

Preventive conservation – a means of sustainability of cultural heritage: The case of the M’Zab Valley

Samia Ouaali^{1*}

Karima Anouche²

¹ University of Sciences and Technology of Oran Mohamed Boudiaf, Faculty of Architecture and Civil Engineering, Laboratoire Métropole Architecture Urbanisme Société (LAMAUS), Oran, Algeria

² University of Sciences and Technology of Oran Mohamed Boudiaf, Faculty of Architecture and Civil Engineering, Oran, Algeria

*Corresponding author

E-mail: samia.ouaali@univ-usto.dz

Article information

Sent: Jun 26, 2024

Accepted: Aug 28, 2024

Abstract: The management of heritage sites is fundamental to their conservation and sustainability, and more broadly, it contributes to the preservation of the environment. This article highlights the conservation plan developed for one of the UNESCO World Heritage Sites in the Algerian context: the M’Zab Valley in Ghardaïa. It has managed to preserve its specific character over the centuries thanks to the management operations that have been necessary for its continuity. The main question of this study is what are the management actions adopted in the M’Zab Valley with regard to the Ksourian architectural heritage to ensure its sustainability? Given the exploratory nature of this research, we chose a qualitative and inductive method. The study is based on a combination of several investigative tools: interviews, observations and photographs. The aim of the article is to highlight the efforts made by the Algerian public authorities and the local community to implement cultural heritage management measures in a particular context. The results of the analysis reveal, first, that the implementation of the permanent plan for the safeguarding and enhancement of the protected sector of the M’Zab Valley has proven itself in the preservation of monuments, sites and historic buildings, but also all the contexts associated with the daily life of people. Second, the rehabilitation operations of the historic ksour shall ensure the authenticity of the buildings and their integrity with the environment will be kept while adapting them to the current needs of users. Third, the combination of efforts between public institutions, the Office for the Protection and Promotion of the Valley of M’Zab, the local community and associations avoided the weakening of traditions and ancestral values through awareness missions, heritage education programmes, the application of heritage laws and regulations, and scientific and historical documentation of local heritage. Finally, the involvement of the local community in all operations on their local heritage ensures the transfer of local knowledge.

Keywords: vernacular built heritage, south Algeria, local management strategy, environmental preservation, Ksourian heritage value

INTRODUCTION

The vernacular constructions are of great historical and architectural interest. They embody the culture of a community and its relationship to its environment; they are adapted to a particular natural and human environment. They are recognised and preserved in the world (Gueliane, 2017). Constituting most of the built environment of man (Viaro and Ziegler, 1983), they disappear every day, impacted by the dilapidated undergoing voluntary demolition or collapse, their ruins remain archaeological sites (Timgad in Algeria, Carthage in Tunisia, Persepolis in Iran, Baelo Claudia in Spain and Babylon in Iraq) (Rezaei and Khoudja, 2022). The heritage of all the peoples of the world is impoverished by the disappearance of any of these precious goods (UNESCO, 1972). It therefore seems important to ensure its sound management in the coming years to enable heritage specialists to study and interpret it for the benefit of present and future generations (Haddad et al., 2021), especially since the vernacular architectural heritage is considered as a lever for the development of sustainable and ecological architecture. Management actions are part of preventive conservation, extend the life cycle, safeguard the cultural values of built heritage (Kayan, 2019), preserve its history and national symbols (Patissi and

Neves, 2023) becoming guiding principles for modern society (Sodangi et al., 2014). They can improve the health of populations and maintain social cohesion (Li and Tang, 2024).

A number of studies recognise that there are greater implications for the preventive conservation of architectural heritage (Wijesuriya, 2018; Xie et al. 2024), requiring different management approaches that vary case by case among countries. Barrera and Bartholomew (2014) examine the conservation method of South Korean vernacular buildings, the analysis evaluates preservation policies, practices and methodologies. Rahaman (2015) outlines the current state of preservation of the national vernacular architectural heritage and the direction of future research in light of advances in research on the protection of Bangladesh’s architectural heritage. Elborombaly (2016) explores different approaches to heritage management in some Arab countries based on a comparative analysis with some successful European experiences. Della Torre (2021) recounts the historical evolution of the preventive conservation of architectural heritage in Italy and gives an agenda for future management trends.

Liang et al. (2023) systematically structure the development of the concept of architectural heritage conservation issued by

UNESCO and ICOMOS before 2000 and from 2000 to 2023, providing insight into the experiences and practices of many countries in architectural heritage conservation and encouraging reflection on architectural heritage conservation in historic cities. Alsubaie et al. (2024) are developing a national management plan for a heritage city in Saudi Arabia to become a viable model in the region. Li and Tang (2024) researches contemporary principles of cultural heritage conservation by reviewing its history, from the 18th century onwards, in international practices, documents and literature on the subject. The examination of historical evolution forms the basis of preventive conservation and defines the various trends in the conservation of cultural heritage today and in the future.

