Quseir Castle An Geoarchaeological Study

Rabab Abd Elhakeem Ebrahim
Assistant Lecturer - Department of Geography and Geographic Information System
Faculty of Arts - Mansoura University - Egypt
E-mail: rabababdelhakim@mans.edu.eg

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Assistant Lecturer - Department of Geography and Geographic Information System
Faculty of Arts - Mansoura University - Egypt
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Abstract:

The Quseir Castle has played a historical role since the era of the Ottoman Sultan Selim Al-Qaatm as the most important navigation route in the Red Sea. The Quseir Castle's history includes its architectural construction as a military fortress, its role as a center for commercial business, and its provision of services to pilgrims. The research examines the geoarchaeological castle to elucidate the ways in which environmental factors shape the surrounding areas, how humans engage with the natural environment to conduct their activities, establish urban shops, and how these interactions impact them. It also influences the occurrence of land shifts and establishes policies to ensure sustainability. The impact of various weathering processes poses a significant threat to the castle due to its use of limestone and clay as building materials. Therefore, defining important policies for sustainability and preserving cultural heritage can enhance national belonging.

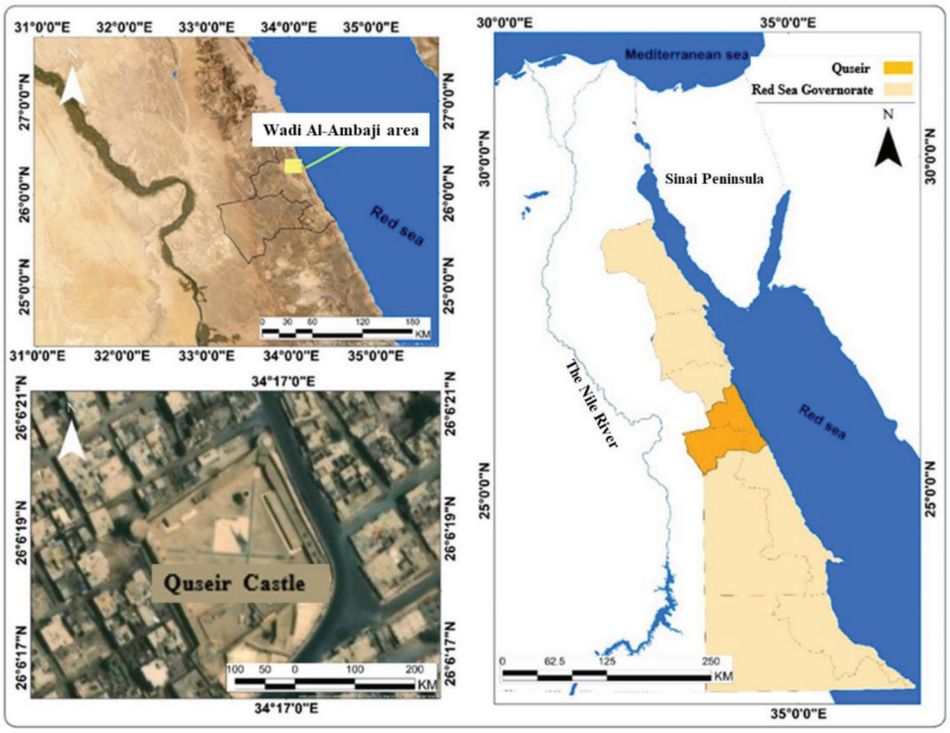
Keywords: Quseir castle; geoarchaeology; archaeological conservation; Quseir City coast; Quseir City.

1. Introduction

The city of Quseir is a small fishing and phosphate mining community. Built in Qusayr Castle, it played a unique role in securing and defending the surrounding villages, countries, and cities, and served as an important port during the Ottoman era, known as Quseir Port. This paper aims to study the historical changes witnessed by Quseir Castle, specifically from a geoarchaeological perspective. Studies have varied in their definition:

Wilson's study Wilson's study from 2011 tracks human interactions with the Earth's atmosphere and traces its history from ancient times to the present, leading to a deeper understanding of the earth's appearance and the environmental changes in the region. Torab et al. (2011) conducted a modern environmental science study, utilizing research methods and tools from the Earth sciences to extract valuable information for archaeology excavations and comprehend the evolution of the Earth's surface over time. Issa (2018) conducted an interdisciplinary study that employs a multi-source approach, particularly in the field of geosciences, to reconstruct ancient environments, examine the mutual influence between man and his environment, and assess its impact. This approach not only confirms these findings, but also aids science in resolving archaeological issues and planning future developments. Geographical studies modernize the subject by connecting the past and present, highlighting the significance of human legacy, and utilizing archaeological evidence to pinpoint historical traces of ancient environments, thereby resolving issues unique to these areas.

Quseir Castle is in the city of Quseir in the Red Sea Governorate, near the coast. It is spatially located at latitude 61″ 6¯26°, 26°6¯16″north and longitude 34°16¯29″,34°17¯ east, Near Wadi Al-Ambaji, from which the stones were derived to build the castle. Fig. (1).



Source: Reliance on UPA shapefile and google earth2023 images.

Figure (1) The location of the study area.

1.1. Previous work:

The study focuses on the following prior studies:

Nicoll.k (2001): Radiocarbon chronologies for prehistoric human occupation and hydroclimatic change in Egypt and northern Sudan.

Leblanc et al. (2010): Un centre d'exposition et d'étude pour le site archéologique de Thèbes-Quest.

Pawlikoweeski, M. (2010). Geology and geomorphology influence the location of archaeological sites in Egypt.

Torab et al. (2017): Geoarchaeology of Portus Mareoticus: Ancient Alexandria's Lake Harbour (Nile Delta, Egypt)

1.2. Objectives:

Examining the region's geographical dimensions (environmental, spatial, temporal, and cultural) and learning about its geoarchaeology will help us understand how natural factors influenced the archaeological areas, as well as how ancient deposits contribute to the analysis of ancient archaeological evidence.

1.3. Methods:

Modern methods and techniques for surveying and dating archaeology are diverse. This research paper employed a variety of methods, including the study of plants found in rocks, the examination of layers and comparisons between different parts of the castle through field studies conducted in June 2023, and the analysis of phenomena using Google images inherited from different years [1] , in addition to considering timing and historical sequence.

