynaş and Dişli (2020) undertook a detailed assessment of the İnce Minareli Madrasa in Konya in terms of its potential risks, threats, and condition assessments. In this study, on the other hand, two cases, namely Karaman City Museum and Hatuniye Madrasa, which are located in close proximity and in the same courtyard, are studied together, compared in terms of their risk levels, and proposals are elaborated. The main reasons for their selection criteria are the following:

- Both the madrasa and the city museum are considered buildings with high structural stability, which provides safe visual observations and field surveys.

- They were built at different times, i.e. Karaman City Museum (built: 1980) is a relatively new building compared to Hatuniye Madrasa (built: 1382), and it is considered important to see if this difference in time affects their current risk level,
- Both buildings are located in the heart of downtown Karaman city, where there are many important historical monuments. Hatuniye Madrasa, in particular, is of great importance not only for the city but also for the entire country due to its architectural features and historical significance, especially with its outstanding portal,
- Since the two buildings are quite close to each other and are located in the same courtyard, it becomes possible to make a comparison between these two buildings in terms of their risk level to see if there is a significant difference or not. Since it is difficult to find such cases with period differences in the same plot, it is considered beneficial to understand the risk levels with a comparative perspective.
- Since the methodology of this research include to take references from the national disaster and meteorological databases (AFAD, MMG) in order to determine the risk levels, this study is applicable for buildings in Turkey, but it can be further developed by using the national databases of other countries instead of Turkey's databases to test it in other countries also.

2. PHYSICAL STRUCTURE AND GENERAL CHARACTERISTICS OF THE PROVINCE OF KARAMAN

Karaman Province is located in the south of the Central Anatolia region and is situated between 37.11 degrees north latitude and 33.15 degrees east longitude. It is surrounded by Konya in the north, Mersin in the south, Ereğli in the east, Silifke in the southeast, and Antalya in the west. Göksu, İbrala Stream, Gödet Stream, Ermenek Stream, and Kocadere are the main rivers within the provincial boundaries. To the east is the Akgöl and to the north is the Acıgöl. According to the AFAD 2021 Report there are Ermenek Dam, Gödet Dam, Ayrancı Dam, and Ibrala Dam as artificial lakes. Karaman has a continental climate with hot and dry summers and cold and snowy winters and the main vegetation is the steppe (AFAD 2021). According to the Thornthwaite climate classification of Karaman Province, it has a semi-arid, low-humidity climate. The average annual temperature is 12.1 C°, and the average annual precipitation is 337.8 mm (MGM 2023). Geologically, Karaman has a solid soil structure and is located in the 5th-degree earthquake zone. The province is located in the regions with the lowest earthquake risk. Based on the data prepared by the Disaster and Emergency Management Department of the Presidency of Earthquakes of Turkey, in Karaman Province, only three active fault zones were identified (Kılbasan-Hotamış Lake (Konya) Fault Zone, Öşün (Aslanköy-Mersin) Fault, Mut (Mersin) Fault Zone) (AFAD 2021). Karaman province is a city with a population of 254,919. While 77.17% of this population lives in urban centers, 22.83% of them live in villages. Looking at the data for the last six years, it is clear that the village population in the province has decreased, while the urban population has increased. The main reasons for the increase in urban population are the oversupply of jobs, the jobs created by industry, and the potential for new employment opportunities. Being located on the historic Silk Road, the city has always remained economically vibrant, occupying an important position in both the agricultural and industrial markets. There is also developed tourism potential in the city, which houses many cultural assets from history

and prehistory (AFAD 2021).

3. MATERIALS AND METHODS

3.1 History and architectural features of Karaman Hatuniye Madrasa

Most of the military, religious and social functions of the Karamanoğulları principality are located in Karaman. Hatuniye Madrasa, built on Turgut Özal Street, in today's Imaret district, in the historic center of Karaman between today's Citadel and Aktekke Mosque, is one of the most important educational buildings of the period and is known as "Hatuniye, Nefise Sultan and Melek Hatun Madrasa" in honor of its founder. The building is located on Block 745, Plot 28.24D and Parcel No. 16. The property was registered with the decision of the Supreme Council of Antiquities and Monuments on 11.07.1980 under the number A-2313 (Topal 2005, p. 234; Karpuz 2009, p. 131) (Figure 1). According to the three-line inscription on the portal of Karaman Hatuniye Madrasa, it was built by Sultan/Melek Hatun in 783 H. / 1381-1382 AD. (Sönmez 1995, p. 314; Topal 2005, p. 234).

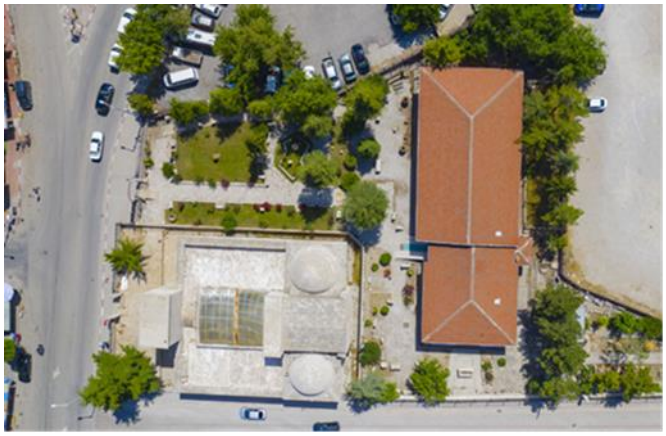

Figure 1. Hatuniye Madrasa and Karaman Museum aerial view (Google Earth 2022).

The courtyard, with a double iwan, a single story, and a portico, has the layout of an open madrasa (Figure 2). The floor plan is symmetrical, with the crown gate and main iwan projecting to the south. The portal of the building is 2.50x7.60 m in size and was built with marble up to half of it and Karaman stone in the upper part. The portal is surrounded by vegetal and geometrically decorated profiles. On both sides of the door, there are mihrabiyes[1] and on the top, there are muqarnas[2] (Figure 2).

[1] Mihrabiye is an ornate small niche on the sidewalls of the portal niche (Sözen and Tanyeli, 2001, p. 161).
[2] Muqarnas is a small engraving in the shape of a prism, which serves as a support and at the same time as an ornament when it passes from an inner part to a surface above (Turani, 1975, p. 93).

