



Management of the Endangered World Heritage in Egypt: A Case Study of the Abu Mena Site

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ABSTRACT

Risk management is considered a fundamental tool of effective management for endangered World Heritage sites, aimed at protecting the Integrity and Authenticity of these sites and sustaining their Outstanding Universal Value (OUV). This is achieved through administrative measures to mitigate risks associated with all aspects related to the heritage site, including its physical, administrative, political, social, cultural, and economic environment.

The Abu Mena site is one of the heritage sites inscribed on the Egyptian World Heritage List in 1979, and was later included on the List of World Heritage in Danger by UNESCO in 2013. This decision was made due to the threats facing the site, which jeopardize its universal value.

Therefore, this research paper aims to present a strategy for managing the risks of the Abu Mena site to preserve its Outstanding Universal Value and ensure its retention on the Egyptian World Heritage List. Through a multi-stage approach, firstly, the theoretical approach involves reviewing the literature and fundamental concepts. Secondly, a review of empirical literature on similar sites was conducted, leading to quantitative and qualitative results. Finally, the third stage involves developing an applicable risk management plan for the Abu Mena site.

Keywords: Risk management, World heritage site, Abu mena, heritage in risk list.

1. Introduction

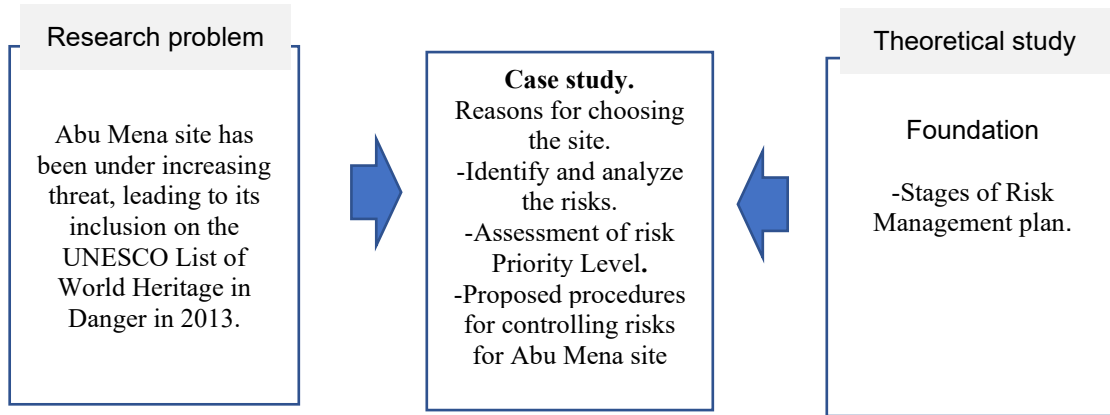
Egypt registers seven heritage sites on the World Heritage List, which are considered an important part of cultural and human heritage. However, these sites face increasing threats that require effective risk management to maintain their integrity, authenticity, and sustainability of their outstanding universal value. The site of Abu Mena, inscribed on the World Heritage List since 1979, is one of these sites facing risks that threaten its survival. In 2013, the site was listed as a World Heritage Site in Danger due to the multiple threats adversely affecting its cultural value.

The risks threatening cultural heritage can vary significantly. They can include sudden events such as earthquakes, floods, fires, and armed conflicts, which can rapidly destroy heritage. On the other hand, there are processes of gradual and cumulative deterioration and damage that can affect heritage over time, resulting from poor management and conservation practices, such as erosion caused by weather factors, pollution, and unsustainable human activities. Therefore, risk management is a vital process that involves a set of activities and procedures aimed at understanding, identifying, and assessing the risks that may affect the achievement of desired objectives. It requires diverse strategies that include prevention, rapid response to incidents, and regular maintenance of sites. This study seeks to develop an integrated risk management strategy for the Abu Mena site, aiming to protect its integrity and authenticity and ensure the continuity of its outstanding universal value. The study addresses the theoretical and practical aspects of risk management, focusing on the environmental, administrative, political and

cultural challenges that threaten the site's survival on the World Heritage List, and provides practical solutions to preserve the site and ensure its sustainability for future generations.

2. Methodology

To achieve the research goals, a descriptive analytical survey was conducted to identify and classify the hazards faced by the Abu Mena site. Subsequently, an applied methodology was employed to delve deeper into the problem and explore treatment methods specific to the site.



the stages of study. Source: authors.