While existing research has provided many approaches to managing heritage sites for their preventive conservation, they remain specific to a unique context. As recalled by Li and Tang (2024): "cultural heritages worldwide need to be conserved fairly, according to their local situation. This preserves cultural diversity and increases social stability by respecting every culture". Algeria has not been the subject of many scientific studies on this topic. Therefore, this article highlight the developed conservation plan of one of the cultural sites classified universal heritage by UNESCO in the Algerian context; it is the M'Zab Valley in Ghardaïa.

Mozabite towns were built in the form of a ksar (ksour in the plural), meaning a type of fortified Saharan and semi-Saharan human settlement widespread in North African countries housing a community of the same ideology and ethnicity. It is also defined as a natural, economic and social ecosystem, the parts of which are carefully articulated. If one part is damaged, the balance of the system may be disrupted. *"It is usually built high up on a rocky promontory close to an Oued (North African river, Middle East). The morphology of the land on which it is built and its immediate environment (palm grove, dunes, depression or rocky plateau) determine the building materials used, its general shape and the internal distribution of its spaces (radioconcentric or checkerboard). The ksar has a fortification system consisting of a surrounding wall punctuated by watchtowers and gates. It consists of a large mosque, housing with a central patio, and sometimes troglodyte a market place usually in the periphery; demonstrating the role of relay that the ksar plays on the roads of the trans-Saharan trade, and finally, division by district and a traffic network reflecting a social hierarchy within the agglomeration"* (Chekhab-Abudaya, 2012).

The Mozabite cities have retained their residential, commercial, religious and educational functions for centuries, despite the demographic increase and the emergence of new domestic needs. Such continuous use results in wear, which required management operations for valley continuity. Thus, the main question of this study is what are the management actions adopted in the M'Zab Valley with regard the Ksourian architectural heritage for its sustainability? This article supports the hypothesis that the combination of the efforts of local public authorities and the local community has favoured the survival of heritage by preserving it and ensuring its transfer to future generations by integrating it into contemporary life. The article aims to understand the efforts undertaken by public authorities and the local community regarding the establishment of cultural heritage management measures in a particular context. This study can provide a reference of a conservation application method for sustainability of local architectural heritages, especially for traditional cities in developing countries.

METHODOLOGY

A field survey was carried out in the historical ksour of the M'Zab Valley and in the regions of El Atteuf, Bounoura, Berriane and Guerrara of Ghardaïa. We chose a qualitative and inductive method given the exploratory nature of this research (Azungah, 2018, Bryman, 2012), it allows a thorough contextual understanding of the information (Birkinshaw et al., 2011) by studying documents, then analysing them and finally it interprets how participants construct and attach meanings to their experiences (Patton, 2015). This study is based on a combination of several investigative tools: interview, photographs, observation.

First, data is collected through semi-structured face-to-face interviews with the inhabitants of the old ksour, members of associations, local administrators and heritage specialists, all actively involved to varying degrees in the management of historical ksour (Tab. 1). The interviews were either individual by means of reviewing the management approach, or group, more open interviews, in the form of information exchange. The advantage of group interviews is to have different points of view with concrete examples.

The use of a maintenance guide, based on our research objectives, provided the required information for the interviews (Tab. 2). We conducted the interviews until we reached data saturation. Data saturation is reached when we cannot get additional new information. It should be noted that the choice of interviewees, among others, is related to their recognised and concrete implications in preventive heritage conservation actions. Then, observations were undertaken during the on-site investigation, accompanied by a sample of photos for the analysis of the different activities performed. Finally, the interview data are analysed using the qualitative coding approach (Tsang et al., 2019, Corbin and Strauss, 2014).

Tab. 1. Details of interviewees.

Interviewees group	Number
Residents	120
Local administrators (technical services of the municipalities ¹ , housing department of Ghardaïa, environment department of Ghardaïa, Centre for Urban Planning Studies and Implementation - URBAT agency of Ghardaïa, culture and arts department of Ghardaïa, administrative subdivision of the housing department of the wilaya of Ghardaïa ²).	25
Heritage specialists (Office for the Protection and Promotion of the Valley of M'Zab - OPPVM, architects, technical design office, building works company)	19
Associations (heritage associations, environmental protection, scientific documentation and teaching and ksour ¹ neighbourhood association)	20
Total	184

(Source: Authors, 2023)

¹ Municipality is the smallest administrative subdivision of the territorial organisation of the Algerian State. It is exercised by the president of the Municipal People's Assembly, who is jointly the representative of the municipality and the representative of the state at the communal level.

² Algeria is divided into 58 territorial communities called wilaya. The wilaya of Ghardaïa is an Algerian administrative subdivision located in the northern part of the Algerian Sahara and includes the M'Zab Valley.