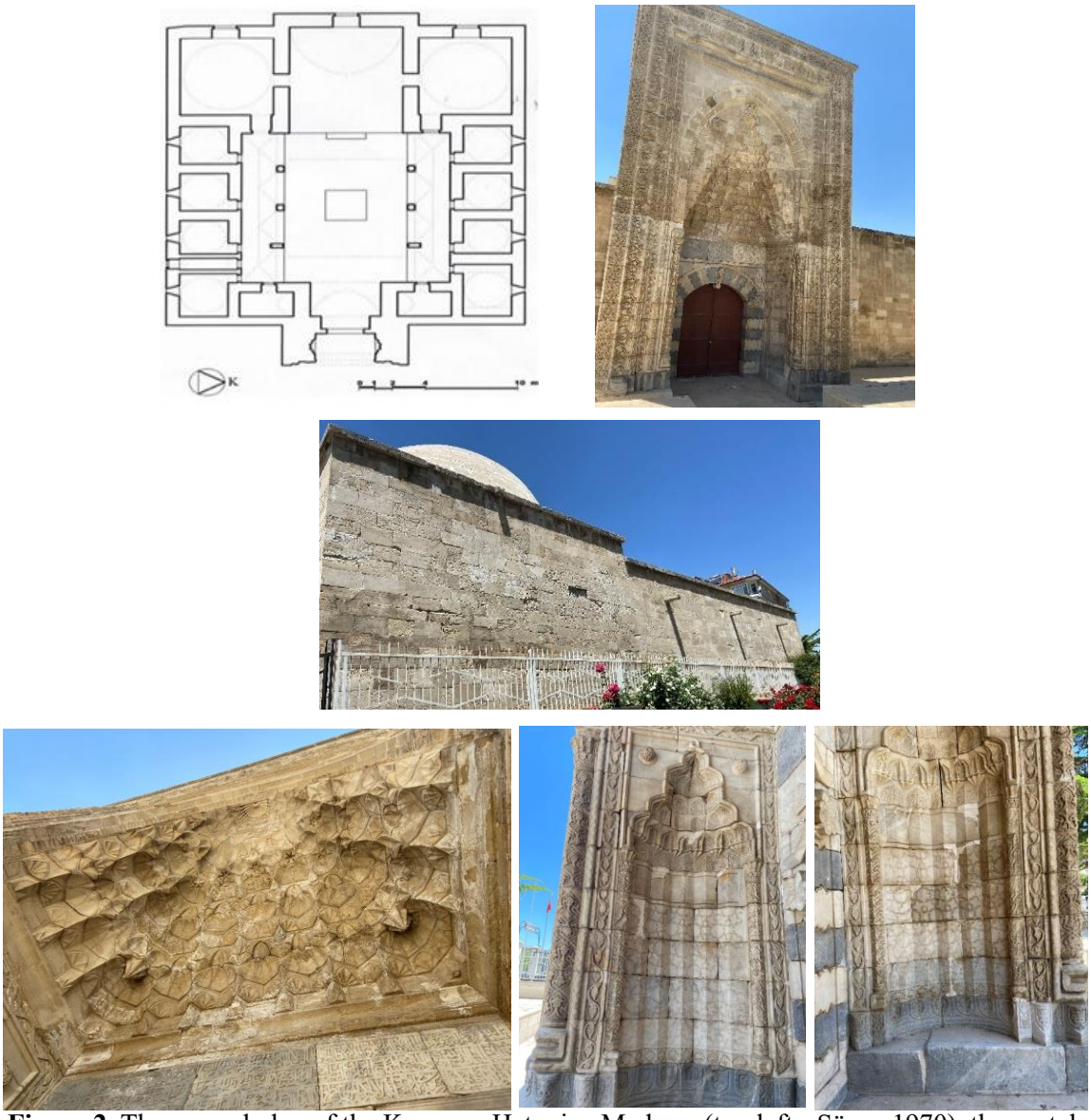

Figure 2. The ground plan of the Karaman Hatuniye Madrasa (top left - Sözen 1970), the portal (top right), its eastern facade (center) muqarnas of the portal (bottom left) and mihrabiyes on the right and left sides of the portal (bottom center and right).

Through the arched doorway, there is a two-story entrance area, and from there into the open courtyard. In the center of the courtyard, which has a depth of 12.30 meters and a width of 7.20 meters, there is a pool. On the sides, there are porticoes with pointed arches, and spolia columns support the arches of the riwaq (Figure 3). Behind the porticoes are three vaulted cells and a barrel-vaulted room on either side of the entrance bay. All the cells, whose depth varies between 3.20 m and width between 2.80 m and 3.10 m, have a fireplace and a crenelated window to the outside. Their entrances are pointed arches. In the south of the building, there is the main iwan and the domed student rooms on both sides of the iwan. The remains on the walls of the building indicate that the interior of the main iwan, the winter classroom, and the tomb were covered with black and blue tiles before the repair (Karpuz 2009, p. 133). These tiles, very few of which have survived to the present day, were placed under protection to be exhibited (Figure 4). Of the domed rooms on both sides of the main iwan, the one on the right is the winter classroom and the room on the left is the tomb of Nefîse Sultan. The entrance doors of

both rooms are decorated with stone ornaments (Kuran 1969, pp. 216-217). The door of the winter classroom was painted by Osman Hamdi Bey (Table of teachers speaking in front of the mosque door) (Demirsar 1987, pp. 94-96) (Figure 5).

Figure 3. Courtyard of the Karaman Hatuniye Madrasa with riwaq (right) and spolia columns (left).

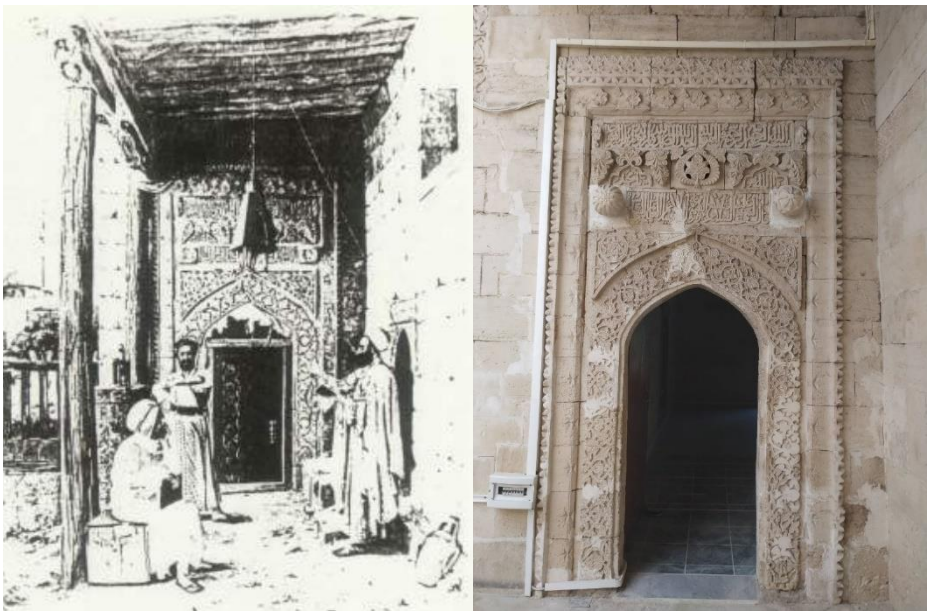

Figure 4. Osman Hamdi Bey's painting "Hodjas speaking in front of the mosque" (left) (Demirsar 1987, p. 241) and the current state of the door to the winter classroom to the right of the main iwan (right).

Figure 5. Tile ruins of Karaman Hatuniye Madrasa.

From the work "The Art of the Karaman Era" by Diez et al. from 1950, it appears that the building was a ruin at that time. The building, which has undergone various repairs until today, was left unfinished due to lack of funds when it was repaired in 1960 and has been exposed to external climatic conditions for a long time since then (Güleç Korumaz and Ayhan 2020, p. 129). During the repair in 1987, the rotting stones of the stone paving on the roof were replaced, the opened joints were renewed, the rotting cellular plaster inside was scraped off, and the paving stones in the courtyard were adjusted to the water slope (Archives of the General Directorate of Foundations, Karaman Hatuniye Madrasa File, Board Decision of 23.10). However, the moisture problem in the building could not be solved (Figure 6). It was restored in 2003 and turned into a restaurant (Topal 2005, p. 234). For this reason, the wet area, kitchen, and other use areas required for this function were added to the building (General Directorate of Foundations Archive, Karaman Hatuniye Madrasah File, Board Decision dated 03.11.2000). Since the original parts of the building were damaged due to its use as a restaurant, the Karaman Municipality took over the building to use it as a municipal facility. In 2013, the Piri Reis exhibition was opened in the building, but since its function could not be maintained, it remained unused until 2019. For a short time, it was used as the Nation's Coffee House,but today this use has been discontinued (Güleç Korumaz and Ayhan 2020, pp. 129-130). The building was transferred to the General Directorate of Foundations in 2022.

Figure 6. Material deterioration in different parts of Karaman Hatuniye Madrasa.