3. Theoretical study

3.1. Risk Management plan

Heritage risk management is a process aimed at protecting and preserving heritage sites from risks that may threaten their integrity and cultural value. This concept includes the assessment of potential risks, such as natural disasters, human activities, and erosion factors, and then developing strategies and procedures to mitigate these risks and effectively address themⁱ.

3.2. Reference to Risk Management in World Heritage Agreements.

The nomination form for the World Heritage List stipulates the need to clarify the risks and the protective and monitoring measures related to the property, and to provide an analysis of the risk mitigation methods, including this plan as part of the nomination file for the property to the World Heritage List. The plan must include the identification of risk mitigation strategies that ensure the management system's ability to cope with major disasters or anticipated shortcomingsⁱⁱ.

3.3. Stages of Risk Management planⁱⁱⁱ.

Given the importance of heritage risk management as a management tool, there are international standards that describe how to conduct risk management. This is to make effective choices to eliminate unacceptable risks or mitigate their negative impacts. According to the Risk Management Guide for Cultural Heritage, there is a set of stages.



Fig. 1. Stages of Risk Management plan. Source: ICCROM, 2016.

3.3.1. Understanding the context

Understanding the relevant aspects of the context surrounding the site. This includes both the physical environment and the administrative, legal, political, social, cultural, and financial aspects.

3.3.2. Risk Identification

The risk identification team identifies risks as either natural risks or human risks, and then classifies them into rare occurrence risks, common occurrence risks, and cumulative operations.

3.3.3. Risk Analysis

An ABC mechanism has been established to express this numerically.

Table 1. ABC mechanism. ICCROM, 2016.

A	Refers to the interval between the recurrence of the hazard.	5	4.5	4	3.5	3	2.5	2	1.5	1	.5
		One year	٢ years	١٠ years	٢٠ years	١٠٠ years	٢٠٠ years	١٠٠٠ years	٢٠٠٠ years	١٠٠٠٠ years	٢٠٠٠٠ years
B	Refers to the degree of loss of significance of the site, or one of the historical, economic, social, or scientific values.	5			4		3		2		1
		Total loss			Large loss		Small loss		Significant loss		Minor loss
C	Refers to the size of the damaged portion of the site.	5			4		3		2		1
		The total value of the heritage site			A large portion of the site value		A small portion of the site value		A minuscule portion of the site value		A tiny portion of the site value

3.3.4. Evaluate

Risk evaluate is the primary factor in comparing risks and determining the level of priority. After recording the three scores from each type of risk identified using the ABC scale, we can calculate the level of risk by aggregating the three scores that constitute the risks: $A + B + C = MR$.

Table 2: Assessment of Priority Level. ICCROM, 2016.

Priority Level	Disaster Priority	Critical Priority	High Priority	Medium Priority	Low Priority
MR	١٣,٥-١٥	١١,٥-١٣	٩,٥-١١	٧,٥-٩	أقل من ٧

3.3.4. treat.

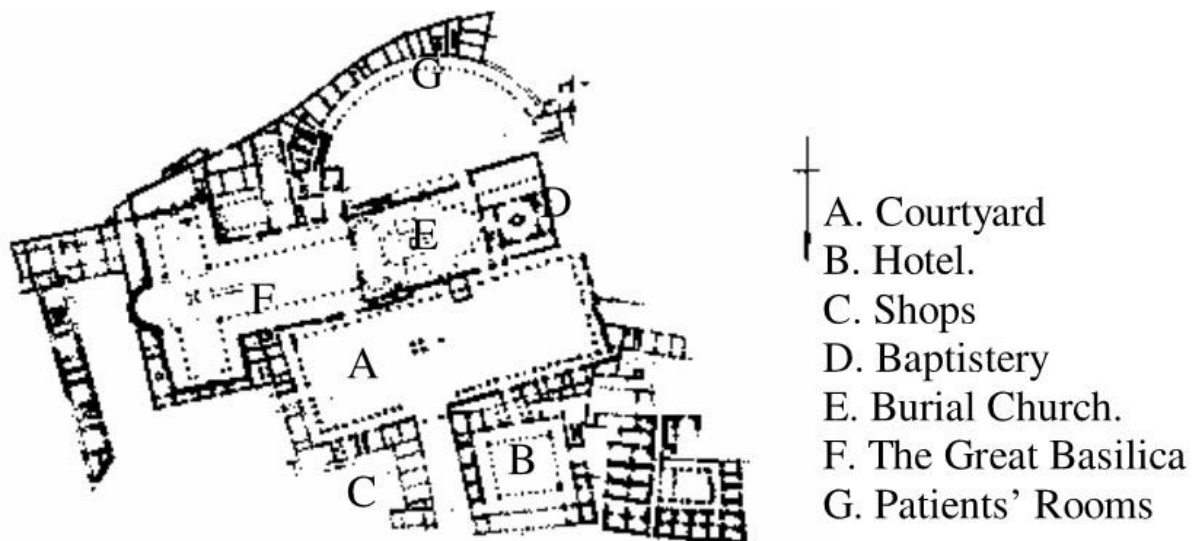
There are five procedures for monitoring and controlling risks. These procedures include both preventive and reactive measures. Preventive measures are considered more important than reactive measures and are more effective; however, good risk management works towards the integration of both types of measures.