The study was based on three main approaches:

[1] This point was an obstacle to the researcher because of the high cost of satellite visualizations of the location of the castle with high accuracy, and the disappearance of some parts of the castle and the replacement and restoration of its place, which led to the difficulty of conducting analyses and was overcome through research that dealt with the region historically.

the descriptive analytical approach to analyzing geographical phenomena, the historical approach to identifying historical events that have occurred in the region during a successive period of time, and the regional approach to knowing the character of the place and linking geographical phenomena.

2. Results:

The first aspect to consider is the environmental and geoarchaeological impact of the study area.

2.1. Quseir Castle History:

In 1502 AD, the Portuguese began to control the area of influence of the Red Sea during the Mamluk era. The Mamluks sought support from the Ottoman Empire. One of the Ottomans' objectives was to expand the Islamic conquest in Egypt, encircle the Islamic world, and divert the trade route through the Islamic countries. They were interested in this road because it is the most important navigational route to India and the Far East, and it leads to the holy sites in the Hijaz, Mecca, and Medina. Both England and France competed with the Ottoman Empire for areas of influence in the Red Sea (Al-Atta, 2007, p. 6). The Ottomans were interested in the city of Quseir, which is considered an example of historical environments. Among its archaeological buildings is the Quseir Citadel. Sultan Selim Al-Qaatem built the castle in the Ottoman era, in 1517 AD (Table 1). Throughout history, repeated attempts by naval forces have highlighted the city's strategic importance. The French captured the castle in 1798 AD. During the battles between the French and the British for effective control of Egypt, a land invasion eventually overpowered the fortress, making it a French stronghold. Two main groups divide the city's community: hunters-gatherers and nomads. The total population consists of approximately 50,000 people spread over 20 square kilometers. The city was known as a commercial center between Egypt and the Kingdom of Saudi Arabia, as Egypt imported camels and timber (Photo 1) and exported grain and cotton. It was also close to Quseir's main port (https://arce.org/project/red-sea-quseir-fort/).

The Holy Sites' servants sent annual supplies by ship from Quseir to Jeddah and Yanbu. When the French arrived in 1799 AD, the castle was the shape of a diamond, topped with four towers (forts) in each corner and limestone walls 26 and 30 cm thick. The castle had few rooms and brackish well water. At a distance of 100 feet from the main southwestern entrance, there is a cistern that holds 45 cubic meters of water. It is connected to many natural water sources from distant hills, making it a natural reservoir during the rainy season (French Campaign, 1999, p. 252).

Table (1) Historical periods in Egypt.

Time period	Date
Egypt in the Pharaonic era	-
Egypt in the Greek and Ptolemaic era	-
Egypt in the Roman and Byzantine era	-
Egypt during the era of the Rightly Guided Caliphs and the Umayyad state	-
Egypt during the Abbasid and Fatimid era	-
The kings of Egypt during the era of the Ayyubid state and the sultans of Egypt during the era of the Mamluk state	-
Egypt during the era of the Ottoman Empire	The castle was built in 1517 AD
Egypt during the French campaign	Description of the castle
Egypt during the reign of Muhammad Ali Pasha	-
Presidents of Egypt until the present era	Presidents of Egypt until the present era

Source: Adapted (Ibrahim,2021, p. 51)

Pic. (1) Hajj and Umrah movement to and from the Kingdom of Saudi Arabia, as well as trade movement inside and outside Egypt.

2.2. Geological structure:

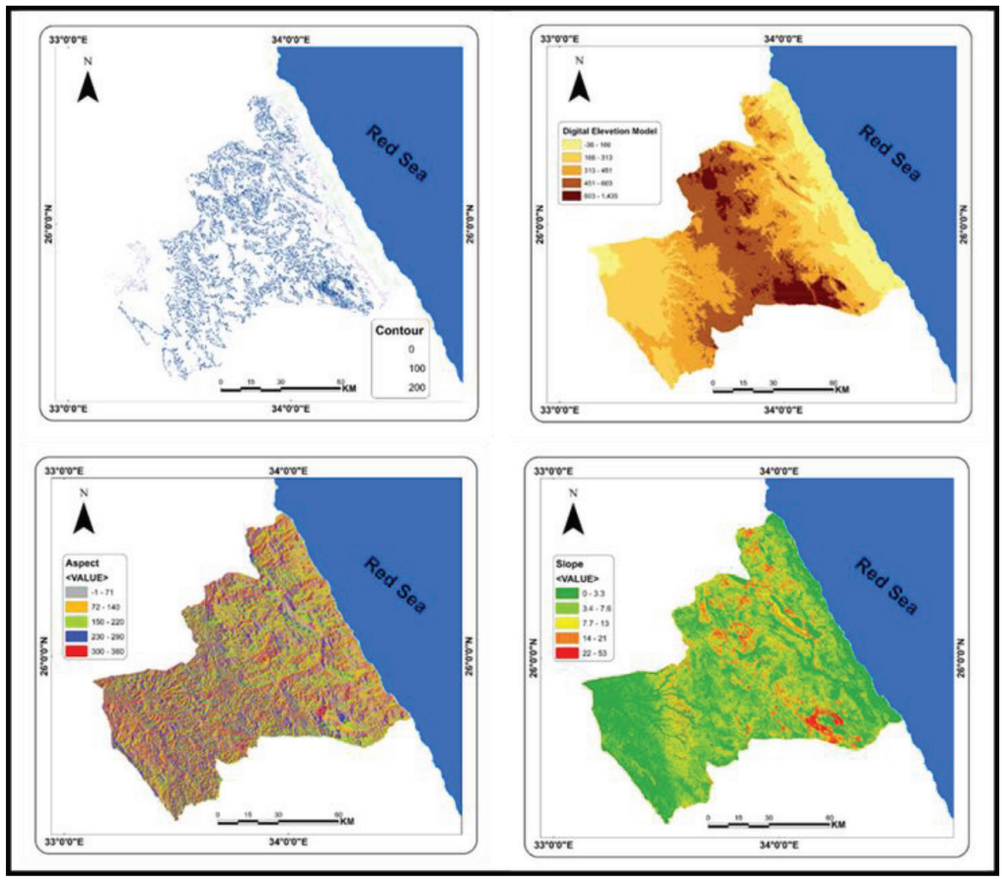
Throughout different eras, the Quseir region has witnessed various geological processes. Fig (2): The analysis of the study site, focusing on its levels, slope, and direction, reveals that the area comprises a flat coastal plain, high plateau to the west of sediments from the Middle Tertiary period and others associated with the Red Sea, and an inland high area. As shown in Table 2, the area's history goes back to the Precambrian period and includes steep fault blocks of Cretaceous to Eocene platform deposits. Several hundred meters of highly deformed Precambrian basements form the rough terrain of the upland interior.

