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THE PALACES OF THE M'ZAB VALLEY BETWEEN THE PAST AND THE PRESENT. A CASE STUDY OF THE PALACE OF ELATTEF - GHARDAIA PROVINCE, ALGERIA

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ABSTRACT

This research paper aims to study the past and present of the palaces of the M'zab Valley, which were classified as a World Urban Heritage site in 1982 due to their unique and distinguished architectural and urban characteristics. The palaces of the M'zab Valley have maintained their style throughout the historical periods they have passed through. However, in recent times, they have struggled to withstand environmental, demographic, and socio-economic factors, leading to noticeable changes and distortions in the old buildings and the urban fabric.
To study this situation, we have chosen the Palace of El Atteuf, one of the oldest palaces and the cornerstone of the settlement of the M'zab Valley, as a case study.
In this research, we adopted two methodologies: the historical approach, through which we will study the past of the palace, and the descriptive-analytical approach, along with fieldwork conducted in 2002. We selected a random sample of 100 residents, which will assist us in the analytical study of the palace's current situation.

KEYWORDS
M'zab Valley Palaces, Palace of El Atteuf, Urban Heritage

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Introduction.

The interest in urban heritage is increasing in all countries around the world, as it is considered a cultural and historical wealth. It represents the customs, values, beliefs, and traditions of societies, serving as a link between the past and the present, and as a source of identity and pride for nations on one hand, and as one of the most important components of tourism attraction and tourism development on the other hand. Algeria is one of the countries that boasts a distinguished urban heritage from the north to the south and from the east to the west. Its southern region is particularly notable for its unique historical landmarks and urban heritage, with such landmarks spread across many desert provinces, including the Tin Hinan monument in Tamanrasset, the red palaces in Timimoun, and the ancient zawiyas and mosques like the TijaniyyaZawiya in Laghouat.

Among the provinces distinguished by their unique urban heritage is the province of Ghardaia, which includes the palaces of the M'zab Valley, embodying the Ibadite customs. The urban fabric's reference point is the local environment (natural factors represented by the harsh climate and social traditions). Consequently, this has resulted in distinctive urban planning and architectural construction that can be studied in the most prestigious universities. This heritage was classified by UNESCO as a World Human Heritage in 1982. However, Algeria today faces significant challenges in protecting and preserving this heritage. Since independence, it has been working to create tools and establish a legislative system through the issuance of several laws for its protection. Notably, these include Law No. 67/281 dated 30/12/1967 related to the protection of excavations and the protection of historical and natural sites and monuments, Law 98/04 dated July 20, 1998 related to the protection of cultural heritage, Executive Decree No. 03/323 outlining the methods of preparing protection plans for archaeological sites and their protected areas and restoring them, and Law 90/29 related to urban planning and construction. Additionally, Algeria has established offices for the protection and promotion of urban heritage. Despite all state efforts to preserve this heritage, many archaeological and heritage sites suffer from significant deterioration and are on the brink of disappearance.

Among these areas is the M'zab Valley, which is experiencing deterioration and deformation in its palaces due to several factors, including natural factors such as harsh climate (heat, humidity, and wind), and human factors such as inappropriate and random interventions. To illustrate this, we have chosen one of the oldest palaces to study this situation, namely the Palace of El Atteuf, which was built in 1012 AD, by understanding its past and analyzing its present condition. The research question is: How was the Palace of El Atteuf built in the past, and what is its current condition?

I. Introduction to the Province of Ghardaia

1. Geographical and Astronomical Location: The province of Ghardaia is considered the gateway to the desert, located 600 km south of Algiers between longitudes 0°,40 and 2°,50 east of the Greenwich line and between latitudes 32°,80 and 33°,20 north of the equator. It covers an area of 86,105 km², extending from north to south by 450 km, and from east to west by 200 to 250 km. It is bordered to the north by Laghouat province, to the northeast by Djelfa province, to the east by Ouargla province, to the west by El Bayadh province, to the south by Tamanrasset province, and to the southwest by Adrar province.

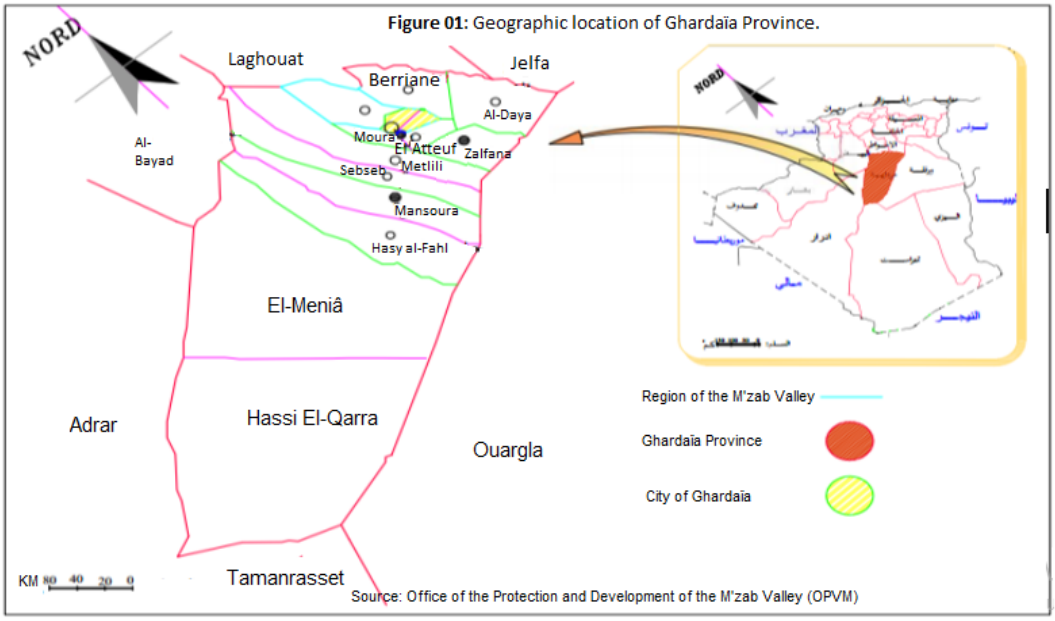


Figure 01: Geographic location of Ghardaïa Province.