Table 3: Procedures for monitoring and controlling risks. ICCROM, 2016.

Interactive		Preventive		
Treatment	Response	Investigation	Prohibition	Avoidance

4. Applies study.

The archaeological site of Abu Mena is located 45 km southwest of Alexandria in a place called Karam Abu Mena, between Wadi Natrun and Alexandria. The Abu Mena area was included in the UNESCO World Heritage List in 1979, as it is considered one of the five most important historical sites in Egypt. It consists of the ruins of churches, monasteries, houses, workshops, and various buildings that were constructed next to the shrine of Saint Mena in Alexandria, following his martyrdom in the late third or early fourth century AD. The archaeological area includes many religious buildings, the most important of which is the tomb of Saint Mena (285–309 AD), after which the surrounding area was named due to his fame in the late Roman period. His tomb became an ancient pilgrimage center in North Africa, not only for early Christians in Egypt but also for early Christians in the Mediterranean basin and southwestern Europe in the fifth and sixth centuries. Subsequently, many architectural structures were built around the tomb of Saint Mena, such as the baptistery, a group of churches, baths, houses, oil presses, and workshops, in addition to guesthouses and a pilgrims' courtyard, which is an open space bordered by rows of marble columns where incoming pilgrims would gather at the sacred place. Over time, the remnants of the ancient city and the tomb of Saint Mena disappeared until they were discovered by the German archaeologist Kaufman in the early twentieth century, leading to ongoing excavations to uncover the remains of the residential city by missions from the Coptic Museum and the Greco-Roman Museum, due to the religious and historical significance of the archaeological site of Abu Mena ^{iv}



4.1. Reasons for choosing the site of Abu Mena (as a case study)

Egypt has 7 heritage sites listed on the permanent World Heritage list, including the Abu Mena heritage site. However, in 2001, UNESCO placed it on the red list (heritage at risk) due to the reasons mentioned earlier. Four years later, the Egyptian government initiated a project to reduce groundwater levels at a cost of 50 million pounds, which was completed in 2010. Unfortunately, maintenance at the site was disrupted, and electricity was cut off for a period, causing the tomb and surrounding area to fill with water again until the new project to develop the heritage area began in 2019 and is still ongoing. These efforts have been made in cooperation with the Ministry of Irrigation, represented by the Groundwater Research Institute and the Wastewater Research Institute, which undertook the cleaning of drains within the area, as well as the Ministry of Agriculture, which contributed by converting the irrigation system for the agricultural lands around the area to drip irrigation instead of flooding ^v. Thus, the Abu Mena heritage site is the first of the seven Egyptian sites listed on UNESCO's permanent World Heritage list to implement a comprehensive management strategy to preserve its outstanding universal value and ensure its continued presence on UNESCO's permanent World Heritage.

4.2. The Outstanding Universal Value (OUV) of the archaeological site of Abu Mena:

World heritage Sites must meet at least one of ten selection criteria and be of outstanding universal value (OUV) in order to be inducted into the World Heritage List.

Six cultural and four natural criteria were used by UNESCO to determine World Heritage sites up until the end of 2004. There is now just one set of 10 requirements following the adoption of the updated Operational Guidelines for the Implementation of the World Heritage Convention.