3.2 Karaman City Museum: history and architectural features

Karaman City Museum is located on the same parcel as Hatuniye Madrasa. Due to the late start of museum activities in Karaman, artifacts found here were exhibited in museums in surrounding provinces until the museum building was built. Due to the archeological richness of Karaman and its surroundings, it was decided in 1961 to collect the artifacts in the surrounding provinces and establish a museum. As a result, in 1962, with the cooperation of the district governor Necati Tümay and the mayor Kemal Kaynaş, the Karaman Library and Tourism Association building was first used as a museum storage. The artifacts stored here were moved to a building in the bazaar in the center of Karaman in 1963 and kept there for three years until 1966. After that, these works were moved to İbrahim Bey Imaret, and since the building was converted into a mosque, this time the second floor of a residential building was used for this purpose. Due to the increase in work, a separate building had to be built for the museum. The Karaman City Museum, the construction of which was started in 1970, was completed in 1980 and has been open to visitors since then (KVMGM 2023; TUTAP 2020).

The museum building consists of a ground floor and a basement. Each floor has a living area of about 550 m² (TUTAP 2020). The ground floor of the building, whose basement is used for storage, consists of an exhibition hall with archeological and ethnographic artifacts and two blocks with administrative units (Figure 7-8). In the courtyard of the building, historical stonework from the Roman, Byzantine, and Turkish-Islamic periods is on display. In 1997, the wooden roof of the building was renewed and an environmentally friendly drainage system was built (General Directorate of Foundations, Karaman Hatuniye Madrasa File, Decision of the Board of Directors dated 14.07.1997).

Figure 7. General view of Karaman Museum with Hatuniye Madrasa on the right side.

Figure 8. Exhibition room and collections of Karaman Museum.

4. METHODOLOGY

In the scope of the study, the aim was to identify and analyze the existing risks of the Karaman Hatuniye Madrasa and the Karaman City Museum, to evaluate the structures and collections in the context of preventive conservation, and thus to ensure their sustainability. In addition, the current condition of the buildings, urgency, and recommendation classification were made with the standard UNI EN 16096 (2012) and the situation of the exhibition depot of Karaman Museum was determined with the method ICCROM's RE-ORG. ISO 31000 and ICCROM-A Guide to Risk Management of Cultural Heritage are used as a guide for risk assessment in the integrated risk management method. For risk identification, AFAD, MMG, and EM-DAT databases were used (Figure 9). Before proceeding to the detailed explanations of these methods, the basic concepts related to risk management are explained below:

Disaster: An event caused by nature, technology, or man that causes physical, economic, and social losses to all or certain segments of society, stops or disrupts normal life and human activities, and for which the coping capacity of the affected society is insufficient. A disaster is not the event itself, but its consequences (AFAD 2022).

Damage: The situation in which something physically loses value, becomes unusable, or loses its normal ability to function (AFAD 2022).

Vulnerability: Any conditions determined by physical, social, economic, and environmental factors or processes that increase the susceptibility of an asset to the effects of hazards (UNDRR 2023).

Risk: The probability of loss of life, property, economic and environmental values that an event may cause under specific conditions and environments (AFAD 2022).

Risk Management: The process of determining and analyzing hazards and risks at the country, regional, city, or settlement level, determining opportunities, resources, and priorities to reduce risk, preparing and implementing policy and strategic and action plans (AFAD 2022)

The data to analyze the current situation of Karaman Hatuniye Madrasa and the restoration works it has undergone in the past were obtained through oral interviews with the authorities in charge of the Madrasa. In order to identify the risks related to the Karaman City Museum, interviews were conducted with the museum directorate, architects, art historian, and archaeologists working in this museum. In addition to the oral interviews, visual observation, data collection, and local archival records (board decisions) were used.

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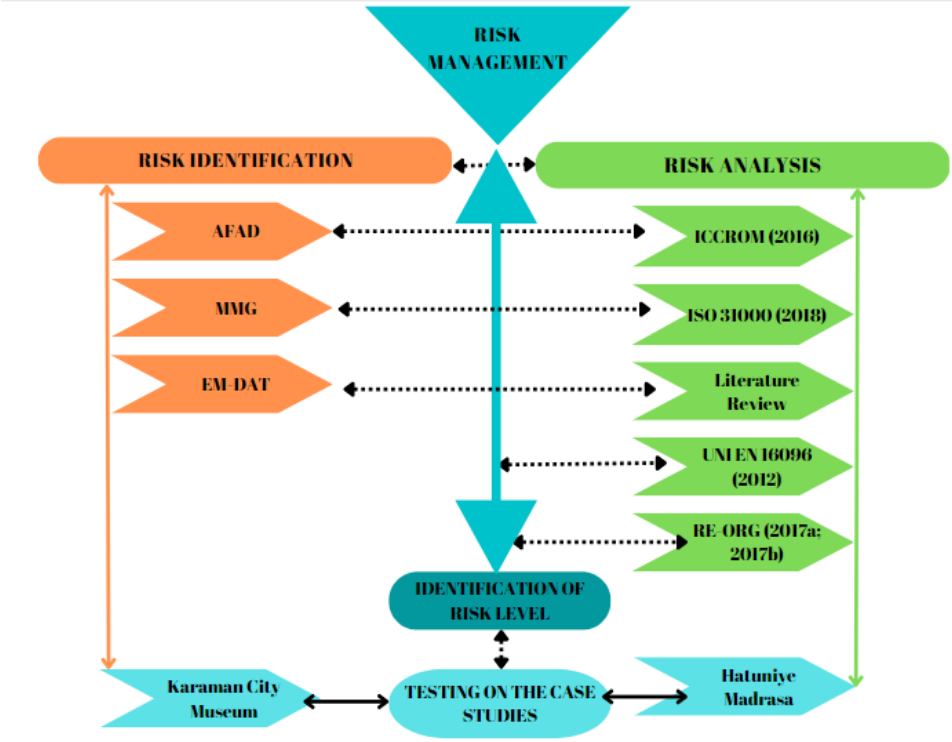

Figure 9. The methodological framework of the research.

In order to determine the risk priority and urgency classes for the madrasa and the museum buildings and to determine the intervention proposals, the individual hazards and risks were determined at different levels, and their probability of occurrence and vulnerability were evaluated. "A Guide to Risk Management of Cultural Heritage" prepared by ICCROM (2016) for risk analyses and management, divided into the phases of context, identification, analysis, evaluation, improvement, and monitoring and the ISO 31000 Standard on Risk Management, which includes the phases of scope, context and criteria, risk assessment, risk elimination, monitoring and review, recording, and reporting, were used as references. The hazards and potential risks were identified at the museum building for object/support, fitting, room, building, site, and region layers. Both local and regional hazards were considered in determining risks to the Karaman City Museum and Hatuniye Madrasa, and past disasters were identified using disaster databases from the Presidency of Disaster and Emergency Management (AFAD) (AFAD 2021), the International Disaster Database (EM-DAT 2009a), and climate data for Karaman were obtained from the Turkish State Meteorological Service (MMG 2023) of Turkey. Field research, oral interviews, archival research, and visual data were other methods used to identify risks. Fieldwork was conducted three times on 4th, 8th, and 17th of June 2022. On 8th of June 2022, in addition to the visual observations, interviews were conducted with museum professionals, RE-ORG questions were asked to them, and the museum depot was examined together with them. The Hatuniye Madrasa was also entered with the help of the museum's administrative staff. This made it possible to conduct observations inside the building as well.

According to the AFAD 2021 Karaman Report, the prevailing hazards, disasters, and potential risks to Karaman were identified and a risk assessment study was conducted. Scenario and assessment studies are prepared for each risk.

The Emergency Disaster Database (EM-DAT) was established in 1988 with the support of the World Health Organization (WHO) and the Belgian government. The main purpose of the database is to serve the purposes of humanitarian assistance at the national and global levels. It contains information on the impact of disasters on humanity, such as the number of people killed, injured, or affected, as well as estimates of economic loss and disaster-specific international assistance. EM-DAT (2009a) also contains basic data on the occurrence and impact of more than 15,700 disasters from 1900 to the present.