2. Locations:

The city of Ghardaia was built on a limestone rocky plateau intersected by many valleys and streams, which ultimately converge and flow into the M'zab Valley. This valley crosses narrow plains that the local inhabitants utilize as oases.

3. Introduction to the M'zab Valley Area

3.1 Location of the M'zab Valley Plain:

It is called the "Land of the Network" due to the limestone plateau, which forms a rocky surface where deep valleys intersect and intertwine, hence the name. A main valley called the M'zab Valley runs through it, extending from the northwest to the southeast, covering an area of 38,000 km².

3.2 Geomorphology of the Region:

This region is located in the northern belt of the African desert and is formed by a Cretaceous depression, which is divided into the Garara Basin and the Melghir Basin, both part of the lower desert. These two basins are separated by a plateau formed by a vertical ridge connected to the Saharan Atlas mountain range to the north, and to the Tediqalt Plateau, which is in turn connected to the Hoggar Range.

The M'zab Valley area represents a gradual depression extending from the northwest to the southeast, with a central canyon no wider than 2 km, stretching from the northwest to the southeast (Bouras, 2002, p. 19).

Image 1: The Great Gully of the M'zab Valley

Source: Google Earth

II. Urban Development in the M'zab Valley:

The M'zab Valley region has undergone various historical phases.

1. Historical Phases of Urban Development in the M'zab Valley Region

1.1 The First Phase: From the Islamic Conquest until the End of the 10th Century AD:

The region was known as the Bedouin land of BeniMousab before the establishment of settlements. These settlements eventually developed into villages, such as the village of AzemNetelzadit southeast of the city of El Atteuf, the village of Oulaoual, the village of El-Akhs southeast of the Palace of Bounoura, the village of Tamizaut north of the confluence of the BeniM'zab and Azouil valleys, and the village of Thalath Moussa in the oasis of BeniIsguen. Some remnants from this period still exist, such as the mosque located east of El Atteuf Municipality (Ahsan, 2006).

1.2 The Second Phase (From the End of the 10th Century to the 14th Century AD):

This phase marks the establishment of the five palaces and is considered the most significant historical period for the region, due to the emergence of its unique urban heritage, represented by the palaces. These palaces were built starting with the Palace of El Atteuf in 1012 AD, followed by Bounoura in 1046 AD, Ghardaia in 1053 AD, Malika in 1124 AD, and finally BeniIsguen in 1347 AD (Bekir, "History of BeniM'zab: A Social, Economic, and Political Study," 1992).

During this phase, the M'zab Valley flourished in agriculture and irrigation, establishing a sophisticated system for rainwater distribution and urban planning. The inhabitants of the region were also known for their isolation and seclusion from the outside world.

1.3 The Third Phase (From the Beginning of the 15th Century until the Early Years of French Occupation in 1853):

This phase was marked by population growth, which led to urban expansion in the region. This expansion is evidenced by the relocation of the city walls more than twice, as seen in BeniIsguen. New neighborhoods also emerged around the walls, such as the Mellah neighborhood, inspired by Ibadi architecture, located in the southern part of Ghardaia Palace, as well as the Moudhabih neighborhood to the north of the valley and the BeniMezroug neighborhood to the south of the valley.

This shift reflected a transition from a Bedouin lifestyle to urbanization. The region also experienced increased trade activities and the establishment of inns to accommodate caravans. The urban expansion adapted to natural barriers, resulting in an oval-shaped development that maintained the same urban principles.

1.4 The Fourth Phase (1853-1962):

This phase saw European intervention through the establishment of some neighborhoods in European styles, though inspired by desert planning. It was also marked by the construction of four dams: Ghardaia Dam (1883), Malika Dam (1889), Ghardaia's second dam (1897), and Bounoura Dam (1889). The first artesian well was drilled to a depth of 440 meters in 1938.

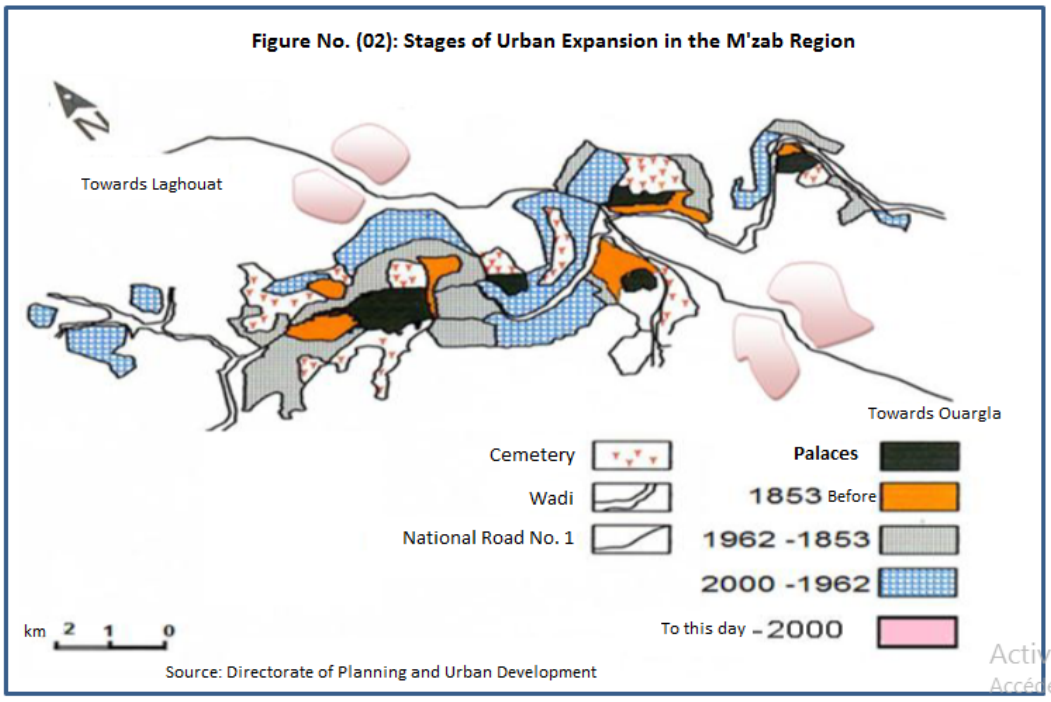
The 1950s witnessed the spread of neighborhoods around Ghardaia and Malika, as well as studies on water drainage and treatment projects, the first of which was in El Atteuf in 1960. The second project focused on Ghardaia, Malika, BeniIsguen, and Bounoura in 1962, while the third project took place in Berriane the same year (Bekir, "History of BeniM'zab: A Social, Economic, and Political Study," 1992).