Tab. 2. Guide to semi-structured interviews.

	Objectives	Questions
Residents	Understand the role of the local community in the preservation of ksour	<p>What are your contributions and initiatives for the sustainability of ksour and natural sites?</p> <p>Do you have a role in the development of tangible, intangible, natural and cultural heritage? Which one?</p> <p>Are you involved in the conservation of the M'Zab Valley? How?</p> <p>Do you support political decisions and actions undertaken for heritage conservation? Provide details.</p>
Local administrators	Reveal the investments of the public authorities for the safeguarding of the M'Zab Valley as living heritage	<p>What changes have occurred in the Historic Region after its universal heritage designation?</p> <p>What are the major decisions for the preventive conservation of the M'Zab Valley? Provide details.</p> <p>What are the main preventive conservation measures (actions and interventions) implemented in the M'Zab Valley?</p> <p>Be specific about the problems faced by these operations.</p> <p>Who are the key players? Is the local community involved?</p>
Heritage specialists	Discover their roles in preventive heritage conservation and identify challenges and obstacles	<p>What do you do for the protection of the local architectural, urban and artisanal heritage?</p> <p>What are the results so far?</p> <p>What are the barriers and challenges you face? Provide details.</p> <p>Do you comply with the heritage standards required by the public authorities during your interventions on the safeguarded sector? Provide details.</p>
Associations	Explore the impact of the associative movement on the sustainability of urban and architectural heritage	<p>What is your status (purpose, aim and operating rules)?</p> <p>Do you have a specific field of intervention? Provide details.</p> <p>What are your roles in managing the Mozabite region as a protected area?</p> <p>What are your tools to support the conservation of the region's cultural heritage?</p> <p>Do you have collaborations with public authorities? What are these collaborations?</p>

(Source: Authors, 2023)

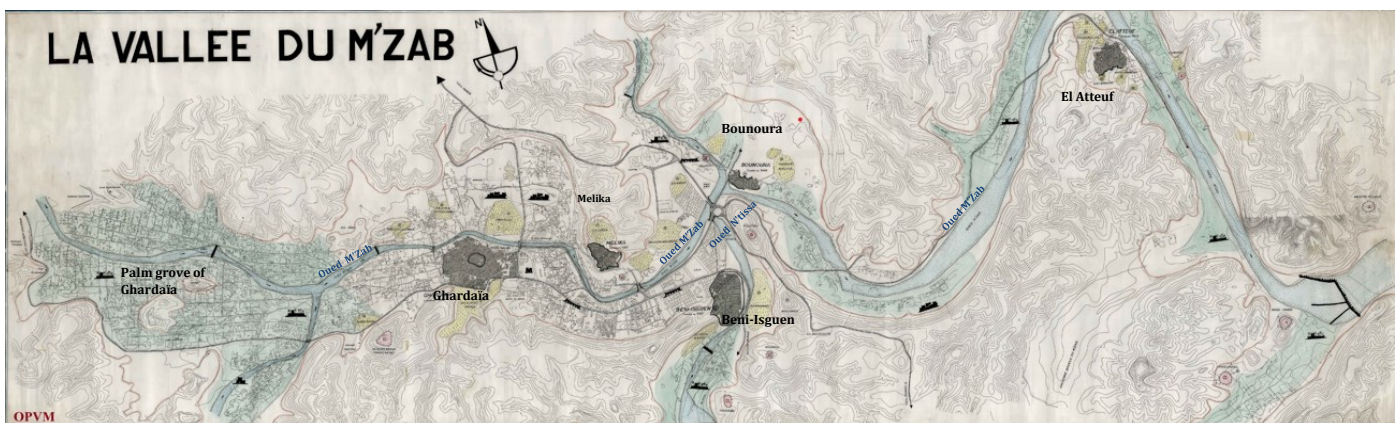


Fig. 1. The map of pentapolis of M'Zab. (Source: Office for the Protection and Promotion of the Valley of M'Zab - OPPVM,1975, adapted by the authors)

CASE STUDY

The M'Zab Valley is an example of heritage still inhabited by the local population, with an area of nearly 4,000 hectares; it is located 600 km south of Algiers, in the northern part of the Algerian Sahara. An area with a hot and arid climate, devoid of all vegetation except the palm groves surrounding the pentapolis (Bourdieu, 1974). The valley was initially composed of five ksour and their respective palm groves: El Atteuf, Melika, Bounoura, Beni Isguen and Ghardaia (Fig. 1). They were founded by the Ibadites between AD 1011 and 1350, in difficult climatic conditions and political conflicts. Two ksour have been added to the pentapolis in seventeenth century: Guerara, 85 km northwest in 1630, and Berriane, 40 km north in 1690 (Cherifi, 2015) (Fig. 2). The M'Zab region has three main resources: cultural resources, environmental landscape and a specific local economy. Cultural resources are the most significant because they have significant material potential: the urbanisation system, the Ksourian architecture; and immaterial: handicrafts, gastronomy and popular festivals.