In the EM-DAT database, disasters are divided into 2 basic categories: Natural Disasters and Technological Disasters (EM-DAT 2009b)). The natural category includes geological (earthquakes, mass movements, volcanic activity), meteorological (extreme temperatures, fog, storms), hydrological (flood, landslide, tsunami), climatological (drought, glacial lake outburst), biological (epidemic, insect infestation, forest fire), and atmospheric phenomena; The technological category is divided into subcategories such as industrial accidents (chemical accident, collapse, gas leak, fire, poisoning, radiation), transportation accidents (air, rail, water, road), and other accidents (EM-DAT 2009b). Disasters were analyzed at the regional level in five categories: Asia, Africa, the Americas, Europe, and Ocean. Disasters between 1900-2023 were recorded in the database (EM-DAT 2023). In conducting the risk analysis of the madrasa and museum buildings, previous studies in the field of cultural property and risk management were also examined (Atakul et al. 2014, pp. 149-165; Paolini et al. p. 2012; Rodriguez-Rosales et al. 2021, pp. 1-14; Ravankah et al. 2021, pp. 1-16; Romeo et al. 2016, pp. 696-708; Ortiz and Ortiz et al. 2016, pp. 1078-1100; Yıldırım-Kaynaş and Dişli 2020, pp. 199-204; Bülbül-Bahtiyar and Dişli 2022; Bülbül-Bahtiyar and Dişli 2021, pp. 295-316; Dişli and Bacak 2022, pp. 137-158; Dişli 2019, pp. 69-87). Among them, the scoring system defined in the study of Bülbül-Bahtiyar and Dişli (2022) was adapted to the sample structures (Table 1). The fact that the aforementioned study had been previously applied to a similar period structure (Karatay Madrasa) and in a similar region (Konya) was a priority in the choice. The hazards, frequency of occurrence, degree of vulnerability, and potential risks of the madrasa and museum buildings were determined, as a second step, the analysis of the current condition (CC), cultural importance (CI), and urgency class (UC), and recommendation class (RC) based on UNI EN 16096 standard (2012) was done only for the madrasa.

As a result of the analysis and classification, the overall risk level (RL) of the buildings was determined. Based on this classification, RL0 = very low: < 10%, RL1 = low: 10%-25%, RL2 = medium: 25%-50%, and RL3 = high: 50%-75%/very high: > 75%, and respectively. The score values for a risk range from 0 to 3 are explained as follows:

- 0 points: No risk or no vulnerability (very low: < 10%) or very low: a scenario where there is no or very little risk in the very long term (RF > 300 years), and if there is, the physical condition of the cultural property will not be affected.

- 1 point: low risk and vulnerability (low: 10%-25%): Scenario with a low level of risk in the long term (RF = 100-300 years) and where the physical condition of the cultural property would not be significantly affected, if at all.

- 2 points: Moderate risk and vulnerability (medium: 25%-50%): Scenario with medium-term risk (RF = 30-100 years) and moderate damage to cultural property (physical condition of cultural property may deteriorate slightly).

- 3 points: High/very high risk and vulnerability (high: 50%-75%, very high/catastrophic: > 75%): High risk in the short term (RF = 1-30 years) and severe

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damage to the cultural property as a result. (Partial destruction or destruction) scenario (Bülbül Bahtiyar and Dişli, 2022).

Table 1. Risk analysis method (Bülbül-Bahtiyar and Dişli 2022).

Risk Management [ISO 31000(2018), ICCROM (2016)]							
STEP 1		**CHANCE OF OCCURRENCE OF THE RISKS (FREQUENCY) (RF)**					
		Very Low: >300 years	Low: 100-300 years	Moderate: 30-100 years	High: 1-30 years		
HAZARDS & POTENTIAL RISKS (Probable loss of value)	Natural	**0 point:** RL0	**0 point:** RL0	**1 point:** RL1	**2 point:** RL2	VL	**VULNERABILITY DEGREE (VD)**
		0 point: RL0	**1 point:** RL1	**1 point:** RL1	**2 point:** RL2	L	
		0 point: RL0	**1 point:** RL1	**1 point:** RL1	**2 point:** RL2	M	
		1 point: RL1	**2 point:** RL2	**2 point:** RL2	**3 point:** RL3	H	
		1 point: RL1	**2 point:** RL2	**3 point:** RL3	**3 point:** RL3	VH	
	Technological	**0 point:** RL0	**0 point:** RL0	**1 point:** RL1	**2 point:** RL2	VL	
		0 point: RL0	**1 point:** RL1	**1 point:** RL1	**2 point:** RL2	L	
		0 point: RL0	**1 point:** RL1	**1 point:** RL1	**2 point:** RL2	M	
		1 point: RL1	**2 point:** RL2	**2 point:** RL2	**3 point:** RL3	H	
		1 point: RL1	**2 point:** RL2	**3 point:** RL3	**3 point:** RL3	VH	
	Human Orijin	**0 point:** RL0	**0 point:** RL0	**1 point:** RL1	**2 point:** RL2	VL	
		0 point: RL0	**1 point:** RL1	**1 point:** RL1	**2 point:** RL2	L	
		0 point: RL0	**1 point:** RL1	**1 point:** RL1	**2 point:** RL2	M	
		1 point: RL1	**2 point:** RL2	**2 point:** RL2	**3 point:** RL3	H	
		1 point: RL1	**2 point:** RL2	**3 point:** RL3	**3 point:** RL3	VH	
TOTAL SCORE Risk Level/ Ratio of the Building		**The overall risk level (RL) of the building:** The ratio of the Building's Total Point/Total point*100 **Score Levels:** Very Low Level of Risk **(RL0):** <%10, Low level of Risk **(RL1):** %10-%25, Moderate Level of Risk **(RL2):** %25-%50, High Level of Risk **(RL3):** %50-%75, Very High Level of Risk **(RL3):** >%75				**RL0-1-2-3** **RL:...%**	
RISK MANAGEMENT STRATEGY		**Acceptable:** Very Low: <%10	**Tolerable:** Low:%10-%25	**Partially Tolerable:** Moderate%25-50	**Intolerable:** High: %50-75 Very High: >%75		
		No need for risk treatment **(No T)**	Risk treatment is needed **(T)**	Risk treatment is needed **(T)**	Risk treatment is needed **(T)**		
STEP 2		**LEVEL of RISK (RL) (per each risk)** **Very Low:** <%10, **Low:** %10-%25, **Moderate:** %25-50 **High:** %50-75, **Very High:** >%75					
Building Units/ Elements/Rooms		**RL0**- Very Low	**RL1**- Low	**RL2**- Moderate	**RL3**-High and very High		
CULTURAL IMPORTANCE (CI) CI0 (Walls, Doors, Windows, Floors, HVAC, Surface Finishing (Plasters, Coverings), Roofs, Roof Covering)		**UC0**- Long term	**UC0**- Long term	**UC1**- Intermediate	**UC1**- Intermediate	CC0	**CONDITION CLASS (CC)**
		RC0- No measure	**RC0**- No measure	**RC1**- Maintenance	**RC1**- Maintenance		
CI1		**UC0**- Long term	**UC1**- Intermediate	**UC2**- Short term	**UC2**- Short term	CC1	
		RC0- No measure	**RC1**- Maintenance	**RC2**- Moderate repair	**RC2**- Moderate repair		
CI2		**UC1**- Intermediate	**UC2**- Short term	**UC2**- Short term	**UC3**- Urgent	CC2	
		RC1- Maintenance	**RC2**- Moderate repair	**RC2**- Moderate repair	**RC2**- Major intervention		
CI3		**UC2**- Short term	**UC3**- Urgent	**UC3**- Urgent	**UC3**- Urgent	CC3	
		RC2- Moderate repair	**RC2**- Major intervention	**RC2**- Major intervention	**RC2**- Major intervention		
STEP 3		**RE-ORG SCORING** (see, RE-ORG (2017b), p.1-10)					
		Collection (C): C1-C10	**Building (B):** B1-B10	**Management (M):** M1-M9	**Furniture and Small Equipment (F):** F1-F8		
No need for RE-ORG		51-48	54-52	42-38	33-28	Building and Room Scale- For Museum Depots	
Only small improvements		47-38	51-42	37-29	27-20		
RE-ORG project is needed		37-11	41-11	28-10	19-9		
Immediate need		10-0	10-0	9-0	8-0		