1.5 The Fifth Phase (From 1962 to the Present):

This phase can be divided into two periods:

The Post-Independence Period: Garden-style housing emerged, and roads and public squares were expanded.

The Modern Period: This period was characterized by development in all fields, with numerous developmental projects. However, urban sprawl began to encroach on areas around BeniIsguen from the east and towards the oasis from the west. Additionally, urban violations and irregularities started to appear in the palaces due to the rapid population growth.



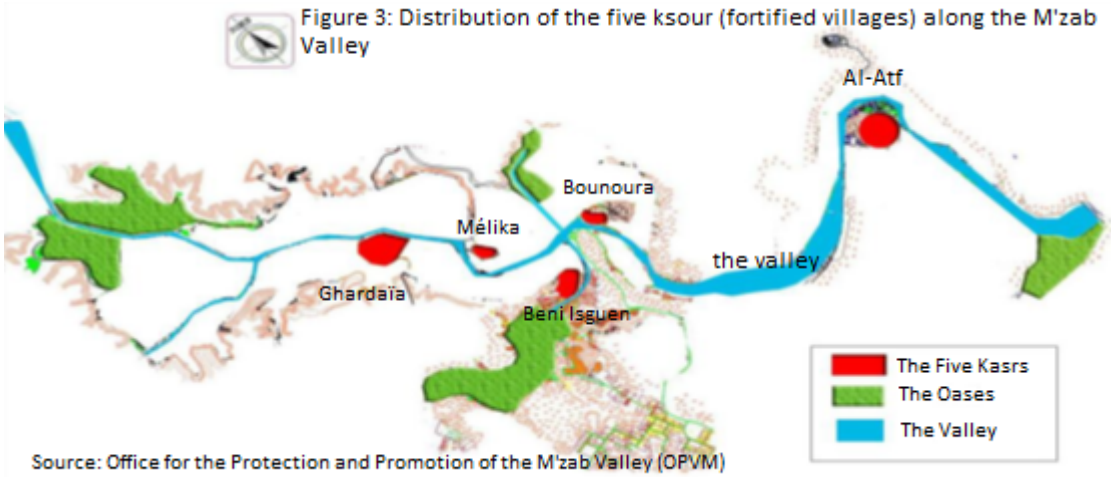
2. Urban and Architectural Characteristics of the Palaces

1. Introduction to the Palaces of the M'zab Valley:

The M'zab region consists of several palaces, some of which have disappeared, while others still stand as witnesses to the history and traditions of the area.

1.1 The Disappeared Palaces: These are ancient palaces that were established before the current ones. They include Telzadit Palace, Oulaoual Palace in El Atteuf, Baba Saad Palace in Ghardaia, Lambertek Palace in El Guerrara, Agram and Aoujena Palaces in Bounoura, as well as El Meniaa and Mourki Palaces.

1.2 The Current Palaces: These consist of five palaces: Ghardaia, Malika, BeniIsguen, Bounoura, and El Atteuf. They were built in a barren landscape in a scattered area (Ahmed, Begbaga, and Zaabab, "Guide to Historical Sites and Landmarks in the Wilaya of Ghardaia," 2012, pp. 9-18).



1.2.1 Bounoura Palace:

This palace was built on the top of a hill where the M'zab Valley intersects with one of the tributaries of Azwil. It consists of two palaces, one of which represents the original core. The palace is characterized by the use of rocky borders that rise 20 meters from the valley on the lower side, forming a defensive front on the western side. On the upper side, there are defensive fortresses for the old palace and the eastern borders of the current palace.

1.2.2 Ghardaia Palace:

The third palace after Bounoura and El Atteuf, it was established in 1048 AD and is called "Tighrdait Palace" or "The Jewel of the Oases." It is located at the heights of the M'zab Valley on a rocky plateau. At the center of this palace stands the Great Mosque, situated at the peak of the plateau.

Image No. (04) and (05): Ghardaïa Palace

Source: Office for the Protection and Promotion of the M'zab Valley

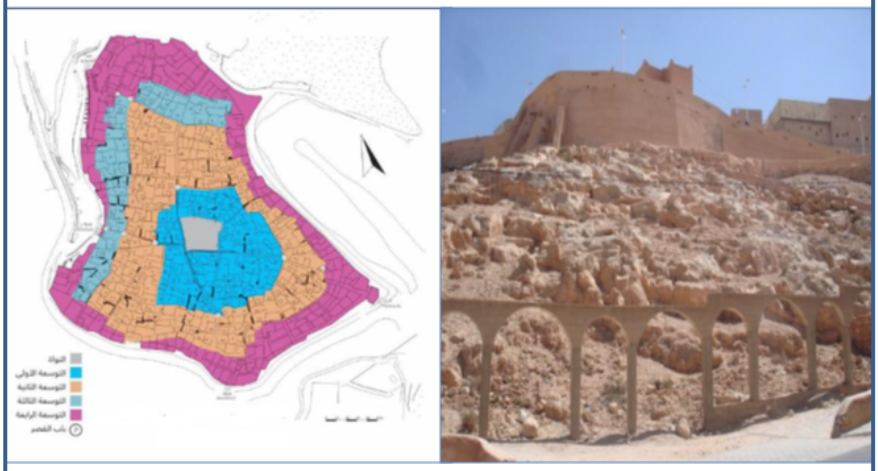
Figure No. (05): Plan of Ghardaïa Palace

Source: Office for the Protection and Promotion of the M'zab Valley

1.2.3 Malika Palace:

"At Mlishet" was established at the beginning of the 11th century on the edges of a hill, located between the palaces of Ghardaia and BeniIsguen. This palace went through several historical phases, the first of which was in 395 AH (1004 AD) when the first palace, called AghremN'wadhay, was built. This palace stood tall until 1123 AD, but only its mosque remains. The current palace was founded in 1350 AD by the Wiro tribe, making it the last of the M'zab Valley palaces.