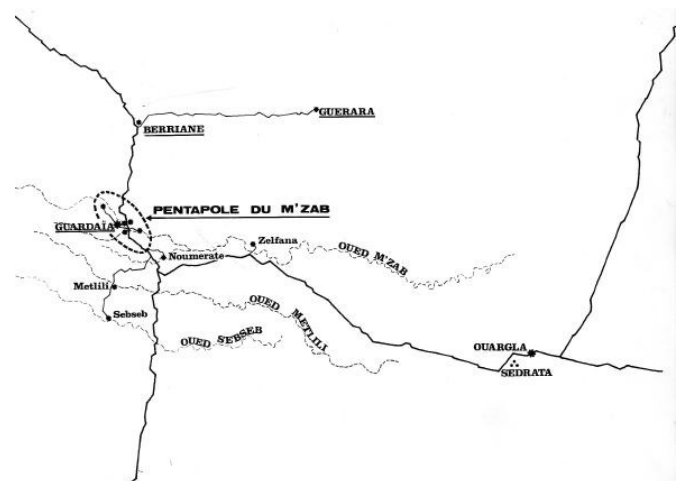


Fig. 2. The map showing the situation of the Guerara and Berriane ksour in relation to the M'Zab pentapolis. (Source: Pavard et al., 1975)

RESULTS

The field survey allowed exploring all the management actions for the conservation of the historical ksour of the M'Zab Valley. The analysis results of our field survey show:

Implementation of the permanent plan for the safeguarding and enhancement of the safeguarded sector of the M'Zab Valley (PPSMVSS)

Since the decision on the creation of the protected sector (Head of Government, 2005), the Centre for Urban Planning Studies and Implementation URBAT Agency of Ghardaïa, the ministries of culture, tourism and housing, have been drawing up a plan for the safeguarding and enhancement of the architectural heritage of the M'Zab Valley (Fig. 3). A series of interventions are carried out with the project partners (administration, municipalities, property owners, associations, social organisations, design offices) including (Tab. 3). However, on the site we found that encroach-

ments are still made to the traditional dwellings of the ksar although the technical services of some municipalities periodically monitor the application of heritage laws. These encroachments are translated by the disfigurement of the facades of traditional dwellings by the addition of windows, elevation of floor, addition of the barreaudage, addition of ornamentation, use of industrial materials, addition of ornaments and exotic colours and the construction of dwellings that do not correspond to the climatic and cultural context of the region (Fig. 4).

For some of our interlocutors, the lack of awareness of the cultural sense has distorted the values for which the ksour are classified as heritage; moreover, the building permits proposed by some architectural design offices violate the law and are to the detriment of the specificities of the safeguarded sector, and the building permit file becomes only an administrative document. Even, it is difficult to intervene when it comes to constructions on private plots that do not comply with the local style and heritage regulations. That is why there are concerns about the future of the region, related to social changes, the difficulty of the community to adhere to political decisions.