RE-ORG (2017a; 2017b) is used as another method to analyze the current condition of museum depots and collections, assess their reorganization, and the need for preventive conservation. This tool is developed by CCI (Canadian Conservation Institute) and ICCROM. The assessment consists of four sections with a total of 37 questions: management (M) (9 questions), building (B) (10 questions), collection (C) (10 questions), and furniture and small equipment (F) (8 questions). Each section consists of 8 to 10 questions. Each question has a score of 0-1-2-3-4-5-6 points and it is determined whether the museum needs RE-ORG based on the total score obtained at the end of the section. In the study, the tool RE-ORG was applied to the Karaman City Museum depot. An oral interview was conducted with archeologists, architects, and art historians working in the museum. Thanks to this evaluation, it is determined whether the museum needed RE-

ORG in each section. The RE-ORG method requires a participatory approach and works including all related bodies in order to get the best possible conservation results. Similarly, studies on the participatory form of science namely open science and citizen science are increasing recently (Yamori et al. 2022, pp. 1-23).

The standard UNI EN 16096 (2012) was prepared by the European Standardization Committee for the Protection of Cultural Property (CEN/TC 346), and the national standardization organizations of 34 countries, including Turkey. Information and data on the remains of the tangible cultural heritage and its current situation are important to determine and define the necessary measures for the protection and preservation of the structures and the practices required for their maintenance/repair. The standard is a guide for assessing, documenting, recording, and reporting on the current condition of the cultural heritage through visual observation and involves its overall evaluation. The first step in the process is to research the condition of buildings and materials and develop the necessary plans and actions for heritage sustainability and conservation. It provides a basis for the planning and assessment needed to make recommendations for preventive conservation, maintenance/repair, and emergency response or suggests more detailed studies. Preventive conservation, periodic condition analysis, and maintenance/repair ensure the preservation of the originality and integrity of the structures and the conservation and maintenance of the significance of the cultural heritage. According to this standard, the current condition of all building components (walls, floors, roofs, etc.) was assessed with the "Physical Condition Classification (CC)", "Urgency Risk Situation Classification (UC)" and "Recommendation Classification (RC)" and suggestions for interventions were determined. Preservation of character-defining features during any repairs and their detailed investigation with UNI EN 16096 is an integral part of architectural conservation, because only in this way it becomes possible to transfer the traditional knowledge to future generations. Similarly, Kandari et al. (2022, 28-56) point out the importance of the traditional knowledge and cultural systems and their contribution to disaster risk reduction. Assessments according to the UNI EN 16096 standard were carried out only for Hatuniye Madrasa. Since the museum building was built in 1980, it was not necessary to apply this standard.

According to this standard, the classification of physical condition (CC) is as follows: Cultural properties that have no or very minor material and structural problems are accepted as good condition (CC0); the condition of cultural properties that have some material problems that do not cause serious problems but have no structural problems is defined as acceptable (CC1). Buildings that have both material and structural problems were classified as poor (CC2), and cultural properties at risk of partial or total destruction due to serious material and structural problems were determined to be very poor (CC3) (UNI EN 16096, 2012). In classifying and evaluating the risk situation, the possible causes, triggers, and, consequences of the current situation, the likelihood and speed of major damage, the need for additional research, the possibility of detailed research to uncover the possible damage and the consequences of that damage, the possible historical significance, the impact, the current situation, and other environmental factors that may significantly affect its possibilities, and the urgency of action were considered. Accordingly, the urgency class (UC) of the building is divided into four categories: Situations Requiring Long-Term Intervention (UC0), Situations Requiring Medium-Term Intervention (UC1), Situations Requiring Short-Term Intervention (UC2), and Situations Requiring Urgent Intervention (UC3) (UNI EN 16096, 2012). Similarly, potential intervention suggestions are divided into four categories: RC0 (no repair required), RC1 (simple repair/preventive conservation), RC2 (major repair and/or duty of

care), and RC3 (major repair requiring structural intervention) (UNI EN 16096, 2012). Karaman Hatuniye Madrasa was evaluated in the context of the urgency of action and possible intervention proposals.

5. DISCUSSION AND EVALUATION: IDENTIFICATION OF RISKS AND RISK ANALYSIS

Based on the data from the AFAD Karaman Provincial Disaster and Emergency Directorate 2021 report and MMG, the major disasters in history for Karaman Province were identified as follows: Mass movements: 34%, landslides: 25%, disasters caused by weather and climate change: 25%, floods: 8%, earthquakes: 8%. Mass movements (landslides and rock falls) pose the greatest risk at 34%. According to AFAD data for 2021, the number of landslides/rockfalls in Karaman since 1950 was reported as 177. Rocks such as limestone, argillaceous limestone, marl, dolomite, and marble surround the the province, and the deterioration of these rocks due to climatic events and natural influences increases the risk of rock fall (AFAD 2021). According to the Thorn Thwaite climate classification of Karaman Province, it has a semi-arid, low-humidity climate. According to the AFAD report, Karaman is becoming a region with an arid climate that is becoming drier. Karaman has a solid land structure and is located in earthquake zone 5. Nevertheless, earthquakes that occur due to three active fault zones detected within the boundaries of the province have a disaster zone of 8% and indirectly affect the occurrence and impact of hazards such as floods and the formation of sinkholes (AFAD 2021).

An earthquake scenario study was conducted based on the Mw: 5.8 and Mw:6.5 earthquakes, which are predicted to be the largest earthquakes in the seismic gap that may affect Karaman city center. As a result of the scenario study, the region is labeled as 'VI Strong', which contains the areas where the demolition started and were selected as the priority area. Within this area, Hatuniye Madrasa and Municipal Museum are also located (AFAD 2021). By the end of 2020, AFAD recorded seven sinkholes within the boundaries of Karaman Province. The maximum earthquake magnitudes that the faults in Karaman can generate are between 2.5 and 3.5. Because of the earthquakes, linear cracks, fracture and crack systems, and sinkholes develop along the active faults at the edges of the trench in places without destructive earthquakes. Buildings and underground pipe systems constructed on these faults, whose width reaches 3 meters in places and depth reaches 7-8 meters, are subject to deformation. Karaman Province is located within the closed Konya Basin and the Eastern Mediterranean Basin. Although the region is classified as semi-arid and less humid, some regions experience flooding throughout the year. In 2015 and 2018, there were two flood incidences in the Karaman city center. There have been 23 flood events since 1950 (AFAD 2021). When examining the data from EM-DAT, it is found that a natural meteorological disaster was recorded in 2000 with an extreme heat wave in a large area of Turkey, including Karaman, (2000-0381- TUR), and a storm in 2004 (2004-0026- TUR). Mine disasters/explosions were reported as technological disasters in 2003 (2003-0567- TUR) and 2014 (2014-0433- TUR) in Karaman, Ermenek. Finally, floods and landslides/mudslides (2022-0358- TUR; 2022-0365- TUR) were reported in 2022 as a result of hydrological natural disasters in Karaman (EM-DAT, 2023).