Table 4: Clarifies UNESCO standards for the selection of World Heritage site ^{vi}

Operational guidelines (Year)	Cultural criteria						Natural criteria			
2002	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)
2005	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(ix)	(vii)	(x)

By studying the site of Abu Mena and the extent to which the criteria for outstanding universal value (OUV) apply to it, we find that it meets criterion (iv), which can be justified as follows:

Criterion (iv): Abu Mena is an outstanding example of one of the first early Christian monastic Centre developed in the Near East. It was also a major pilgrim Centre with a much larger settlement than many of its contemporary sites in the Near East. Its architectural elements, in a wide range of building types, were strongly influenced by Egyptian practice, and express clearly the articulation of traditional Egyptian architecture with various other styles from the Mediterranean basin and were a significant advancement of early Christian architecture and practices ^{vii}.

4.3. Reasons for including the site of Abu Mena in the list of World Heritage in Danger

The land reclamation program for agricultural development in the region, funded by the World Bank, has caused a significant rise in groundwater levels over the past ten years. The local soil, which consists only of clay, is hard and capable of supporting buildings when dry, but it becomes semi-liquid as water increases. The destruction of many tanks scattered throughout the city has led to the collapse of several structures that were above them. Massive cavities have opened up underground in the northwestern part of the city. The risk of collapse is so high that authorities have had to fill the bases of some of the most vulnerable buildings with sand, and the Supreme Council of Antiquities in Egypt is trying to address this phenomenon by digging trenches and expanding the listed area in hopes of alleviating irrigation water pressure; however, these measures have proven insufficient given the magnitude of the problem and the limited resources available. In 2019, a groundwater reduction project began, self-funded by the Supreme Council of Antiquities at a cost of 50 million pounds, and indeed the groundwater level has decreased and the tomb well has appeared in full. All UNESCO recommendations are being implemented to remove all obstacles that placed the site on the endangered list ^{viii}



(Fig. 3), Abu Mena Archaeological Area Development Project.

4.4. Risk management plan for Abu mena site.

4.4.1. Understanding the context for Abu mena site.

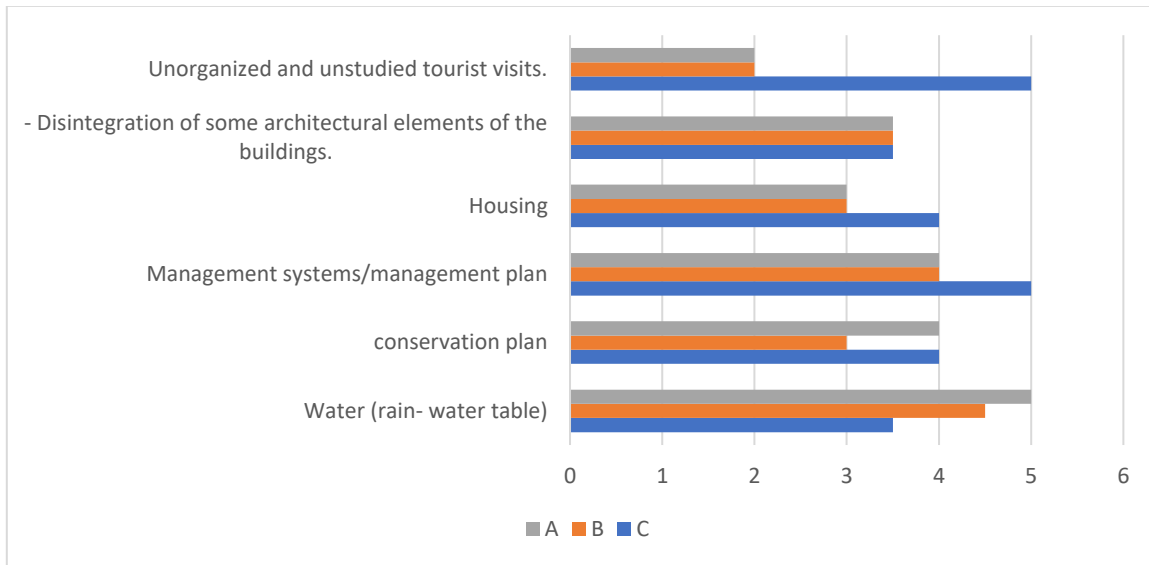
The legal framework	The legal framework governing and influencing the Abu Mena area is divided into two levels. The first level is the international level, represented by the 1972 World Heritage Convention concerning the protection of cultural and natural heritage. These agreements obligate member states to protect and preserve sites listed on the World Heritage List, such as the Abu Mena site. The second level is the local level, represented by the Antiquities Protection Law No. 117 of 1983, which constitutes the main legal basis for the protection of antiquities in Egypt ^{ix} .
The Administrative Framework	the archaeological area of Abu Mena, administrative work intersects between three main entities, which are: The Egyptian Ministry of Antiquities: plays a key role in managing the site and is responsible for making final decisions regarding the development and enhancement of the archaeological area. Officials at the Monastery of Saint Mena the Miracle Worker: represent the religious aspect of the site, as they play an important role in preserving the religious and historical heritage associated with the monastery. UNESCO: acts as an international body for the protection and preservation of global cultural heritage, contributing to providing the necessary guidance to ensure the site's value is maintained as a World Heritage Site. The Ministry of Antiquities seeks UNESCO's approval before making significant decisions related to the development or modification of the site. This relationship indicates that the Ministry of Antiquities is the most influential entity in decision-making, following consultations with the other parties and obtaining UNESCO's approval.
Financial Framework	The main funder is the Supreme Council of Antiquities, in addition to contributions from the World Heritage Committee, such as: Funding issued in 2023 to finance a training program on preparing a site conservation plan ^x .