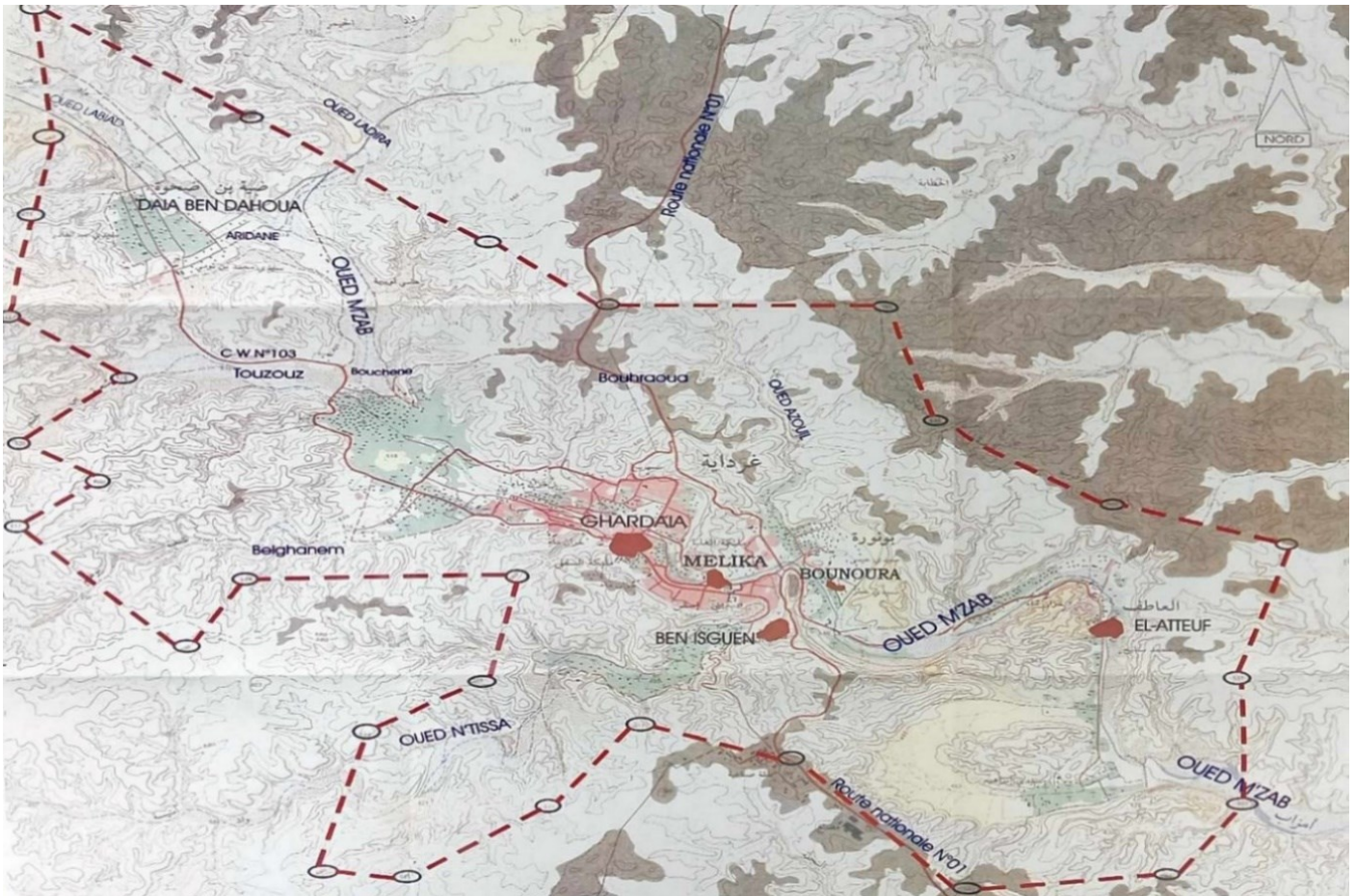


Fig. 3. The Boundary Plan for the protected sector of the M'Zab Valley. (Source: National Institute of Cartography and Teledetection Algiers (NICT), 1987, adapted by Office for the Protection and Promotion of the Valley of M'Zab - OPPVM)



Fig. 4. State of the dwellings of the ancient ksour. A) An old dwelling in Ghardaïa ksar; B) An old dwelling in Beni Isguen ksar; C) A new dwelling in Beni Isguen ksar; D) A new dwelling in Beni Isguen ksar. (Photos: Authors, 2023)

Tab. 3. The interventions of the PPSMVSS.

Action undertaken (codes n=repetition)	Action categories (percentage)	Main themes (percentage)
Restoration of water systems and water well; (n=3)	Preservation of the built heritage (18%)	The permanent plan for the safeguarding and enhancement of the safeguarded sector of the M'Zab Valley (30%)
Restoration of enclosures, ramparts and ksour roads; (n=8)		
Design of a restoration guide for master artisans; (n=2)		
Delimitation of a protection and visibility zone for ksour, monuments and historic sites; (n=9)		
Inventory of monuments and historic sites; (n=4)		
Definition of the emergency measures to be taken on historic buildings at risk of collapse; (n=5)	Preservation of natural heritage (12%)	
Requalification of the urban landscape on the heights of the M'Zab Valley. (n=2)		
Delimitation of easement areas; (n=4)		
Raising awareness among citizens to protection of palm groves; (n=5)		
Demolition of anarchic constructions in the natural environment; (n=2)		
Installation of oasis preservation signage in natural sites; (n=7)		
Introduction of conditions for access to palm groves and traditional water-sharing systems; (n=3)		
Municipal monitoring of natural sites. (n=1)		

(Source: Authors, 2023)

Launch of rehabilitation operations for the historic ksour of the M'Zab Valley

This is a rehabilitation project of 5,486 traditional dwellings of the historical ksour in the region of Ghardaïa. They are distributed as follows: 5,025 dwellings located in the seven cities of the M'Zab Valley: Attef ksar, Bounoura ksar, Ghardaïa ksar, Melika ksar, Beni-Isguen ksar, Berriane ksar and Guerrara ksar; and 461 dwellings located in the ksar of Metlili, 40 km south of Ghardaïa. According to the conservation plan of the Metlili ksar, it was founded in the XIV century AD on a rocky mound at the edge of the Oued Metlili. It has been classified as a national heritage site since 1982. The operation is placed under the supervision of the housing directorate of the wilaya of Ghardaïa and under the supervision of the Ministry of Housing, Urbanism and City and the wilaya of Ghardaïa. The rehabilitation works were launched in April 2023 for an undetermined period, given the scope of the work and their very meticulous execution, the work carried out is structured around these main actions (Tab. 4).