From this point, the Miocene coastal plain comprises intermittent spots from the Pliocene era, as well as the oldest direct polar block dePic.ted in Figures 3 and 4. Short, swift valleys connect the steeply descending eastern slopes to the narrow coastal plain. The mountain range sculpts the terrain with lines of sand and gravel, enhancing its ruggedness yet occasionally creating suffocating passageways. However, its value extends beyond its role as a road. The most important of these valleys are Wadi Al-Karim, Wadi Al-Hamamat, Wadi Jasus, and Wadi Al-Nakhil. Quseir's geological nature concentrates coastal islands in front of Gulf capitals, shielding them from strong winds and

waves. For this reason, ports in these places, including the port of Quseir, have concentrated throughout the ages (Hamdan, _____, p. 505).

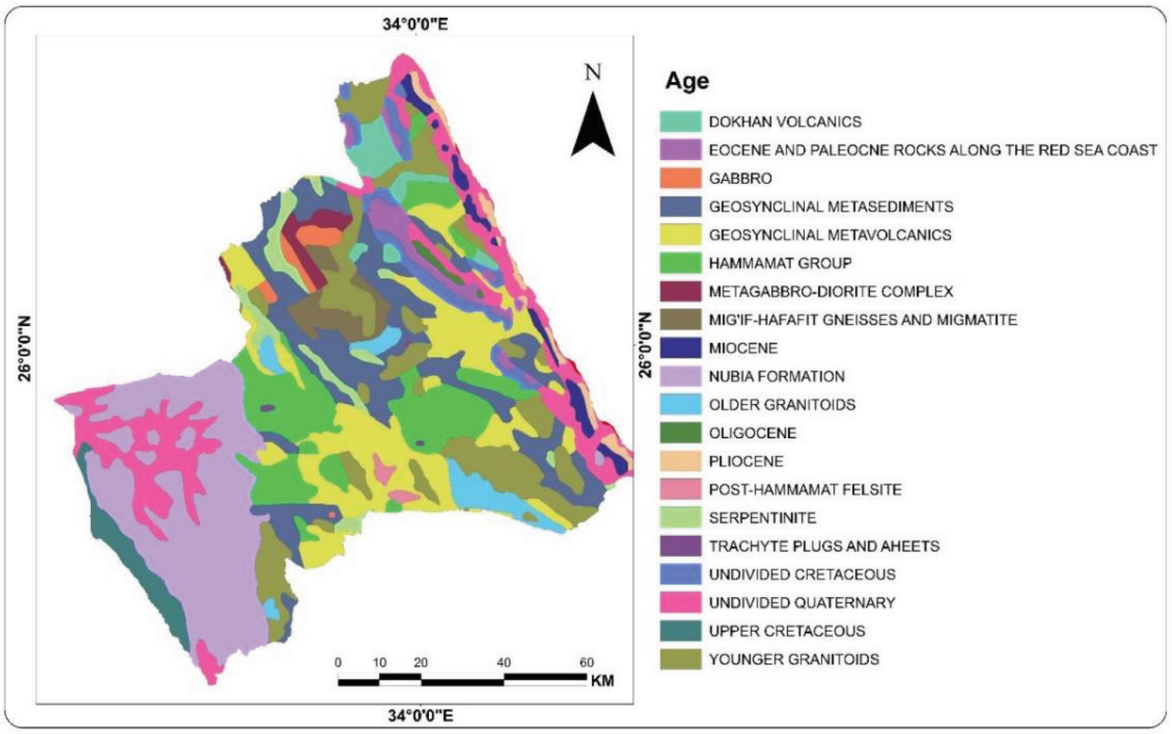
Despite the geological diversity, this study focuses on the castle stone extraction site. In the northeastern corner of Quseir is Wadi Ambaji (Al-Ambaji), whose sediments flow towards the sea. During the late Cretaceous and early Miocene, only the gypsum member and the upper reef member were visible in the Ambaji massif, rising in harmony with the main reef member's overlying coral reefs. Light-yellow marl and marly chalk, interbedded breccia, mossy limestone, and gravel conglomerate derived from the Precambrian basement comprise the gypsum portion. This gypsum formation occurs in a highly saline coral reef environment, possibly due to local block cracking in the Ambaji Valley area. It is thicker than approximately 35 meters. The upper reef member, like the main reef member, is characterized by light yellow, light brown to grey hues, a large amount of limestone and gravel, a high degree of recrystallization, and a richness in fossils. It differs from the main reef in that it has more common breccia horizons. The main reef is a cap of reef limestone, likely indicating a rebalancing of the Embaji mass with sea level (Green, 1984, p. 12).

The French campaign's dePic.tion of Egypt revealed that a creek named Ambaji lies two leagues away from Quseir, while the quarries to the right provide a glimpse of the stones used in Qusayr's construction. Local rocks from the study area helped build the castle (French Campaign, 1999, p. 257).