Image and Plan No. (06): Melika Palace



Source: Office for the Protection and Promotion of the M'zab Valley

BeniIsguen Palace:

"At Izjen" was founded in the 14th century and is located about 2.5 km south of the city of Ghardaia. It lies between the M'zab Valley and the Antissa Valley, with Bounoura Palace on the opposite bank and Malika Palace to the north. The palace still preserves its architectural organization, including the wall and watchtowers.

Plan and Image No. (07): Beni Isguen Palace

Source: Office for the Protection and Promotion of the M'zab Valley

2. Structure of the Cities of the M'zab Valley:

The cities of the M'zab Valley differ from other desert cities in their components, which are: the oasis, the cemetery, and the palace.

- **The Oasis:** It is an economic resource and one of the most important assets for local development. The production of dates supports the social and economic life of the inhabitants. Additionally, the oasis serves as a refuge for the population during the summer and plays a key role in cooling the atmosphere.
- **The Cemetery:** Located outside the palace walls, it is a space for the dead, connected to the palace by designated paths.
- **The Palace ("Aghrem"):** It represents the heart and core of the cities, the area where social and economic life takes place. It is characterized by a unique urban design, appearing as a single cohesive block interwoven with a network of narrow, intricate passageways that serve as the arteries of the palace. It consists of several structured elements, which will be discussed in the following section.

2.1 Structural Elements of the Palaces of the M'zab Valley:

The structure of the palaces is one of their most distinctive features, consisting of several key elements that form the palace's framework.

2.1.1 The Mosque ("Tamjidna"): The most important facility in the palace, the mosque plays not only a fundamental religious role but also serves a significant function in the social, economic, political, educational, and cultural affairs of the community. Thus, the mosque represents the center of authority.

It occupies a central location at the top of the palace, connected to most of the main roads. It is distinguished by its minaret, which is conical in shape, symbolizing the M'zab cities. The principle of having only one mosque in the palace ensures unity and prevents division. However, as the population grows, the mosque is expanded. Additionally, there is a secondary mosque or prayer space without a minaret in the oasis.

Image No. (08) and (09): Mosque of Ghardaïa Palace

Source: Office for the Protection and Prom otion of the M'zab Valley, 2006

2.1.2 Towers and Walls:

The function of the towers and walls is to provide protection and surveillance in case of any event requiring caution. The towers are strategically placed along the network at points that facilitate monitoring. The walls range in height from 3 meters to 6 meters, with main and secondary gates interspersed, some used for entry and others for exit. This design is what characterizes the layout of the palaces. They are essentially fortified structures, protected from any external aggression, with a cohesive and interconnected urban fabric resembling a single block, linked by pathways and surrounded by palm groves.

Images No. (11, 12, 13, 14, 15, 16): Towers and Walls

Source: Office for the Protection and Promotion of the M'zab Valley, 2015

2.1.3 The Market:

The market represents a space for trade where commercial exchanges and transactions take place. It is also considered a space for leisure. The market is located on the outskirts of the palace to facilitate the supply process. It is characterized by the presence of a large square where business transactions occur, and each square has distinctive features that set it apart from the others.

Image No. (17, 18): Market of Ghardaïa Palace

Source: Office for the Protection and Promotion of the M'zab Valley

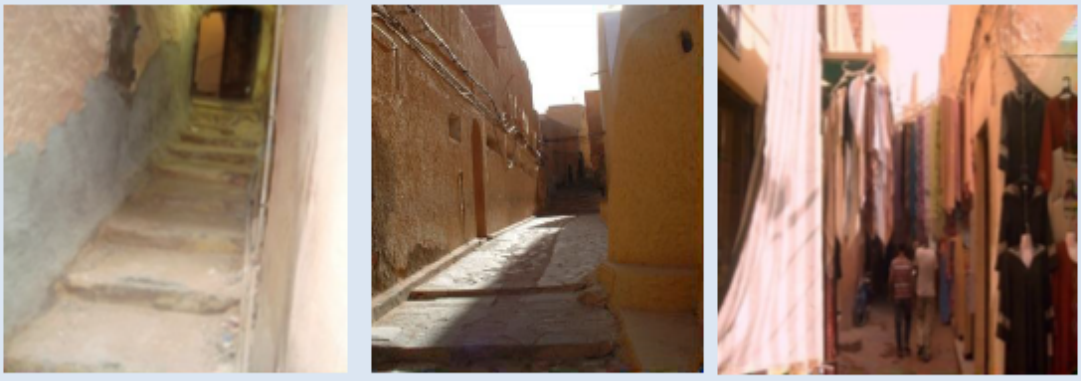
2.1.4 Wells:

Due to the dry climate characteristic of the region, wells were dug, which serve as a vital source of water for the residents' survival.

2.1.5 Alleys and Passages:

These are essential elements in the structure of the palace and represent the main arteries for residents' movement. The alleys are characterized by their winding nature, resembling a maze. The alleys and pathways vary within the palaces depending on ownership and function. There are main roads connected to the mosque and narrower secondary paths leading to residences. Three types of alleys can be found: main streets for public use, through passages, and dead-end passages. (Kamal and Belhaj, 2015).

Images No. (19, 20, 21): Streets, Alleys, and Passageways



Source: Office for the Protection and Promotion of the M'zab Valley

2.2 Principles of Urban Planning for the Palaces:

The planning of the palaces was based on three principles:

2.2.1 Centrality:

This principle refers to the location of the mosque at the center of the palace due to its significant religious function, as well as its role in handling political matters and the educational and cultural affairs of the Mozabite community. The mosque is the center of authority, and life revolves around it, making it the core element in the palace's structure.