The field investigation reveals that to date the operation is on track (Fig. 5, 6). All its actions are implemented in close collaboration with various actors: the housing directorate of the wilaya of Ghardaïa, three approved design offices specialising in heritage, twenty-three companies specialising in heritage. The Office for the Protection and Promotion of the Valley of M'Zab, architects specialising in heritage designate the Ministry of Culture and Arts, the housing directorate of the wilaya of Ghardaïa, the municipal technical services, the subdivision of housing and equipment of the wilaya of Ghardaïa, and heritage associations are also involved.

Major actions implemented by the Office for the Protection and Promotion of the Valley of M'Zab (OPPVM)

The Office for the Promotion and Protection of the Valley of M'Zab, commonly known as the OPPVM, is a public administrative institution under the umbrella of the Algerian Ministry of Culture, and also acts as an intermediary between the Ministry and the UNESCO World Heritage Centre. It brings together historians, architects, archaeologists, civil engineers, field technicians and research assistants. Interviews with OPPVM members and on-site observations reveal that the institution ensures the task of a true guarantor of the local and artisanal architectural and urban heritage in coordination with local operators (Tab. 5).

Since the existence of the OPPVM, it has managed to rehabilitate more than sixty historical monuments in the M'Zab Valley and its surroundings, nearly 2,000 traditional dwellings in the different ksour of the valley, as well as more than twenty operations of renovation and restoration of watchtowers, doors of ksour, funerary monuments, mosques and ramparts, the water-sharing system and marketplaces. On the other hand, it contributed to the granting of the national heritage status to: the ksar of Metlili in 1982, the ksar of El Menea in 1995 and the ksour of Berriane and Guerrara in 1998 and the classification of the valley of M'Zab as universal heritage by UNESCO in 1982. Finally, the office launches the implementation of a geographical information system (GIS) for the protected area of the M'Zab Valley which allows to gather all the data on different themes of the valley, in order to better control its spatial and urban evolution and to identify the various problems of the safeguarded sector.



Fig. 5 (left). The rehabilitation operations for the historic ksour of the M'Zab Valley. From top to bottom: A) A dwelling before rehabilitation; B) the result of rehabilitation; C) a patio of a dwelling before the rehabilitation; and D) the result after rehabilitation. (Photos: The housing directorate of the wilaya of Ghardaïa, 2023)

Active community engagement through the community movement

Two categories of associations are identified in Ghardaïa, first, the associations with specialised interests, addressing various topics of environmental protection, heritage protection and education. This category of associations covers the whole city. The second category is represented by neighbourhood associations (committees) which do not have a particular field of intervention and focus on the ksar as a whole. Each ksar is divided into fictional zones where each association is responsible, they are often more than ten in each ksar, and some prefer to exercise their activity without having a status, because not all of them have completed the integration process in the republican framework through the associative regime.

We explored the impact of the associative movement on the sustainability of urban and architectural heritage (Tab. 6, 7). In the ksar, billboards are installed in the neighbourhoods to mobilise residents. Other means are used depending on the interlocutors, including phone calls, during prayers at the mosque or the broadcast of ads directly in the houses. It is common for residents to pay an annual fee to provide funding for some of the associations. Other do not require any contribution from the inhabitants, they proceed to the aid of the authorities granted upon request of the association or automatically especially during the events of the Heritage Month.

Construction of the new ksour

The new ksour refer by their name to the historical ksour which inspired their construction. These ksour are therefore the ideological and ethnic extension of the traditional nuclei. They are developed as part of a new initiative born within the community itself, promoted and supported by the notables and then by the Algerian State, reflecting a desire to preserve the cultural heritage of the valley. Its urban extensions, the construction of which began in the 1990s, include six such new ksour: Tafilelt, Tinemmirine and Tawenza annexed to the ksar of Beni Isguen, Tinaâm annexed to the ksar of Bounoura, Ioumed to the ksar of Melika and Hamrayat to that of El Attef (Fig. 7). We have summarised in the following points the responses of these urban complexes to universal heritage as follows (Tab. 8). Several interlocutors expressed their desire that the approach of the new ksour spread throughout the city, these sets protect the old fabrics from interventions and anarchic extensions and participated in this way in their preservation. The results conclude that the new urban fabrics preserve the Ksourian ecosystem and the tangible and intangible heritage of the M'Zab Valley.