Based on the data on all these past disasters for Karaman province, the main possible risks for Karaman Hatuniye Madrasa and City Museum were determined for different layers, the risk assessment was made, and the risk levels were determined (Table 2, Table 3, Table 4). In conducting the risk analysis based on layers, the risks in different layers of cultural properties were studied in three categories as natural, human-induced, and technological risks, using the "Guide for the Risk Management of Cultural Heritage" of ICCROM (2016), and these were categorized as rapidly and slowly developing risks in themselves. These layers consist of six parts: object/support, fitting, room, building, site, and region (Table 2). Looking at Table 2, it is clear that earthquakes, floods, floodwater, sinkholes, rain, and snow load, as fast-growing natural hazards, can cause wear, breakage, collapse, cracking, deformation, etc., in the case of their occurrence in all layers. Pollution, drought, temperature, sudden changes in humidity and temperature, UV rays, and climate change are among the natural hazards that develop slowly, and over time, color change, blackening, black crust formation, detachment, corrosion, deformation, embrittlement, material loss, and fading are among the possible risks. Graffiti, vandalism, transportation, theft, and faulty restoration practices are among the rapidly developing human-induced hazards. The main risks triggered by these hazards are breakage, loss of inventory, destruction, cracks, deformation, and abrasion. Tourism pressure, lack of legal framework, abandonment, heavy traffic, and faulty restoration are the slowly developing main hazards of human origin. The main risks that can arise from these are deformation, color change, abrasion, incorrect restoration interventions, loss of data, loss of material, and erosion. Plumbing problems and database shortages are the main hazards resulting from the rapidly developing technology. Incorrect lighting, inappropriate relative humidity/temperature/light, inadequate ventilation, and heating are also among the slowly developing technological hazards. They can cause discoloration, fading, deterioration, mold, abrasion, loss, brittleness, corrosion, cracking, and vertical deviation.

Considering Table 3 and Table 4, the possible risks identified by the databases EM-DAT, AFAD, MMG, and the guidelines used (ICCROM, 2016; ISO 31000, 2018) are evaluated according to the hazards, vulnerability, and frequency of occurrence. The risk levels of both Karaman City Museum and Hatuniye Madrasa are determined as a result of the outcomes of this academic research and as a result of the evaluation, the risk level of Karaman City Museum is determined as RL2: %37.5, Moderate (partially tolerable) (Table 3), while the risk level of Hatuniye Madrasa is determined as RL3: %54.32, High (intolerable) (Table 4).

Among the natural hazards, the highest frequency of flooding and the formation of sinkholes is the hazard with a high/very high vulnerability level. The malfunctioning of Hatuniye Madrasa and the resulting deterioration of the building structure, mold, and deformation were identified as the main risks to be taken care of. Another major risk to the building is inadequate use or abandonment. Deformation and loss of materials due to the building being left unused are other major risks. Both oral interviews and archival research at the Karaman Municipality, Conservation Board, and the Regional Office of the General Directorate of Foundations in Konya show that there is no management plan for the Madrasa and that financial resources for its preservation are rather limited. The lack of a management plan results in deficiencies in governance, resources, operations, conservation, stewardship, educational awareness, risk crisis management, and visitor planning for the building.

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Table 2. Risk assessment for Karaman Hatuniye Madrasa and City Museum.

LAYERS	RISKS					
	NATURAL		HUMAN-INDUCED		TECHNOLOGICAL	
	FAST-GROWING	SLOW-GROWING	FAST-GROWING	SLOW-GROWING	FAST-GROWING	SLOW-GROWING
OBJECT/SUPPORT	- Breakage, cracking in objects due to earthquake - Flooding, mold, and weakening of objects due to flooding	- Color change and detachment, corrosion, blackening, black crust, and black staining on objects due to pollution - Bending, twisting, brittleness, discoloration of objects due to drought and temperature changes - Breaking of objects due to graffiti vandalism	- Breaking of objects during transportation, cleaning - Loss of inventory due to theft	- Deformation, wear and tear, discoloration, and loss of data of objects due to tourist pressure and human impact - Improper handling of objects due to lack of legal conditions	- Burning, darkening, and staining on objects as a result of A fire caused by the installation	- Embrittlement, discoloration of objects due to incorrect lighting -Humidity - mold, discoloration, weakening of objects due to improper relative humidity
FITTING	- Breakage and cracking of display cases due to earthquake - Flooding, mold, and weakening of the preservative due to flooding	- Brittleness, discoloration of the preservative due to drought and temperature changes	-Destruction, breakage, and cracking of the supports/ fittings/objects due to vandalism		- Burning, darkening, or discoloration of the support/fitting/object due to fire caused by installation	-Discoloration, corrosion, and weakening of the support/fittings/ objects due to humidity and mold caused by the inappropriate relative humidity of the air - Embrittlement, cracking, discoloration, and weakening of the protector due to temperature fluctuations
ROOM	- Cracking, the collapse of the walls due to earthquakes -Wet mold, loss of material on room walls due to flooding	-Wet mold, deformation, and corrosion on walls due to heat and humidity	-Destruction, breakage, and cracking of walls due to vandalism	-Distortion of parts of the building due to tourist pressure, abrasion on the floor caused by installation	-Burning, darkening, and discoloration of walls as a result of fire	- Deformation, discoloration of walls due to insufficient ventilation
BUILDING	- Abrasion, moisture-mold, spillage, the collapse of the structure due to rain/snow load - Collapse, cracking, loss of material, deformation of the structure due to rockfall - Collapse, cracking, loss of material, deformation of the structure due to sinkhole	- Brittleness, weakening, deterioration of the material, change in color of the structure due to sun exposure	-Deformation, embrittlement, abrasion, moisture-mold, loss of material in the structure due to faulty restoration	- deformation, abrasion in the structure due to tourism pressure -Deformation, embrittlement, abrasion, moisture-mold, loss of material in the structure due to abandonment/under-capacity use - Deformation, abrasion, moisture-mold, tarnishing, material discoloration, material loss due to improper reuse - Erosion, surface loss, and deformation due to heavy traffic	-Burning, darkening, staining, the collapse of the structure due to fire caused by installation	- Brittleness, cracks, and deformation, discoloration in the structure due to improper heating system
SITE	- Objects in the courtyard are broken, cracked, and collapses in the courtyard due to the formation of holes in the ground - Mold, color change of objects in the courtyard due to flooding	- Color change, brittleness, and fading of objects in the courtyard due to exposure to sunlight		- Deformation, erosion, and surface loss due to tourism pressure		
REGION	Earthquake, storm Flooding, sinkhole	Climate change, moisture change	Vandalism	Visitor density, lack of legal framework		

Because the right function for the building has not been found over many years, the constantly changing functions prevent the public from adapting to the building. The fact that the building is no longer functional today exacerbates this adaptation problem, and at the same time, the end of the building's financial and employment opportunities makes the building more vulnerable to existing risks.

Therefore, the lack of a management plan and the lack of financial resources are among the greatest threats to the madrasa and among the issues that should be prioritized in improvement works. Due to the closure of the building's open courtyard, the upper cover, which creates a greenhouse effect in the summer due to the intense sunlight, causes excessive fuel consumption in the winter due to its poor insulation. During the period when the building was used as a restaurant, sinks and toilets were installed in the rooms to the right and left of the entrance. Some of the floors and walls are covered with tiles. During this change of function, the winter classroom was used as a kitchen and the chimney of the kitchen was led directly to the outside by drilling the south wall. Dampness, mold, and material deformation, especially in the kitchen area, have become the building's biggest problems, and no definitive solution has been found since the 2000s. Strong vibrations in the foundations and walls affect both structures, located at the busiest point in the city. The madrasa's portal, on the other hand, is subject to deformation in the material due to heavy traffic, bad weather conditions, and pollution.