2.2.2 Connectivity:

The different functions and the complementary, interactive pairs reflect the social dimension that the palace was designed for. These pairs include: (internal - external), (public - private), (religious - secular), (living - dead), (male - female), and so on. This demonstrates the spatial and territorial balance of the palace, which appears as a unified and harmonious entity.

2.2.3 Inclination:

The palaces were built on slopes, with the purpose of ensuring fortification against attacks and preserving agricultural lands.

3. Historical Landmarks:

The palace contains many historical landmarks and sites from various periods. These include religious, economic, and defensive landmarks, among others. (Ahmed, Baghdada, and Zaabab, *Guide to Historical Sites and Landmarks*, 2012).

Table 1. Historical Landmarks of Al-Atf Palace

The image	The site
 	**Cemeteries and Funeral Prayer Area:** A religious establishment that still exists to this day.
 	**Towers and the Great Gate:** A defensive structure aimed at surveillance and protection.
	**The Market:** An economic establishment with a unique character that still thrives to this day.

 	**Wells and Foggaras:** A social establishment from which all residents benefit equally in water distribution.

Source: Office for the Protection and Promotion of the M'Zab Valley, 2015.

III. Al-Attaf Palace: Past and Present

1. Introduction to Al-Attaf Palace

1.1 Origin and Naming:

The palace was named after one of the bends of the M'zab Valley. It is also known as "Tajnint" in Amazigh, meaning the bottle or container made from palm leaves used for drinking water. The palace was established in 1012 AD by Khalifa Ibn Abghur and is considered the first settlement of the M'zab Valley.

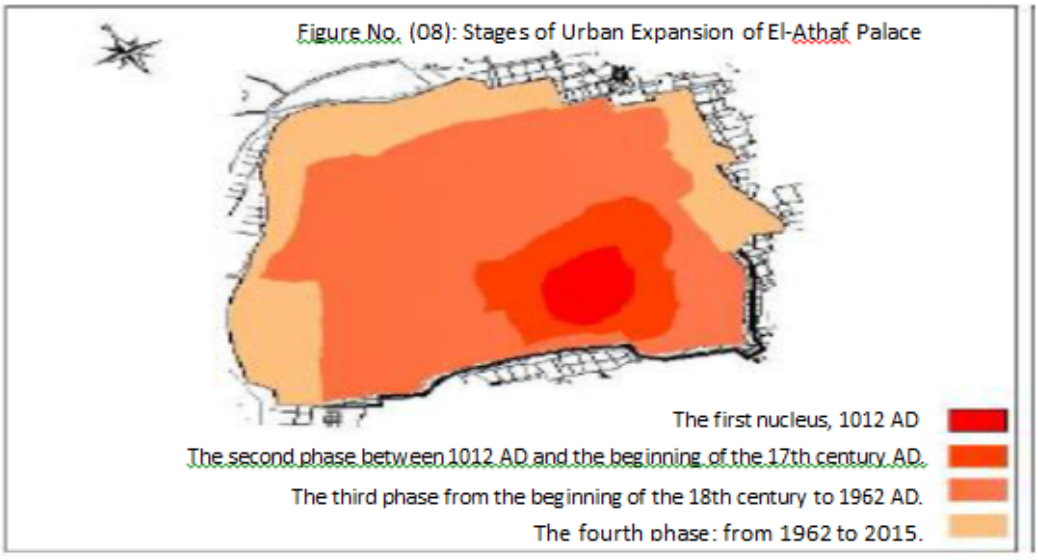
1.2 Location and Setting of the Palace:

- Location: The palace is bordered to the north by the M'zab River, to the south by the cemetery of Ami Ibrahim Ibn Menad, to the east by palm groves, and to the west by steep ravines and the cemetery of Ami Hammou.
- Setting: The palace was built on a rocky plateau at an elevation of 400 to 500 meters above sea level, surrounded by several small ravines and valleys that converge.
- Area: The palace covers an area of 8.59 hectares.

2. Stages of Urban Expansion of the Palace:

The palace went through four stages of expansion:

- The first core of the palace, established in 1012 AD.
- The second stage, representing the first phase of expansion, which extended from 1012 AD to the 17th century.
- The third stage, during which expansion began in the 18th century and lasted until 1962.
- The fourth and final phase of expansion, from 1962 to 2015.



Source: Study on the Preservation and Rehabilitation Plan of El-Athaf Ksar.

3. Architectural and Urban Characteristics of the Palace:

3.1 Urban Characteristics:

Like all the palaces in BeniM'zab, Al-Attaf Palace shares the same features previously mentioned, both in terms of planning and the built or unbuilt environment.

3.2 Architectural Characteristics of the Dwelling:

We will focus on this element since it wasn't previously mentioned to avoid repeating information (Ahmed &Zaabab, Traditional Housing: Architecture and Customs in the Protected Area of the M'zab Valley, 2014).

3.2.1 Design Principles of the Dwelling:

The design of dwellings in Al-Attaf Palace is based on five principles:

- Centrality: The dwelling features a central space called "Wasat al-Dar" (middle of the house), which structures the various spaces. It allows sunlight to enter the dwelling and aids in ventilation.
- Privacy: This is reflected through several design rules, such as the use of an entrance hall ("Saqifa") to block direct views into the house.
- Orientation: Ensures optimal use of sunlight.
- Sequence: This refers to the smooth transition from public to private spaces.
- Social Solidarity: The principle of building according to need, respecting neighbors, and maintaining modest dwellings where all homes in the palace resemble each other (Ahmed &Zaabab, Traditional Housing: Architecture and Customs in the Protected Area of the M'zab Valley, 2014, p. 8).