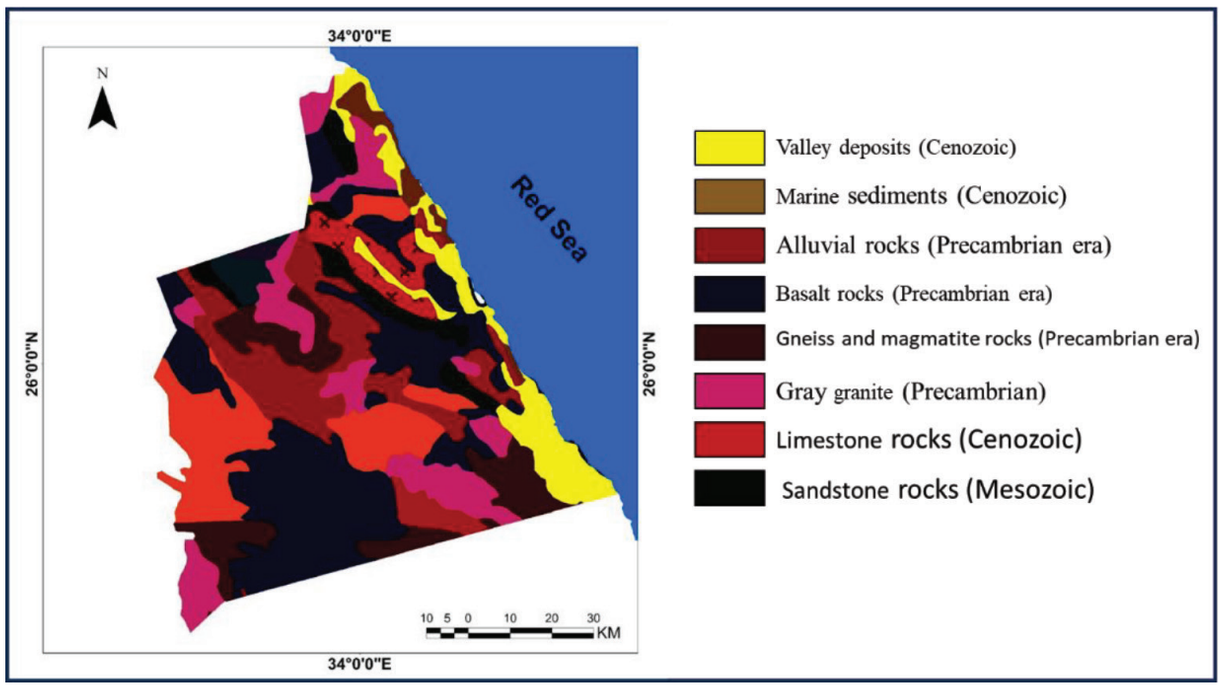
Source: From the researcher's work based on a digital elevation model 2009.

Fig (2) It shows the levels, slope, and slope direction of the study area.



Source: Based on shapefile geological map of Egypt.

Fig (3) The geological history of the study area helps us understand The environment surrounding the castle and what was used in construction



Source: Based on shapefile geological map of Egypt.

Fig (4) A figure showing the types of rocks in the study area. Limestone and clay were relied upon in building the castle

Table (2) Phanerozoic History of the Quseir Area

Tectonic Phase	Time period	Units Deposited	Tectonic Events
Erosion of Precambrian	Cambrian to middle Cretaceous	1. kaolinized saprolitic horizon 2. possibly some Paleozoic sediments, subsequently eroded	1. epeirogenic uplift, erosion, and peneplaination of the Precambrian basement
Platform Sediment Deposition	middle Cretaceous to middle Eocene	3. deposition of the platform sediments sequence: a) Nubia Fm. b) Quseir Fm. c) Duwi Fm. d) Dakhla Fm. e) Tarawan Chalk f) Esna Shale g) Thebes Fm.	2. epeirogenic downwarping, and a progressive north to south marine transgression from the Tethys Sea 3. epeirogenic uplift and/or lower sea level results in marine regression and end of deposition in middle Eocene.
NorthNortheast Compression	early Miocene	4. deposition of Nakheil Fm. in fault-bound depressions 5. development of a terminal erosion surf ace, themid-Tertiary	6. development OF A NE extensional stress regime 7. reactivation of strike-slip faults as west dipping normal faults 8. emplacement of down faulted platform sediment blocks (e.g. Gebel Atshan, Gihania) in asymetric grabens in the Precambrian basement 9. uplift in coastal region combined with differential subsidence results in erosion of platform sediments cover from topographic highs
Formation of Proto Red Sea	middle Miocene	6. deposition of Gebel el Rusas Fm. in the developing Red Sea basin	10. Continued regional extension, down faulting, and possibly sea floor spreading results in development of Red Sea marine basin
Quiescence	late Miocene	7. Deposit of Evaporite Fm. in Red Sea basin	11. hiatus of tectonic activity
Sea Floor Spreading	Pliocene to Present	8. Deposit of Gasus Fm. 9. Deposit of wadi sediment and reef terraces	12. beginning (or resumption?) of sea floor spreading in Red Sea 14. minor block faulting and flow of underlying gypsum results in seaward tilting of the coastal plain sediments 13. second phase of coastal uplift begins, and continues to present

Source: (Greene, 1984,p143).

2.3. Paleoclimate of the study area:

Geological and geomorphological studies revealed that the earth's temperature reached a high point during the third epoch until the Pliocene era. The temperature gradually decreased from the start of the Pliocene era. A rapid thermal decline began at the onset of the Pliocene, reaching its peak after approximately two-fifths (40%) of that era. Evidence between the latitudes of approximately 25-30 north indicates that a rainy period late in the third time (in the Paleocene era) may have extended to the ancient Pleistocene, and the first half of the Pleistocene (excluding the first) was Java (Issa, 2018, p. 25).

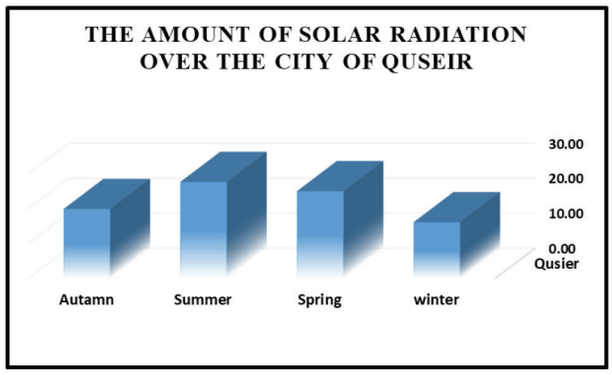
The Pliocene era, which lasted between 10 and 12 million years, as well as the second half of the Pleistocene, saw intermittent periods of rainfall over this northern range in the middle of the Arabian deserts, with the average amount falling during the two periods of the Middle Stone Age and the Neolithic civilization. The Pliocene era experienced higher average temperatures than our current era, while the Pleistocene era had lower average temperatures. The Pliocene era experienced more annual rainfall than our current era, with the half-winter season and surface runoff playing a significant role. Mr. 2006 divided the Miocene into three periods that differ among themselves in their climatic conditions, especially in the amount of rain: the lower, middle, and upper Miocene. In the lower Miocene on Egyptian territory, the rain fell heavily. With the advent of the middle Miocene, the percentage of rainfall decreased. The start of the higher Miocene brought about a climate shift, with drought dominating Egyptian territory. In the Pliocene and Pleistocene, successive periods of rain and drought occurred. All these events contributed to the development of water drainage systems in the eastern desert, which differed from those in the west.