4.4.2. Identify and analyze the risks for Abu mena site.

	Risk Identification	Evaluate		
Natural risk	Water (rain-water table)	Rise of the underground water table level and ensuing damage to the structures.		
		A	٣,٥	This request has been repeated in the preservation reports from the year 2001 to the year 2024. A project to lower the groundwater level was implemented in 2007. The area experienced a rise in the groundwater level in 2011. Currently, projects are underway to address the problem.
		B	٤,٥	According to reports from the World Heritage Committee, the groundwater at the site represents a long-term and fundamental threat to the outstanding universal value of the property, leading to the closure of the site to visitors.
		C	4.5	The destruction of numerous cisterns, disseminated around the city, has entailed the collapse of several overlying structures. the risk of collapse is so high that the authorities were forced to fill with sand the bases of some of the most endangered buildings, including the crypt of Abu Mena with the tomb of the Sain . ^{xi}
	MR		12.5	
Administrative risk	Management systems/management plan	need for a management plan, to include research, presentation and interpretation, the role of stakeholders (e.g. the Mar Mena community), staffing, sponsorship, visitor facilities, access, etc. ^{xii}		
		A	٥	The Management Plan presented most recently is a schedule of activities and projects, but does not include basic requirements for a Management Plan for a World Heritage property, such as

				management structure, resources, statutes, research, presentation and interpretation, or the role of stakeholders.
		B	4	The absence of a management plan affects all archaeological sites within the property.
		C	4	The absence of a comprehensive management plan for the Abu Mena site may lead to the loss of numerous cultural values that characterize the site. This includes the deterioration of the historical, religious, and architectural values that the site holds, in addition to the negative impact on the tangible and intangible heritage associated with it.
		MR	13	
Administrative risk	conservation plan	Lack of conservation plan, defining short-, medium-, and long-term objectives and establishing technical parameters (materials, techniques, etc.) ^{xiii}		
		A	٥	This request has been reiterated in the preservation reports from the year 2001 to the year 2023, and a draft was prepared and presented to the World Heritage Committee in 2024.
		B	٣	Despite the absence of a preservation plan for the site, coordination has begun between the Ministry of Tourism and Antiquities, the UNESCO office in Cairo, and the Monastery of Abu Mena to prepare a conservation plan for the antiquities. Initial efforts focus on organizing a training program to support the preparation of the plan, thanks to funding provided by the World Heritage Fund. The project has been implemented. Coordination has begun between the Ministry of Tourism and Antiquities, the UNESCO Cairo Office and Abu Mena Monastery for the preparation of the Conservation Plan. Initial efforts are focused on organizing a training programme that will support the preparation of the Plan, thanks to funding provided by the World Heritage Fund
		C	٤	The absence of a preservation plan has led to the loss of some cultural and architectural values.
		MR	12	
Development risk	Housing	The continuous exposure of the heritage site to numerous internal violations by the monastery and external violations by the local residents.		
		A	٤	The site has faced housing risks since 2017, and this has been reiterated in the preservation reports from 2017 to 2024.
		B	٣	The abuse of the archaeological sanctuary through the negative impact on the archaeological and aesthetic values in the area.
		C	3	
		MR	10	
collapse risk	- Disintegration of some architectural elements of the buildings.	Poor preservation practices for the heritage site leads to Disintegration of some architectural elements of the buildings.		
		A	4.5	The reasons that led to this problem have not yet been addressed.
		B	3.5	The negative impact on the integrity and authenticity of the site and its heritage value.
		C	3.5	Deterioration at parts of the Abu Mena Archaeological Site, including the Monastery with salt-affected walls, collapsed walls and remnants of pillars, and the grave of St. Mena supported by iron rods and wooden beams ^{xiv} .
		MR	10.5	