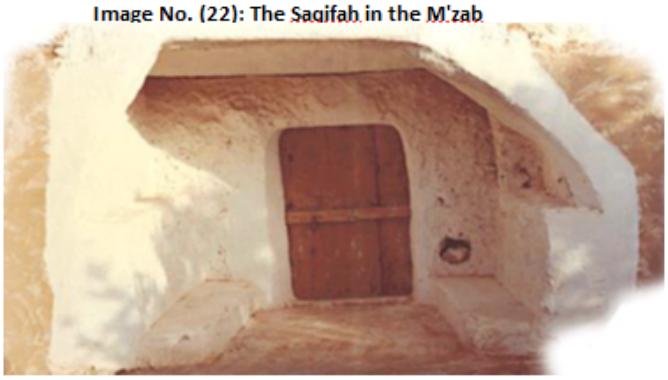
3.3 Components of the Dwelling:

The dwelling is built in a simple yet profound way, reflecting the cultural and social dimensions, using local building materials that adhere to standard construction measurements. Every space in the house is utilized efficiently and thoughtfully. The dwelling consists of two floors with a height not exceeding 7.5 meters.

3.3.1 The Entrance Hall "Tasekift":

It occupies a side corner of the dwelling and serves as a waiting area before entering. It plays an important role as a sound barrier between the inside and outside of the home and helps in ventilating and cooling the house's interior.

Image No. (22): The Saqifah in the M'zab



Source: Publication of the Office for the Protection of the M'zab Valley: Traditional Housing, Architecture, and Customs.

3.3.2 The Entrance:

The main door to the house is 1.70 meters high and 1.10 meters wide, with a step that rises about 10 cm. This step serves as a barrier against dust, water infiltration, and cold winds, as well as preventing the entry of reptiles and poisonous insects.

3.3.3 Entrance Corridor:

This corridor serves as a transitional space between the entrance hall and the central courtyard of the house. Its function includes being a space for weaving and a place where animals can be stationed to unload cargo, away from the central courtyard.

Image No. (23): Entrance to the Residence.

Source: Publication of the Office for the Protection of the Mzab Valley: Traditional Housing, Architecture, and Customs.

3.3.4 The Central Courtyard ("Tiwira"):

This is the largest and most central space of the house, where all other rooms converge. The courtyard features several niches that serve as shelves for storing various tools. It is semi-covered, with a rectangular opening at the top to allow natural light and ventilation into the house. The courtyard serves a vital role as a gathering and passage space, providing access to all rooms of the house. It is also where various household activities, such as cooking and weaving, take place.

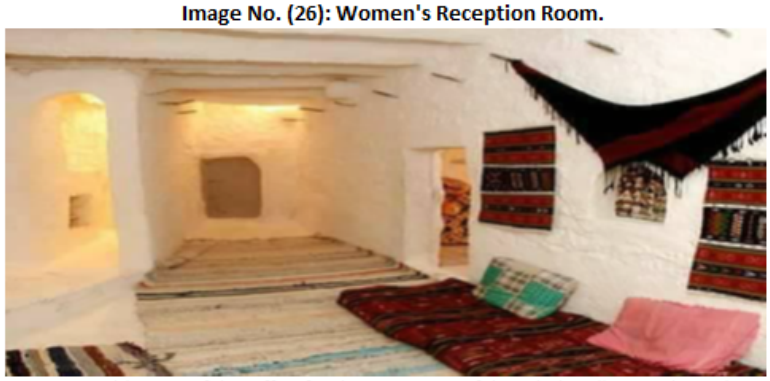
Images No. (24, 25): The Courtyard of the Residence.

Source: Publication of the Office for the Protection of the Mzab Valley: Traditional Housing, Architecture, and Customs.

3.3.5 The Reception Room ("Tizfari"):

This space serves as a gathering area for the family and a place for prayer. It is also primarily used for welcoming and hosting women. Typically, this room is oriented towards the southeast to maximize natural light that enters through the window.

Image No. (26): Women's Reception Room.



Source: Publication of the Office for the Protection of the M'zab Valley: Traditional Housing, Architecture, and Customs.

3.3.6 Men's Reception Room:

This room is directly connected to the "Skeefa" (entrance area) and is typically located on the upper floor, separated from the daily activities of the women. It has a second entrance that directly connects to the central courtyard of the house.

3.3.7 Storage Room:

A very small room, usually located next to the stairs, where provisions and dates are stored. It is separated from the central courtyard by a wooden door and a raised threshold.

3.3.8 The Cellar (or Vault):

Image No. (27): The Hallway in Traditional Housing.

Source: Publication of the Office for the Protection of the M'zab Valley: Traditional Housing, Architecture, and Customs.

Its function is to serve as a storage room during the winter and as a cooling room in the summer.

3.3.9 The Sanitary Space:

It represents the toilet and bathroom, located on both floors. In the building tradition of the Palace of Al-Attaf, the sanitary space is allocated to the neighboring wall to avoid any harm.

3.3.10. The Staircase:

Image No. (28): Staircase of the M'zab Residence.

Source: Publication of the Office for the Protection of the M'zab Valley: Traditional Housing, Architecture, and Customs.

It is located in the corner, occupying a small space, with the number of steps ranging from 8 to 10, and their dimensions between 20 to 25 cm.

3.3.11 The Window:

It represents the rectangular opening in the ceiling of the central courtyard, allowing light and sunlight to enter, as well as facilitating air circulation.

Image No. (29): The Window in Traditional Housing.

Source: Publication of the Office for the Protection of the M'zab Valley: Traditional Housing, Architecture, and Customs.

3.3.12 The Iqumar:

It is a corridor equipped with arches located on the first floor, connecting the roof with the covered spaces at a right angle directed toward the southeast and southwest. It allows warm sunlight to enter during the winter while blocking it in the summer.

Images No. (30, 31): Roof of Traditional Housing.

Source: Publication of the Office for the Protection of the M'zab Valley: Traditional Housing, Architecture, and Customs.

3.3.13 The Roof:

It is an extension of the Iqumar, protected by four walls.

3.4 Building Facades:

The facades are solid and devoid of embellishments, characterized by the same yellow color due to the rocky nature of the area. Only wooden doors are visible, while the windows are small openings located in the upper floor to maintain privacy and adhere to social values, designed to break the wind.