In the second step, which was not applied to the City Museum because it is a building constructed in 1980, the cultural importance (CI) of the building parts/elements of Hatuniye Madrasa was determined and the current condition classes (CC) and urgency classes (UC) were assigned within the framework of the standard UNI EN 16096 (2012) and the recommendation class (RC) were determined. The element with the highest value for cultural significance (CI) is the original portal of the building (Cl3), the original walls, the pool in the courtyard, the winter classroom and the tomb door, the spolia columns, and the tile remains have a value of Cl2 (Table 4).

Due to the fact that there is a depot, RE-ORG was only applied to the City Museum. Oral interviews with the responsible staff and field observations revealed that there is no need for RE-ORG in the Management (M) and Furniture and Small Equipment (F) categories in the building and museum depot and that minor interventions are needed in the Building (B) and Collection (C) categories. Oral interviews were conducted with the museum manager, archaeologist, architect, and the art historian working at the museum, who are highly equipped and expert on museum collections. In total 37 questions were asked to them related to the management, furniture and small equipment, building, and collection of the museum as included in RE-ORG questionnaire. During the filling of the questionnaire, the museum depot and the building itself were also inspected together with museum manager in order to get the best possible answer to the questionnaire. In addition, the logic of RE-ORG method was explained in detail before the oral interviews and field surveys in the museum. But the difficult access to the museum depot and the fact that the method RE-ORG is not known to the authorized personnel have led to the limitations of the method in its application. The method RE-ORG was not applied for Hatuniye Madrasa because it does not have a collection depot.

Table 3. Karaman City Museum risk assessment and current condition analysis.

HAZARDS	POTENTIAL RISKS	FREQUENCY OF OCCURRENCE				VULNERABILITY DEGREE
NATURAL		VERY LOW:>300 YEAR	LOW: 100-300 YEAR	MEDIUM: 30-100 YEAR	HIGH/VERY HIGH: 1-30 YEAR	VERY HIGH-HIGH-MEDIUM-LOW-VERY LOW
POLLUTION	Discoloration and flaking, corrosion, tarnishing, black crust, black staining			RL1:1 POINT		LOW
EXTREME WEATHER CONDITIONS	Abrasion, moisture-mold, spillage, collapse, cracking, deformation			RL1:1 POINT		MEDIUM
RAIN, SNOW	moisture mold, warping	RL0:0 POINT				MEDIUM
ACCIDENT	Collapse, cracking, deformation	RL0:0 POINT				MEDIUM
WIND/STORM	Loss of material, delamination, abrasion, deformation, erosion subsidence, surface loss			RL2:2 POINT		HIGH
FLOOD	Spillage, loss of material, moisture, deformation				RL3:3 POINT	HIGH
FIRE	Surface spillage, blackening, collapse, deformation, loss of data, material and structural damage		RL2: 2 POINT			VERY HIGH
FROST	Deformation, detachment, embrittlement, material weakening			RL1: 1 POINT		LOW
EARTHQUAKE	Collapse, cracking, loss of material, deformation	RL1: 1 POINT				VERY HIGH
ROCK FALL	Collapse, cracking, loss of material, deformation	RL1: 1 POINT				VERY HIGH
SINKHOLE	Collapse, cracking, loss of material, deformation				RL3:3 POINT	VERY HIGH
UNSUITABLE RELATIVE HUMIDITY	Spillage, moisture-mold, deformation, corrosion		RL1: 1 POINT			MEDIUM
DROUGHT	Detachment, deformation, material loss, embrittlement			RL1: 1 POINT		LOW
BIOLOGICAL HAZARDS	Material weakening and loss due to mold, fungi, infestation, discoloration of material surface			RL1: 1 POINT		MEDIUM
TECHNOLOGICAL						
TRANSPORTATION ACCIDENTS, INFRASTRUCTURE/STRUCTURAL DEFORMATIONS	Surface deterioration, darkening		RL0: 0 POINT			VERY LOW
UNSUITABLE LIGHTING	Discoloration, brittleness		RL1: 1 POINT			MEDIUM
UNSUITABLE HEATING	Brittleness, cracks/cracks, deformation, discoloration		RL1: 1 POINT			MEDIUM
HUMAN-INDUCED						
DEVELOPMENT AND IMPROVEMENT	Deformation, abrasion			RL1: 1 POINT		VERY LOW
SOCIAL AND CULTURAL USE/TOURISM PRESSURE	Wear, data loss, deformation		RL1: 1 POINT			LOW
LEGAL FRAMEWORK	Interventions not suitable for the structure		RL1: 1 POINT			MEDIUM
LACK OF MANAGEMENT PLAN	Interventions that are not suitable for the structure			RL1: 1 PUAN		MEDIUM
LACK OF FINANCIAL RESOURCES	Interventions that are not suitable for the structure			RL1: 1 POINT		MEDIUM
THEFT	Loss of objects, loss of documents		RL0: 0 POINT			VERY LOW
VANDALISM, GRAFFITI	Loss of objects, breakage, tearing		RL2: 2 POINT			HIGH
KARAMAN MUSEUM TOTAL SCORE: 27	ACCEPTABLE (RL0) VERY LOW: <%10	TOLERABLE (RL1) LOW: %10- %25	PARTIALLY TOLERABLE (RL2) MEDIUM: %25- %50		INTOLERABLE (RL3) HIGH: %50-75 VERY HIGH: >%75	RISK LEVEL: RL2 MEDIUM: 27/72*100= 37,5 RL: %37,5
	No need for risk treatment (No T)	Risk treatment is needed (T)	Risk treatment is needed (T)		Risk treatment is needed (T)	

RE-ORG			
MANAGEMENT (M)	BUILDING (B)	COLLECTION (C)	FURNITURE AND SMALL EQUIPMENT (F)
M1:6, M2:3, M3:6, M4:6, M5:2, M6:0, M7:3, M8:6, M9:6 Total Score: 38	B1:6, B2:4, B3:6, B4:6, B5:6, B6:0, B7:6, B8:6, B9:6, B10:1 Total Score: 47	C1:6, C2:6, C3:3, C4:6, C5:2, C6:6, C7:4, C8:3, C9:6, C10:2 Total Score: 44	F1:4, F2:3, F3:3, F4:3, F5:3, F6:6, F7:6, F8:3 Total Score: 31
NO NEED FOR RE-ORG	ONLY SMALL IMPROVEMENT	ONLY SMALL IMPROVEMENT	NO NEED FOR RE-ORG

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Table 4. Hatuniye Madrasa risk assessment and current condition analysis