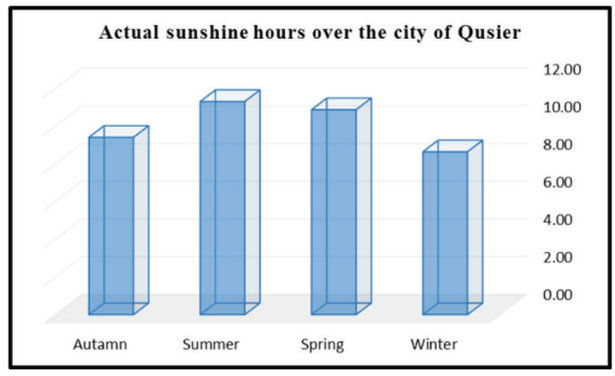
Major climate discrepancies between the wet and dry cycles occurred in the Holocene, and these changes were associated with the geological sectors, starting with the wet cycle phase in 1400 BC and ending with the severe drought phase between the Neolithic and the Neolithic eras. The dynasties began to emerge between 3000 and 4000 years ago. But during the first half of the third millennium BC, climatic conditions reached what they are now.

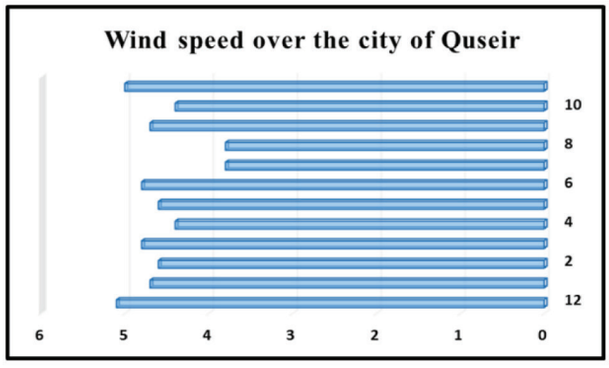
Climatic elements are considered the main influence on the preservation or deterioration of archaeological areas. The analysis of climate data for the period from 1980 to 2022 makes it clear that the region's climate is dry. The average daytime temperature ranges between 20 and 30 degrees Celsius (Figure 5), the humidity percentage is 40%, the northern and eastern winds blow at a speed between 10 and 12 knots, and the average rainfall is less than 1 cm annually (Issa, 2018, p. 26: 29).

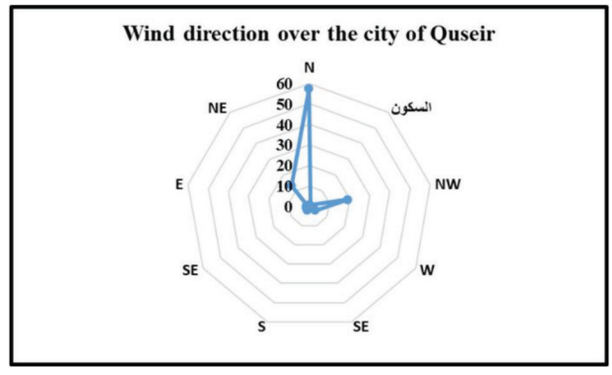
2.4. Coastline and Qusier Castle:

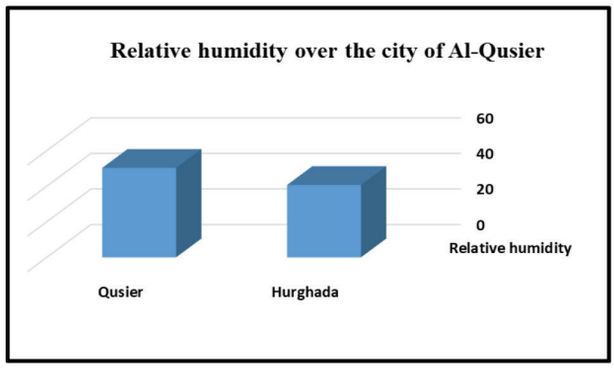
Qusayr, the port city, is on the Red Sea coast—a three-hour drive east of Luxor—and is located at the narrowest point between the Nile River and the Red Sea. Because of this privileged strategic location, Al Qusayr has served as a commercial and military port since Roman times in Egypt. In the first century AD, the ancient port of Qusayr developed and remained active until the fourth century. The Ayyubid dynasty revived in the 12th and 13th centuries, but by the 15th century, the harbor had become eternally deserted. However, only five miles (eight kilometers) south of old Qusayr, the Ottomans established a new port and fort in 1571.

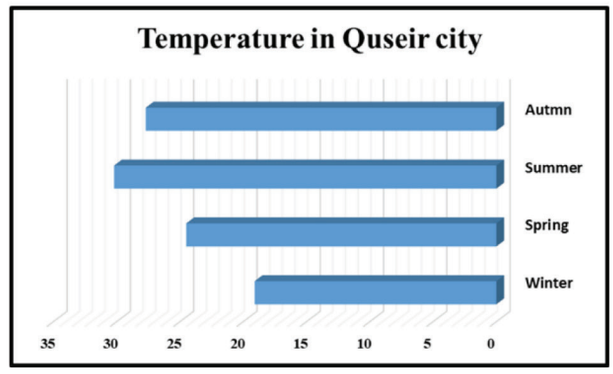












Source: https://power.larc.nasa.gov/

Figure (5) shows the climatic elements that affect the climate of the study area during the period 1980-2022.