Planning risk	Unorganized and unstudied tourist visits.	The area is not officially open for visits, Though Abu Mena is not as heavily visited as other sites, there is no census of the number of tourists arriving in the area, as the site lacks basic tourist services ^{xv} .		
		A	3	The Mar Mena Monastery complex attracts a large number of pilgrims and tourists annually.
		B	2	The safety of the heritage site is endangered by visitors.
		C	2	The high volume of visitors can lead to physical degradation of the site, including damage to structures, artifacts, and the surrounding environment
	MR		9	



(Fig. 4), Analyze the risks for Abu mena site. Authors.

4.4.3. Assessment of risk Priority Level for Abu mena site.

Table 5: Assessment of Priority Level for Abu mena site. Authors.

The risk	MR	Priority Level
Water (rain- water table)	12.5	Critical Priority
Management systems/management plan	13	Disaster Priority
conservation plan	12	Critical Priority
Housing	10	High Priority
Disintegration of some architectural elements of the buildings.	10.5	High Priority
Unorganized and unstudied tourist visits.	9	Medium Priority

4.4.4. Proposed procedures for controlling risks for Abu mena site

Table 6: Proposed procedures for controlling risks for Abu mena site. Authors.

	Interactive		Preventive			Previous response procedures	Proposed procedures for controlling risks
	Treatment	Response	Investigation	Prohibition	Avoidance		
Water (rain-water table)		*				A project to lower the groundwater level in the area was implemented in 2007 and began execution in 2009, successfully reducing the water level to a depth of 5.5 meters below the ground surface.	-Implementation of a project to lower the groundwater level to a depth of 8 meters below the surface of the earth.
Management systems/ management plan		*				The Higher Committee for the Management of World Heritage Sites has been formed, chaired by the Assistant to the President of the Republic for National and Strategic Projects ^{xvi} .	-Develop a management plan approved by the World Heritage Committee, taking into account the recommendations provided by the World Heritage Committee in the conservation reports.
conservation plan		*					-Encouraging the local community and volunteers -Development of Human and Financial Resources. Raising awareness in the local community about the importance of heritage to reduce violations. -The use of of geographic information systems to manage site data to provide and facilitate the monitoring of site status.
Housing		*				The ministry removed the encroachments made by the Bedouins, but the removal orders for the encroachments made by the monastery have not been implemented.	-Accurate definition of the buffer zone. -Map the land use around the site. -Implementing decisions to remove encroachments
- Disintegration of some architectural elements of the buildings.		*				The project for the restoration and risk mitigation of the archaeological area has been implemented, and the installation of architectural elements in the Basilica and the Church of the Tomb has been completed. Restoration work is underway on the walls of the Great Basilica and the surrounding walls.	-Invitation of Advisory Committees by the World Heritage Committee. -Request for Financial and Technical Assistance from the World Heritage Committee. -Conducting regular maintenance of the surfaces of historical buildings to prevent the entry of pollutants and pests that may harm the condition of the building.

Unorganized and unstudied tourist visits.					*		<ul style="list-style-type: none"> - Establish a heritage route for visitation within the site to avoid interference with archaeological sites. - Enhance tourism services within the site. - Provide legal tourist guidance within the site.
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5. Results and Recommendations

5.1 Results:

1- The archaeological site of Abu Mena in Egypt, listed as a UNESCO World Heritage Site since 1979, is one of the sites facing threats that jeopardize its outstanding universal value (OUV). In 2013, the site was designated as a World Heritage Site in danger due to multiple threats negatively impacting its cultural values.

2- To monitor the dangers facing World Heritage Sites on the List of World Heritage in Danger, especially in the study area (the archaeological site of Abu Mena in Egypt), the strategies outlined in the Risk Management Guide for Cultural Heritage published by ICOMOS in 2016 were followed. These threats were classified to facilitate the risk management process in the study area.