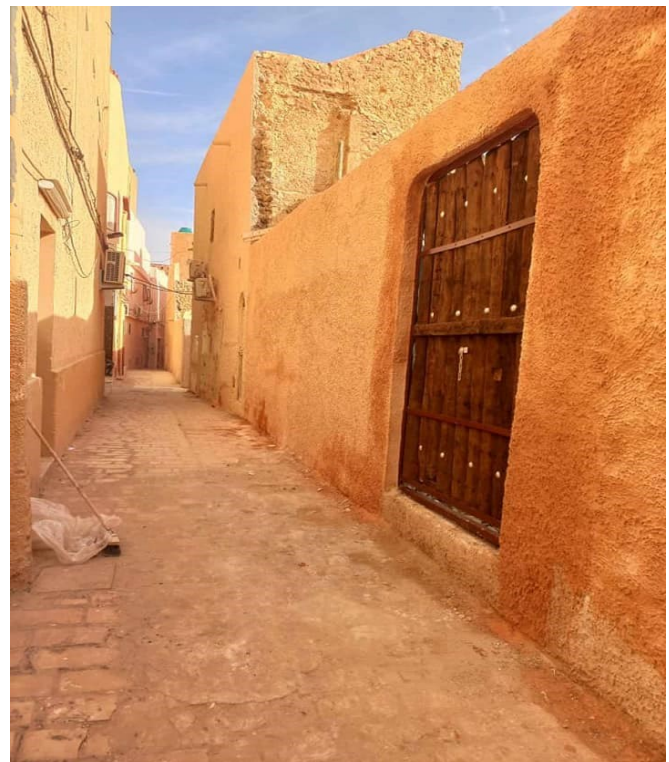


Fig. 6. The rehabilitation operations for the historic ksour of the M'Zab Valley. Left: Main facade of a dwelling before rehabilitation; right: the result after rehabilitation. (Photos: The housing directorate of the wilaya of Ghardaïa, 2023)

Tab. 4. The main rehabilitation actions.

Action undertaken (codes n=repetition)	Action categories (percentage)	Main themes (percentage)
Consolidation of walls, floors, and reinforcement of supporting structure; (n=10)	Sustainability of local architectural values (21%)	Launch of rehabilitation operations for the historic ksour of the M'Zab Valley (21%)
Crack treatment and remediation of degraded exterior and interior walls; (n=9)		
Repair of drinking water, plumbing and sewage lines; (n=8)		
Treatment of moisture problems in humid areas of the home (kitchen, bathroom, toilet) and sealing in the walls of wet rooms and cellar; (n=7)		
Additional work to beautify the home is not part of the rehabilitation process. (n=5)		

(Source: Authors, 2023)

Tab. 5. Major actions of the OPPVM.

Action undertaken (codes n=repetition)	Action categories (percentage)	Main themes (percentage)
Ensure compliance with protection legislation for M'Zab Valley classified sites; (n=7)	Heritage protection (10%)	Major actions implemented by the Office for the Protection and Promotion of the Valley of M'Zab (OPPVM) (16%)
Technical inspections of renovation and rehabilitation work carried out in the safeguarded sector; (n=3)		
Planning of the round table days with the presence of the Wali of Ghardaïa and the directors and executive officers concerned in order to exchange experiences, present solutions to the problems facing cultural heritage; (n=3)		
Enhanced cultural heritage protection regulations; (n=4)		
Participation in the restoration of cultural and cultural historical monuments (mausoleums and mosques), the defensive system (approaches, watchtowers, ramparts and ramparts houses), the ancestral hydraulic system and built properties located in the historic sites of the listed ksour. (n=2)		

Increase local awareness of the heritage qualities of their habitat; (n=2)	The enhancement of heritage (6%)
Organisation of training days for learning restoration and rehabilitation techniques; (n=2)	
Offer theoretical and applied internships and scientific visits to the M'Zab Valley through national and international scientific exchanges; (n=4)	
Organising days of scientific meetings as part of Heritage Month; (n=1)	
Planning of awareness days, exhibitions and publications of brochures and audiovisual materials open to the public; (n=1)	
Encourage the use of local traditional building materials, techniques and traditional architectural forms in new construction. (n=1)	

(Source: Authors, 2023)

Tab. 6. Major action of the neighbourhood associations.

Action undertaken (codes n=repetition)	Action categories (percentage)	Main themes (percentage)
Cleanliness, repair and maintenance of common areas; (n=6)	Internal maintenance of ksar (6%)	Active community engagement through the community movement of the neighbourhood associations (11%)
Follow up on the smooth running of the common space maintenance work; (n=2)		
Collaboration with ksar residents for complaints of collective problems addressed to public authorities (frequent water cuts, public lighting failure, degraded public roads, etc.); (n=1)		
Controls the conversion of shops in alleys and markets. (n=2)	The development of heritage (5%)	
Inform authorities of non-compliance with heritage laws when residents making changes to the formal or exterior appearance of houses; (n=4)		
Organising heritage activities for youth and children during national holidays; (n=1)		
Orchestration of the preparations for the communal festivals, the great cleaning of the ksar, palm groves and wadis. (n=4)		

(Source: Authors, 2023)

Tab. 7. Major action of specialised associations.