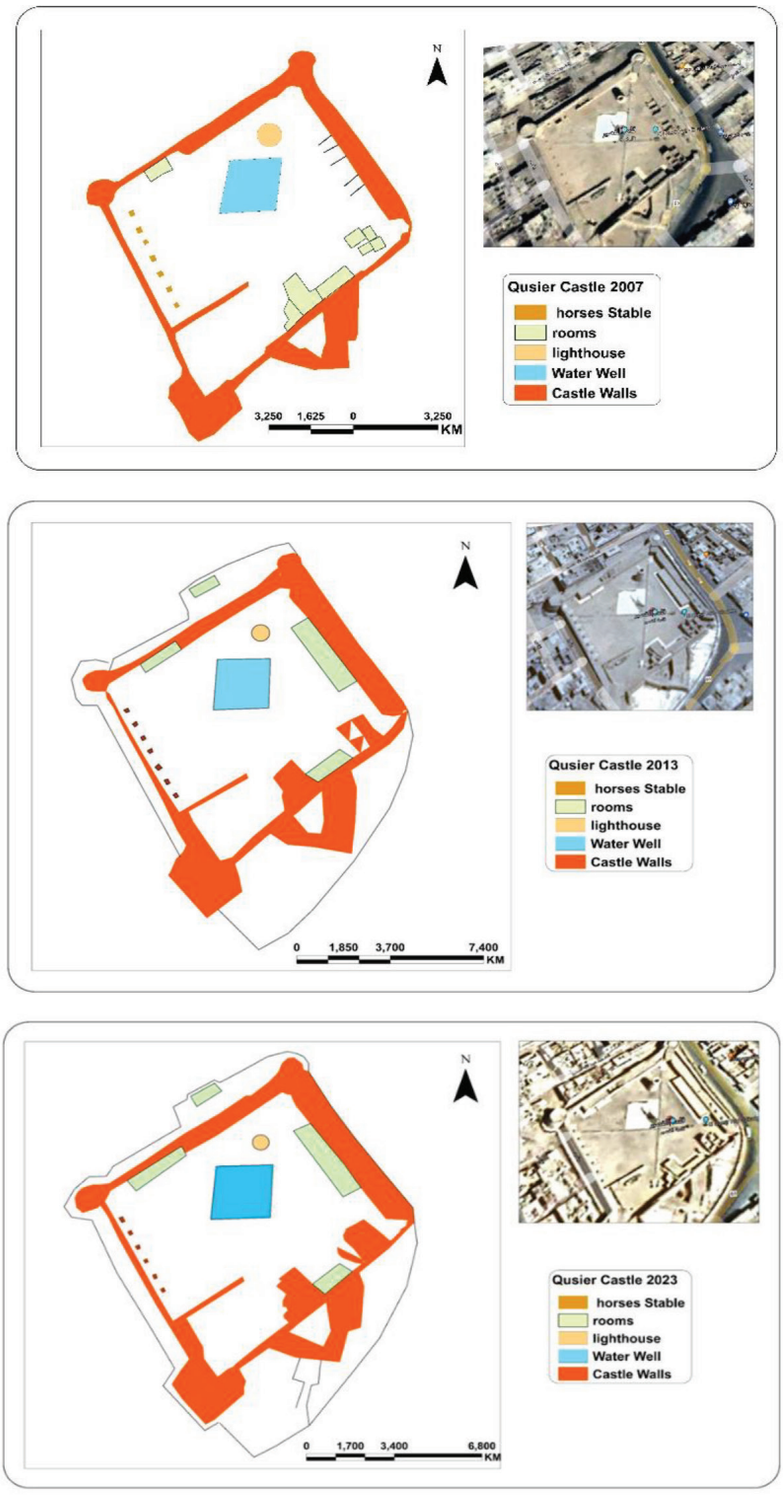
Centuries later, the American Research Center in Egypt initiated a project that resulted in the creation of a restored fort and visitor center, which now holds a prominent position in Egypt. This is where Quseir's current city center is located.

In its years of activity, Quseir Castle's recent history is a captivating sight of trade, immigration, and military power in Egypt. The Ottomans built the fort as a military garrison, but local resistance from neighboring Bedouin tribes gradually halted its use. In 1799, Napoleon's army recognized the strategic advantage of the fortress site—which could help thwart British expansion into Egypt from India—and recaptured the fort from local nomads. To face the battle, the French rebuilt the fort and survived the bombing by the British Royal Navy for three days. In 1801 the French withdrew from Egypt and abandoned the fort again, but Muhammad Ali's sons revived it in 1816 and used it during military journeys against the Wahhabis (Le Quesne, 2007, p. 18).

Quseir remained a strong player until the mid-19th century, when it faced competition from Suez, the larger port. The importance of Qusayr slowly waned, and for decades the fort housed a phosphorus factory. The Egyptian Coast Guard used it as a station for a few decades before abandoning and falling into disrepair in 1975. Opened in 1999, the Qusayr Castle and Visitor Center continues to draw tourists to the tranquil coastal city, a remarkable testament to the Red Sea's historic trade routes and the powerful armies that have risen and fallen over the centuries in Egypt.

Human factors impacted the castle, including the influence of the people around it and the unsuccessful attempts at permanent restoration (Rashed et al., p.). In recent times, as dePic.ted in figure (6) from Google images, the residents in the southwest of the castle have contributed to the castle's degradation, resulting in its continued presence among the local population. From 2013 to 2023, the effects of the restoration operations have become evident. However, the restoration processes inside the castle have a negative impact because they rely on building materials from the surrounding environment, which in turn affects the stones' weathering processes.

According to Egypt's description, natural factors influenced the distance from the coastline. The port in the north is a plateau of coral reefs that extends for two hundred and fifty meters inside the sea, descends vertically, and becomes a natural port for ships. However, at high tide, the water covers it by three decimeters, and at low tide, its surface appears rough, making it difficult to walk over. The shallow sea is only eight or ten meters from the city (French Campaign, 1999, p. 250).



Source: Prepared by the researcher based on historical images from Google Legacy.

Figure (6) Restoration operations inside Al-Qusayr Castle.

Recent Red Sea sediments appear along the edges of the Red Sea, forming a narrow coastal plain that runs along the Red Sea and the Gulf of Suez (Greene, 1984, p. 4). We demonstrated this by comparing various images of the Qusayr region's coast with the castle, as illustrated in Table (3) and Fig (7).