3- A multi-stage approach was adopted in the research, combining a theoretical methodology represented by a review of literature and the basic concepts of risk management, along with a review of previous successful cases of risk management for endangered cultural World Heritage Sites. Additionally, a case study approach was utilized to ultimately reach an effective and implementable proposal for risk management at the Abu Mena archaeological site in Egypt, assisting local officials and relevant institutions in selecting appropriate strategies to address each type of risk in the study area based on a scientific methodology.

4- To calculate the (magnitude/size of risk) and compare it numerically with other risks and communicate it to the relevant institutions regarding the site of Abu Mena, the research relied on the (ABC) scale, which expresses the frequency of occurrence or rate and the expected lost heritage value caused by various risks. As a result, it was found that the most significant risks faced by the site of Abu Mena, which must be addressed in the short term, are first its lack of an effective management and conservation plan, which is classified as a catastrophic risk to the site, and second, the negative impact of groundwater on the heritage site, which is classified as a critical risk that must be confronted and mitigated as soon as possible.

5- The research presents a proposal to mitigate the risks faced by the heritage site of Abu Mena, detailing those risks and prioritizing their management based on the (ABC) scale, as well as how to interact with and reduce those risks, the previous procedures followed to address those risks, and the future ideas proposed by the research for interaction and mitigation of those risks.

6- The study presented in the research represents clear support for managers of global heritage sites, whether at Abu Mena or other Egyptian World Heritage sites, as well as for international bodies concerned with the management of World Heritage sites.

7- There is potential to develop the heritage site in a way that could have a highly significant positive impact, both archaeologically and touristically, through the implementation of the development plan set for the area, specifying the various support aspects for all stages of the plan, determining the timeframe for its implementation, and also identifying the entities responsible for executing each stage of the established plan.

5.2 Recommendations:

1- The study recommends the necessity of documenting the current situation of the Abu Mena heritage site by obtaining information accurately and comprehensively, relying on the integration of modern architectural documentation techniques, which ensures the collection of comprehensive information and data about buildings and areas, and then identifying the expected risks.

2- The study recommends the necessity of conducting regular monitoring and tracking of the deterioration rates of the Abu Mena heritage site by comparing the information and statistics obtained over different periods, thus enabling the prediction of crises and disasters that could significantly affect the heritage buildings and areas.

3- The study recommends that no future development projects should take place in the vicinity of the Abu Mena heritage site without consulting the Egyptian Ministry of Antiquities and other relevant authorities to study the expected impacts on the site.

4- The study recommends the necessity of implementing demolition decisions related to encroachments on the buffer zone of the archaeological area designated for the local Bedouins, as well as other demolition decisions issued for the monastery within the site.

5- The study recommends the need to increase tourism services at the site of Abu Mena, as there is no census of the number of tourists in the area, no promotional programs for the area, no explanatory signage in the area, and no special gates for entering the heritage site.

6- The research recommends the necessity of applying the proposed risk mitigation strategies within a short to medium timeframe (ranging from four months to two years) to address all risks faced by the area, such as pressures resulting from increased development in the buffer zone of the heritage site, the growing negative impact of rising groundwater levels at the site, the lack of effective management and preservation plans for the heritage site, the negative impact of unplanned and unorganized tourist visits, and the risk of important architectural elements of the heritage site collapsing.

7- The study recommends the optimal selection of intervention methods that correspond to the type of risk faced by the area under study and the nature of the area, and then determining intervention priorities and the desired outcomes, which the research suggests for future studies

8- The study recommends supporting and enhancing the capacity to face risks at Egyptian World Heritage sites and conducting more restoration and maintenance operations continuously and permanently to preserve the sustainability of the outstanding universal value of those sites.

9- The study recommends the necessity of evaluating the potentials of Egyptian World Heritage sites, their methods, and the conservation and management plans set for them, as well as identifying shortcomings in the capacities related to risk assessment and risk management.

10- The study recommends establishing a specialized risk management department within each World Heritage site in Egypt to assess institutional capacities and evaluate risk processes in light of this study and to include it in the administrative organizational structure of heritage sites.

11- The study emphasizes the importance of identifying emerging and potential risks to World Heritage sites in Egypt and incorporating them into the plans and strategies for managing heritage sites.

12- The study highlights the importance of involving local Bedouin populations with relevant government entities in addressing the risks facing the Abu Mena heritage site and preparing training programs for them to enhance their capacities and capabilities in dealing with expected crises, as well as strengthening their role in strategies to mitigate post-crisis consequences.

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