3.4 Materials Used in Construction:

The region is characterized by a harsh, dry climate, which has led the Mzab community to choose locally available building materials that help them cope with the harsh environment.

3.4.1 Stones:

These are the primary building material used to construct houses, towers, and walls, as well as to pave alleys and pathways. The area has quarries located near the palaces (Coignet and Coignet, 2007).

3.4.2 Adobe:

This refers to blocks made from clay soil mixed with straw and palm fronds, left to ferment, and then placed in wooden molds to dry for 5 to 10 days.

3.4.3 Sand:

Since the area is a valley, it has an abundance of clayey and non-clayey sand extracted from the riverbanks. The first type is used as a finishing material, while the second is used in making mortar (Donnadieu, 1986, p. 87).

3.4.4 Gypsum (Tamshamt):

This is a locally sourced primary material used as a binding agent and mortar. It is extracted from the quarries of the Mzab Valley and contains aluminum silicates and carbonate of lime, resembling cement in composition, which explains its strong cohesion (Festa, 1998).

3.4.5 Wood:

This refers to dry dead palm trees, which are cut into sections to be used as pillars to support the roof and as structural elements in construction.

Image No. (32): The Wooden Beam (Al-Khashaba).

Source: Publication of the Office for the Protection of the M'zab Valley: Traditional Housing, Architecture, and Customs.

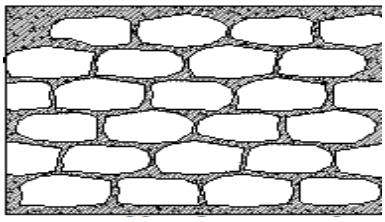
3.3.6 Dried Palm Fronds:

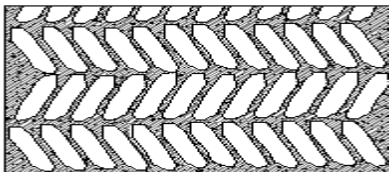
Dried palm fronds are used in roofing and for shaping arches. They are placed vertically on wooden beams, then palm leaves are added to prevent the seepage of gypsum mortar during roofing.

3.4 Construction Techniques:

The construction techniques in the Mzab Valley are among the most important features of urban development in the area. They are in harmony with local customs and traditions, as well as the harsh climate.

Table 2. Wall Construction Techniques

	**Mixed Blending Technique**: Construction is carried out using unpolished building materials, primarily rocks. Therefore, it is essential to select suitable stones. The gaps between the rocks are filled with binding materials such as gypsum, mortar, and lime. This technique is widely used in M'zabian architecture.

	**Spike Technique**: This technique is distinguished by its artistic flair, as the arrangement of the stones resembles a spike. The stones are placed at an angle in a specific direction, and in the opposite direction, the second row of stones is laid in a similar manner, creating a spike-like pattern.
Roof Construction:	
	**Flat Roof:** The flat roof consists of closely arranged palm tree trunks, with a gap of 0.2m to 0.3m between each trunk. Over these trunks, tightly bound palm fronds (jareed) are placed, secured with plant fibers and leather cords. Afterward, palm leaves are laid to fill the gaps, followed by thinly cut stones. Next comes a layer of gypsum, followed by a 0.3m thick layer of clay. Finally, a finishing coat of lime mortar mixed with sand, about 0.02m thick, is applied on top.
	**Roof Supported by Small Vaults:** This technique was used for roofing buildings by placing palm tree trunks as wooden beams across two walls, with equal spacing between the beams, typically around 0.35 meters. Three wooden strips are placed between the beams, and the ends are secured with stones and gypsum mortar (Tamshmet). Once the beams are fixed in place, small vaults are built using gypsum mortar and thin limestone slabs. After the construction material dries, the wooden strips are removed. Finally, the undersides of the small vaults are coated with gypsum, forming a half-circle shape.

Source: Types of Roofing in Traditional Buildings in the M'zab Valley, 2013.

5. Diagnosis of the Current Situation of El-Ateuf Palace:

The palaces of the M'zab Valley in general, and El-Ateuf Palace in particular, are witnessing significant deterioration in the condition of buildings and passages, as well as numerous violations and architectural breaches that have led to the distortion of the region's architectural heritage. Through field investigations, several violations were identified.

5.1 Condition of the Houses:

El-Ateuf Palace consists of 896 individual houses with traditional architectural characteristics. Through on-site observations, the houses were classified into three categories:

- **Houses in good condition** (walls, roofs, rooms, facades, etc.): A total of 380 houses, representing 42.41%, are still maintaining their architectural design due to regular maintenance by their residents.
- **Houses in moderate condition:** 244 houses, or 27%.
- **Houses in poor condition:** 272 houses, or 30.35%.

5.2 Violations and Breaches in the Palace:

The palace suffers from several violations that have led to the distortion and degradation of its architectural heritage.

Image number (33), (34) shows a violation of exceeding the height of buildings, surpassing the standard height limit of 7.5 meters

Source: Field Investigation 2024

Image number (35), (36): Introduction of new building materials, which are considered foreign to the palace

Source: Field Investigation 2024

Image number (37), (38): Random point renovation with a design completely different from the traditional one, using foreign materials

Source: Field Investigation 2024

The architectural design of the newly constructed houses is completely different from the traditional design. Renovation using foreign materials, opening windows in rooms and corridors, and water drainage pipes discharging into the corridors, as shown in images number (39), (40), and (41).

Source: Field Investigation 2024

5.3 Deterioration of the Palace:

The palace is experiencing significant regression and deformation in its construction and urban fabric, as evidenced by the photographs taken in 2024. These images illustrate the deterioration of the oases, passages, and buildings.

Image number (42): Urban distortion of the buildings in the Palace of El Atteuf

Source: Field Investigation 2024

6. The Importance of the Palace to the Inhabitants:

The significance of the palace to the local population lies in their sense of belonging and awareness of the value of architectural heritage. This awareness helps sustain this cultural legacy.

6.1. The Community's Commitment to Traditions and Customs:

Based on field investigations, it was revealed that 57% of the population takes pride in the Amazigh community, its traditions, and customs. Meanwhile, 36% are strongly committed to the Amazigh identity, and 7% do not agree with holding on to Amazigh culture.