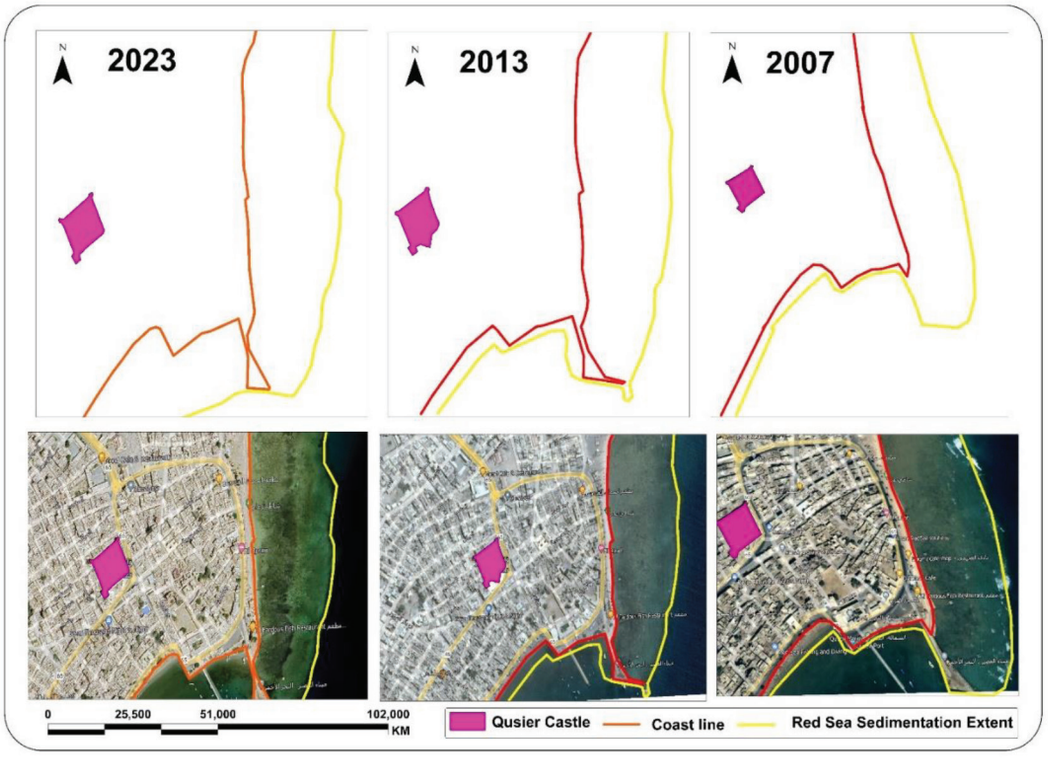
Table (3) Measuring distances between the coastline and the sedimentation line within the Red Sea in the coast of the city of Quseir.

Year	Costal line	Red Sea Sedimentation Extent
2007	18	334
2013	23	336
2023	183	337

Source: Distance measured through Google Earth.

Second: the geomorphological aspects of Quseir Castle and how to deal with risks:

Different climatic processes over time affect natural stones through a variety of weathering factors, with the type and extent of the stone's erosion controlling each effect. The castle was built of local coral limestone, as it was brought from the northeastern corner area (Embaji) of the city of Al-Qusayr, which belongs to the Cretaceous period, and clay was used to line the building and complete the construction. We did not permit it during the field study due to the significance of categorizing the damage to the castle, a process that requires laboratory samples. However, we will adopt it in this section to determine the categories of damage on Table (4) through historical comparison and tracking of the stones inside the castle, which shows the diversity of weathering processes.



Source: Prepared by the researcher based on Google Inheritance images.

Figure (7) shows the change of the sedimentation line in the coast of the city of Al-Quseir.

Table (4) Characteristic damage according to different categories

Category Numbers	Characteristic damage	Sub-groups
0	No visible damage	Bird dropping and loose masonry
1	Very slight damage	sanding, flaking, loose masonry, surface crust, bird
dropping, graffiti, soiling,		
2	Slight damage	Pitting, alveolar weathering, outbreaks, back
weathering, missing insets, loss of stone material		
3	Moderate damage	Large pitting Fissures, Joint,Scaling, Exfoliation
4	Severe damage	Y-shape joints, salt efflorescence, microbiological
deterioration, insect colonization,structural instability		
5	Very severe damage	Fault, connected joints, anthropogenic activity,
pollution, quarries, collapsed wall		

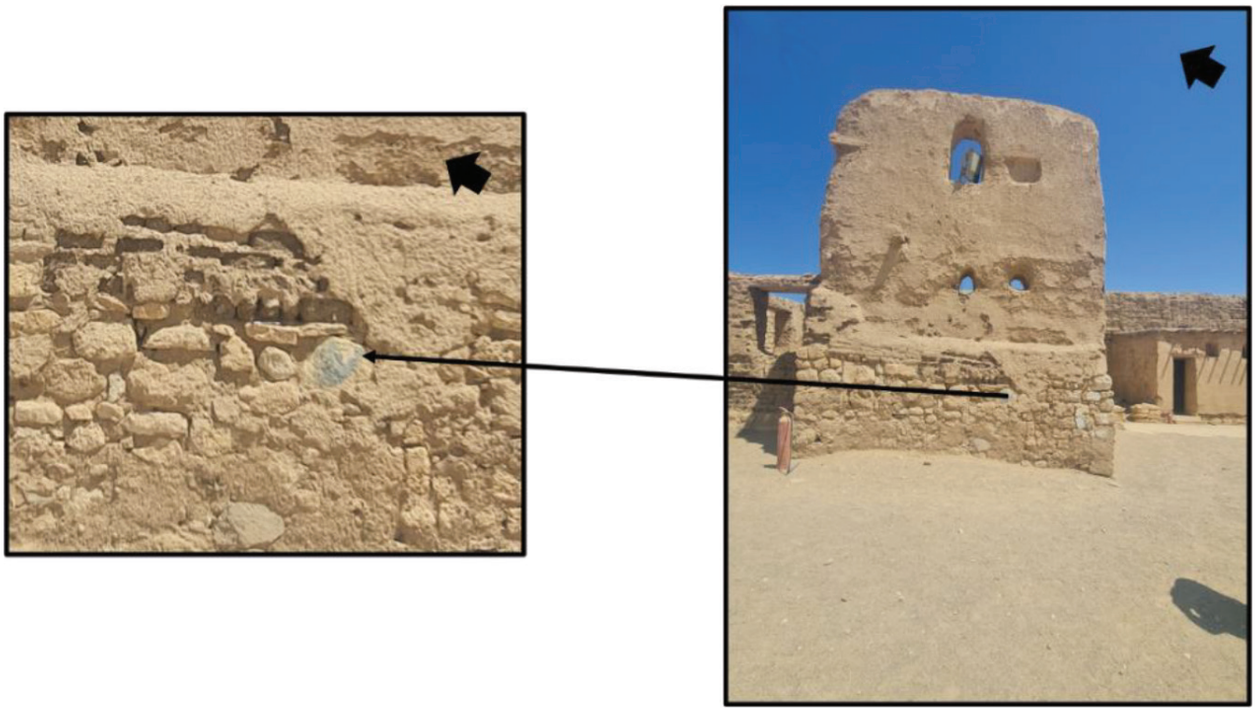
Source: (Ismail, 2015, p74)

2.5. Chemical weathering:

It is a process that chemically alters the mineral content of the rock due to its interaction with atmospheric conditions, specifically oxygen, carbon dioxide, and water vapor, and it also serves as a method of rock decomposition.