HAZARDS	POTENTIAL RISKS	FREQUENCY OF OCCURRENCE				VULNERABILITY DEGREE
NATURAL		VERY LOW:>300 YEAR	LOW: 100-300 YEAR	MEDIUM: 30-100 YEAR	HIGH/VERY HIGH: 1-30 YEAR	VERY HIGH-HIGH-MEDIUM-LOW-VERY LOW
POLLUTION	Discoloration and flaking, corrosion, tarnishing, black crust, black staining		RL1:1 POINT			LOW
EXTREME WEATHER CONDITIONS	Abrasion, moisture-mold, spillage, collapse, cracking, deformation		RL1:1 POINT			MEDIUM
RAIN, SNOW	moisture mold, warping		RL1:1 POINT			MEDIUM
ACCIDENT	Collapse, cracking, deformation	RL0:0 POINT				MEDIUM
WIND/STORM	Loss of material, delamination, abrasion, deformation, erosion, surface loss		RL2:2 POINT			HIGH
FLOOD	Spillage, loss of material, moisture, deformation				RL3:3 POINT	HIGH
FIRE	Surface spillage, blackening, collapse, deformation, loss of data, material and structural damage	RL1: 1 POINT				VERY HIGH
FROST	Deformation, detachment, embrittlement, material weakening			RL1: 1 POINT		LOW
EARTHQUAKE	Collapse, cracking, loss of material, deformation	RL1: 1 POINT				VERY HIGH
ROCK FALL	Collapse, cracking, loss of material, deformation	RL1: 1 POINT				VERY HIGH
SINKHOLE	Collapse, cracking, loss of material, deformation				RL3:3 POINT	VERY HIGH
UNSUITABLE RELATIVE HUMIDITY	Spillage, moisture-mold, deformation, corrosion		RL1: 1 POINT			MEDIUM
DROUGHT	Detachment, deformation, material loss, embrittlement			RL1: 1 POINT		LOW
BIOLOGICAL HAZARDS	Material weakening and loss due to mold, fungi, infestation, discoloration of surface			RL3: 3 POINT		HIGH
TECHNOLOGICAL						
TRANSPORTATION ACCIDENTS, INFRASTRUCTURE/ STRUCTURAL DEFORMATIONS	Surface deterioration, darkening		RL0: 0 POINT			VERY LOW
UNSUITABLE HEATING	Brittleness, cracks/cracks, deformation, discoloration			RL2: 2 POINT		HIGH
UNSUITABLE LIGHTING	Discoloration, brittleness		RL1: 1 POINT			MEDIUM
HUMAN-INDUCED						
ABANDONMENT/ UNDER CAPACITY USE	Deformation, embrittlement, abrasion, moisture-mildew, material loss				RL3:3 POINT	VERY HIGH
FAULTY RESTORATION WORKS	Deformation, embrittlement, abrasion, moisture-mildew, material loss				RL3:3 POINT	VERY HIGH
DEVELOPMENT AND IMPROVEMENT	Deformation, abrasion			RL1: 1 POINT		MEDIUM
SOCIAL AND CULTURAL USE/TOURISM PRESSURE	Wear, data loss, deformation			RL1: 1 POINT		LOW
LEGAL FRAMEWORK	Interventions not suitable for the structure				RL3: 3 POINT	VERY HIGH
LACK OF MANAGEMENT PLAN	Interventions that are not suitable for the structure				RL3: 3 POINT	HIGH
LACK OF FINANCIAL RESOURCES	Interventions that are not suitable for the structure				RL3: 3 POINT	HIGH
THEFT	Loss of objects, loss of documents			RL1: 1 POINT		LOW
VANDALISM, GRAFFITI	Loss of objects, breakage, tearing			RL2: 2 POINT		HIGH
IMPACTS OF PUBLIC WORKS EFFECTS AND NEARBY HIGHWAYS	Erosion, surface loss, deformation		RL1: 1 POINT			LOW
HATUNIYE MADRASA TOTAL SCORE: 44	ACCEPTABLE (RL0) VERY LOW: <%10	TOLERABLE (RL1) LOW: %10- %25	PARTIALLY TOLERABLE (RL2) MEDIUM: %25- %50		INTOLERABLE (RL3) HIGH: %50-75 VERY HIGH: >%75	RISK LEVEL: RL3: MEDIUM: 44/81*100= 54,32 RL: %54,32
	No need for risk treatment (No T)	Risk treatment is needed (T)	Risk treatment is needed (T)		Risk treatment is needed (T)	

CULTURAL IMPORTANCE								
Parts of the Building			**RL0:** Very Low	**RL1:** Low	**RL2:** Medium	**RL3:** High-Very High		
Cultural Importance	**CI0**	Courtyard cover			UC2-RC2		CC1	**Condition Class**
		Wc floor-winter classroom floor		UC1-RC1			CC1	
		Doors-windows	UC0-CC0				CC0	
		Ventilation system			UC2-RC2		CC2	
	CI1	Original windows		UC1-RC1			CC1	
		Iwan vault cover			UC2-RC2		CC2	
		Domed top cover of student rooms			UC2-RC2		CC2	
	CI2	Original walls	UC1-RC1				CC1	
		Pool	UC1-RC1				CC1	
		Doors of winter classroom and the tomb			UC2-RC2		CC1	
		Spolia columns			UC1-RC1		CC1	
		Remains of black and blue tiles				UC3-RC3	CC3	
	CI3	Original portal			UC2-RC2		CC1	

6. CONCLUSION

Cultural properties have been exposed to various disasters and damages since their construction, which can lead to different deformations. Knowing the disaster history of the buildings and the region in which they are located is important in determining potential future hazards and risks. In addition, determining the potential level of these risks is as important as determining the risks associated with cultural properties. This paper presents an interdisciplinary methodology based on internationally recognized guidelines, databases (ISO 31000, UNI EN 16096, ICCROM (2016), RE-ORG,) and international and national disaster and meteorological databases (AFAD, MGM, EM-DAT) to identify the main hazards, potential risks, and risk levels of historic buildings in Turkey, including the vulnerability of these buildings. By understanding the main risks, it becomes possible to make preventive conservation decisions with respect to the most important factors, to set priorities, and to select the best possible preservation treatment options. Moreover, the diagnosis of building conservation, the identification of the current conditions, and the determination of various fast-growing and slow-growing natural, human-induced, and technological risks at different layers (object/support, fitting, room, building, site, and region), all based on scientific knowledge and guidelines/databases and applied in this paper in a comparative approach, reinforce its novelty and versatility.

For this reason, risk management, which includes the identification and analysis of risks in cultural properties, was conducted in this study using the examples of Karaman Hatuniye Madrasa and Karaman City Museum. The results show that, in contrast to the existing literature (Konyalı, 1967; Kuran, 1969; Ögel, 1957; Güleç Korumaz and Ayhan, 2020; Akalın Eryavuz, 1997; Şaman-Doğan and Bilget-Fataha, 2011; Fidan and Baş, 2022; Dilay, 2012) that focuses mainly on the architecture and art-historical features of these two buildings, this study provides more concrete data on the current condition of these two buildings with detailed risk analyzes and vulnerability assessments, which is of great importance for their further development and sustainable conservation. Thus, the main objective of this study has been achieved. Thanks to the comparative study of these two buildings, built at different times, it is also possible to test the methodology for its applicability to different construction periods and to show that the risk assessment of the methodology can be used for both new and old buildings. It is shown that, RE-ORG Part is applicable only for buildings used as museums or in which collections are exhibited, or for collection depots, therefore only the Karaman City Museum has been examined with RE-ORG method, results showing that it needs minor interventions in the Building (B) and Collection (C) categories. The cultural significance part of the methodology, on the other hand, is applicable only for historic buildings in order to obtain the best possible results, and hence only Hatuniye Madrasa has been evaluated regarding the cultural importance of its different parts, and the results showed that its portal has of great cultural importance with CI3 level. Thus, with this study, different from the similar research (Bülbül Bahtiyar and Dişli, 2021; Bülbül Bahtiyar and Dişli, 2022; Dişli, 2019; Dişli and Bacak, 2022, Yıldırım-Kaynaş and Dişli, 2020), a new comparative and methodological perspective has been integrated, which increases the practical significance of the study.

The existing hazards and potential risks to the structures and their collections were identified through oral interviews with staff and authorities, archival and literature research, on-site investigations, and data on the disaster history of the region so that

scenarios of risk levels, frequency, and vulnerability degree of risks to the structures were determined. Visually, both buildings studied are well preserved to some degree, but the detailed risk analysis of this study has shown that the risk level of Karaman City Museum is RL2 and Hatuniye Madrasa is RL3 and both need risk treatment and preventive conservation measures are recommended. It would also be advisable to draw up emergency plans for sinkholes, biological hazards and floods and increase capacity, management and financial resources.

It will be possible to protect the cultural assets and the collections exhibited in them, to ensure their continuity, and to pass them on to future generations, by determining the precautionary measures and risk scenarios against the hazards and risks identified based on the building and its context, and by carrying out preventive conservation studies. Thanks to the risk level (RL) obtained as a result of all the analyzes and assessments, the awareness of local administrations should be raised in order to determine the current condition of the buildings, carry out maintenance/repair works and to ensure their sustainability, proper functioning, and economic and social development studies.

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