Table 3. Community Commitment to Traditions and Customs

Degree of Commitment to Traditions and Customs	Frequency	Percentage
I strongly agree	36	%36
I do not agree	7	%7
I agree	57	%57

Source: Field Survey 2022.

6.1 Housing Ownership: Through field research, it was found that 94% of the population owns their homes, while 6% are renters. Therefore, it can be said that homeowners demonstrate the significance of housing and the need to preserve it.

Table 4. Distribution of the population according to housing ownership.

Type of Ownership	Frequency	Percentage
Owner	94	%94
Renter	06	%06
Total	100	%100

Source: Field Survey 2022.

6.2 Sense of Belonging and Comfort in the Home:

The Mozabite community remains strongly attached to its customs, traditions, and family values. This was confirmed by the field investigation, where 77% of the residents expressed a sense of belonging and comfort in their homes, as they provide family warmth. However, 23% of the population reported feeling uncomfortable due to the small size of their homes, which no longer meets modern needs. This is illustrated in the following table.

Table 5. Distribution of Residents Based on Sense of Belonging and Comfort in the Home

Sense of Belonging and Comfort in the Home	Frequency	Percentage
Yes	77	77%
No	23	23%
Total	100	100%

Source: Field Investigation 2022

6.3 Satisfaction with the Urban Planning of the Palace:

The urban planning of the palace was based on tradition, so most of the area's residents agree on their satisfaction with the planning, whether it be the location of the mosque, the market, or the narrow passageways that protect them from the harsh climate. This group constitutes 76% of the population, while the second group, representing 24% of the population, is not satisfied.

Table 6. Residents' Satisfaction with the Urban Planning of the Area

Level of Satisfaction with Urban Planning	Frequency	Percentage
Satisfied	76	76%
Not Satisfied	24	24%
Total	100	100%

Source: Field Survey 2022

7. The Relationship Between Belonging and Urban Heritage and the Condition of Housing: From the field investigation, it is evident that the deterioration of houses in the Qasr of El Atteuf is due to a lack of a sense of belonging. This is confirmed by the figures, as 30% of the houses are in poor condition, closely matching the 23% of residents who do not feel a sense of belonging. The 7% difference represents residents who are unable to renovate their homes due to financial difficulties.

This is further supported by the field investigation, which reveals the professional status of residents as follows:

- 29% are traders
- 23% are workers
- 20% are freelancers
- 28% are unemployed

Conclusions.

In conclusion, we have drawn several findings that summarize the causes of the deterioration of the Qasr and the proposed solutions and recommendations.

Factors Contributing to the Deterioration of the Qasr:

- **Biological factors:** These include bacteria, fungi, lichens (which are fungi and algae), growing on the outer surfaces. Additionally, plants and trees cause root expansion, leading to structural damage, requiring regular maintenance of the homes.
- **Natural factors:** The region's harsh climate is a major cause of the Qasr's deterioration, especially erosion and temperature extremes. The temperature difference between day and night can reach 12.8°C in July, and the seasonal thermal range is around 32.6°C. This constant expansion and contraction of the building materials gradually leads to deterioration.
- **Human activity:** The actions of residents inside the Qasr, without understanding the consequences, contribute to the deterioration. For example, the use of drilling machinery causes large vibrations, leading to cracks. Water misuse and numerous leaks from wastewater systems, as well as unauthorized alterations to buildings, all threaten this heritage.
- **Animals and insects:** Various insects such as cockroaches, ants, and rodents (like rats) dig holes in the walls, weakening their structure. Birds, too, build nests in the roofs, and their acidic droppings react with the building materials, causing damage.
- **Demographic factors and overcrowding in housing:** The area has seen significant population growth, with a growth rate of 2.28% in 2014. Field investigations show that 44% of houses are occupied by two families, and 18% by three families, highlighting the overcrowding and housing crisis in the area. This leads to negative effects on the buildings, such as adding floors, expanding homes, using non-traditional building materials, and demolishing traditional houses to construct modern ones in their place.

Proposed Solutions:

To address the situation in the area, immediate and periodic solutions must involve all stakeholders to preserve the urban heritage. The local community, which is still strongly attached to customs and traditions, must play a key role. The mosque, which serves social, economic, and educational functions in the region, should help raise awareness among residents about the importance of regular maintenance and preserving homes without using non-traditional building materials.

Scientific methods should also be followed to preserve this architectural heritage, including:

- **Conservation:** Protecting the building by using specialized methods to prevent further deterioration.
- **Reinforcement:** Strengthening the original structure with additional bonding materials.
- **Monitoring and maintenance:** Addressing deteriorating areas using local materials and traditional building techniques.
- **Rehabilitation:** Some houses may need to be reconditioned and repurposed, either for their original function or a new one.
- **Restoration.**
- **Authenticity.**

There are, however, several obstacles to preservation efforts, such as the difficulty of evacuating traditional homes to perform necessary work, especially in such a conservative region. Additionally, many residents are unable

to carry out regular maintenance or restoration works, as previously mentioned, and often use non-traditional materials. Lastly, there is a desire among some residents to make changes to traditional homes.

Therefore, residents must be encouraged and made aware of the importance of protecting their heritage and cultivating a culture of heritage tourism. This is crucial for preserving the architectural legacy, as the development of this type of tourism can generate revenue in foreign currency, contributing to restoration and preservation efforts.

Foreign tourists are often drawn to experiencing something entirely different, exploring unique aspects that set a destination apart from their previous travels. Thus, it is essential to promote this type of tourism in the Qasr of M'zab, offering tourists a new experience where they integrate with the locals, living, eating, and working as they do for a period of time. This will provide them with a life-changing experience, distinct from their previous lifestyle. This type of tourism is particularly attractive to both foreign and local tourists, as the M'zab region stands out with its unique customs, traditions, and norms.

Moreover, this type of tourism does not harm the area, as tourists will respect local traditions and immerse themselves fully in the local lifestyle.

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