A-Oxidation:

The limestone Pic. (2) revealed that the stones had oxidized, transforming their original color to black. This resulted in the distortion of their external appearance and blurring of their color, with oxidation occurring in different areas of the castle.



Source: Field study conducted by the researcher in July 2023.

Pic. (2) shows the oxidation of limestone in QuseirCastle.

B-Carbonation:

The union of carbonate or bicarbonate with carbon dioxide in the atmosphere caused a significant chemical change in limestone rocks, leading to the dissolution of the stones in the castle's open areas. The resulting acid then decomposed these rocks, changing their chemical and mineral properties as the temperature rose.

C-Hydrolysis:

Chemical weathering activity is increasing in limestone rocks, especially in dry areas, as breaks and cracks increase. Calcium carbonate reacts and turns into calcium bicarbonate, which seeps into the rock. Melt pits are small pits and gaps that form and expand over time as a result of raindrops or dew combining with carbon dioxide. Pic. (4) We discovered gaps in both the limestone and the mud spread on the castle's walls.

Source: Field study conducted by the researcher in July 2023.

Pic. (3) shows the carbonization of limestone in Quseir Castle.

Source: Field study conducted by the researcher in July 2023.

Pic. (4) shows the dissolution pits for limestone in Quseir Castle.

2.6. Mechanical weathering:

Temperature and humidity variations frequently cause the rock to fragment and break, which in turn causes mechanical or thermal weathering. This phenomenon was clearly visible on the castle's southern wall.

A-Peeling:

Variations in the thermal conductivity of the rock's outer and inner parts cause repeated expansion and contraction processes that separate the surface layer. This stress causes the surface layer to heat up faster than the inner parts of the rock itself, causing crusts to appear in the castle covering the limestone. The researcher measured the level of vacuum supply between the stone and the outer crust, which extended for a distance of 10–15 cm. Despite its separation from the stone, it remained stable, consistent with the parts of the stone that did not experience stress.

B-Granulomatous disintegration:

The temperature variations and the numerous cracks and joints cause parts of the limestone to disintegrate, as Pic.. 6 clearly illustrates.

Source: Field study conducted by the researcher in July 2023.

Pic. (5) Exfoliation of limestone in Quseir Castle.

Source: Field study conducted by the researcher in July 2023.

Pic. (6) Granular disintegration of limestone in Quseir Castle.

2.7. Biological weathering:

Biological weathering rates, including those of microorganisms, are increasing. Microorganisms such as bacteria and fungi attack the carbonate bonding substances in limestone, leading to rock discoloration or flaking of the surface layer. Red br High humidity exposure of the red bricks in the tank causes bacteria and algae to spread on the inside walls, as well as salt deposition (Pic. 7). The study showed the spread of ants, especially in the ceilings of the castle, which contain wood, where ants attack them and make tunnels in stone (Pic. 8).

Despite the efforts of the castle's guards to demolish and close it, the foxes continue to dig large pits, particularly in the southern wall, indicating the negative impact of birds nesting in the castle.

Source: Field study conducted by the researcher in July 2023.

Pic. (7) The spread of salts and bacteria inside the tank in Quseir Castle.

Source: Field study conducted by the researcher in July 2023.

Pic. (8) Small pits dug by ants in Quseir Castle.

Source: Field study conducted by the researcher in July 2023.

Pic. (9) Pits drilled by foxes in the southern wall of the castle.

Third: Archaeological Sustainability to Preserve Quseir Castle:

Many researchers are interested in Quseir Castle due to its historical significance, particularly in the context of developmental and community planning projects led by the USAID project, the Advanced Research Center in Europe (ARCE), ancient Egyptian monuments, the Red Sea Governorate, officials in charge of Quseir Castle, community leaders, and various individuals from the city of Al-Qusayr. While the trend towards promoting sustainability and preserving monuments is significant, it may not yield significant benefits for people's daily lives (Pic. 10)

We must first focus on promoting archaeological culture, increasing public interest in the project, and establishing VIP halls. While establishing projects to preserve the cultural heritage is important, particularly given the castle's rich historical legacy, the building itself may not be able to withstand frequent visitors due to poor restoration work and the use of building materials that react quickly to weathering factors. We must first work to preserve this impact by implementing the following measures:

a) The castle has been storing archaeological artifacts and discoveries since the Ottoman era and the French campaign.

b) The castle needs meticulous restoration and materials that can withstand repeated weathering processes.

c) We are incorporating sound and light effects into various areas of the castle.

d) We consistently monitor the presence of tour guides.

e) To create a one-of-a-kind safe, cut out castle entry tickets.

f) Establishing guidelines at the castle's entrance ensures a smooth and organized arrival for the guest.

g) We are marking the locations within the castle where we found assets and documenting its history.

h) In order to preserve its economic resources and implement the proposed development plans, pay close attention to the castle's financing.

i) The development of mechanisms for the maintenance and preservation of archaeological sites is critical for sustainability, as it enhances a sense of national belonging by safeguarding and emphasizing Quseir Castle's unique character and identity.

Source: Field study conducted by the researcher in July 2023.

Pic. (10) Poor restoration work using local building materials

3. Conclusion

Quseir Castle has an ancient history and is considered an important historical resource to attract tourists. The lack of interest in Quseir Castle as a tourist attraction necessitates periodic restoration efforts, including the creation of a visitor center to attract diverse tourism offerings. Choose the most appropriate materials for restoration that are compatible with the region's climate.

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