Action undertaken (codes n=repetition)	Action categories (percentage)	Main themes (percentage)
Digitisation and backup of manuscripts, books, theses, articles, reports, maps, reports of scientific events and all other scientific activities of researchers in the field of heritage in general and Mozabite and Saharan heritage in particular; (n=2)	The provision of scientific documentation by teaching associations (associations: Cheikh Abou Ishak Brahim Tfiyèche, Cheikh Ammi Saïd, Ettourat) (2%)	Active community engagement through the community movement of specialised associations (9%)
Conservation of valuable works to establish and safeguard the memory of Mozabites. (n=2)		
Formulation of practical recommendations to restore the vitality of palm groves; (n=3)	The sustainability of the oasis ecosystem by environmental protection associations (Association for the Protection of the Environmental Heritage Palm Grove of Ghardaïa, Association for the Protection of the Environment and Sustainable Development, Association for the Protection of the Environment of Beni Isguen, AMIDOUL Tafilelt) (4%)	
Animation of awareness campaigns to safeguard palm groves as an economic, ecological, cultural and social heritage of humanity; (n=2)		
Offer agroecology training to farmers and organise meetings to exchange experiences on the rational and rigorous management of groundwater resources; (n=1)		
Organisation of activities to promote and promote oasis culture in the community (climbing competitions of palm trees, the best palm grove in terms of maintenance and conservation of biodiversity, the most consumed product of the year from oasis agriculture). (n=1)		

Organisation of construction schools for the training of master artisans in methods of heritage maintenance and restoration. (n=1)

Organisation of trainings on intangible cultural heritage (traditional weaving, traditional fabric tint, etc.). Launch of periodic tourism educational programs. (n=2)

Organisation of traditional festivals and cultural and heritage events. (n=2)

Participation in the preparation of material heritage files to be restored (n=1)

The development of architecture, urbanism, culture, customs and ancestral traditions of M'Zab by heritage associations (associations: Imekres, Folklore, young El Amal, Tagemi) (3%)

(Source: Authors, 2023)



Fig. 7. The new ksour. Top: A bird’s eye view on Taflelt ksar and its eco-park; bottom: a dwelling in Tinemmirine ksar. (Source: Authors, 2023)

Tab. 8. The responses of the new ksour on the conservation of the old ksour.

Action undertaken (codes n=repetition)	Action categories (percentage)	Main themes (percentage)
Decongest the old ksour following their saturation; (n=3)	Preservation of the built heritage (4%)	Construction of the new ksour (13%)
Stop vertical extensions of Ksourian dwellings; (n=1)		
Master anarchic urbanisation actions in palm groves. (n=3)		

Inspiration by the old ksour (compact fabric, template, landscape integration, colours, hierarchy of spaces, types of openings); (n=3)	
Use of ancient architectural symbols (watchtowers, wells); (n=5)	Enhancement of tangible and intangible heritage (6%)
Mobilisation of Mozabite social values during construction by Twiza which means voluntary participation of the population; (n=2)	
Use of Mozabite constructive knowledge. (n=1)	
Construction on rocky terrain with no agricultural value. (n=1)	
Creation of green spaces and eco-parks (the case of Tafilelt ksar). (n=1)	Protection of the Ksourian ecosystem (3%)
Limitation of ksour development. (n=1)	
Construction of wastewater treatment plants. (n=1)	
Treatment of household waste by residents at Tafilelt ksar. (n=1)	

(Source: Authors, 2023)

DISCUSSION

In recent decades, the conservation of cultural heritage has evolved in terms of both concept and scope. This evolution has gone from the traditional vision of conservation, protecting the material fabric of objects classified as monuments, to the current vision, which also aims at protecting the values represented by heritage ranging from objects to landscapes (Liang et al., 2023) even digital heritages (Li and Tang, 2024). Indeed, this study confirms it, actions undertaken for the conservation of the M'Zab Valley focus on tangible and intangible heritage and extends throughout the Mozabite region and its surroundings to the urban and natural context namely the listed historical ksour, their monuments, the respective extramural historical sites, the palm groves and the outer territory of the protected area. In order to preserve the authenticity of the places and the conservation of the tangible and intangible cultural heritage, it was necessary to implement technical and legal operations of management of the Ksourian heritage by the Algerian state and that the power of the whole society be mobilised to the whole process, which confirms the hypothesis of this paper. Achig-Balarezo et al. (2017) explain that in the management of built heritage, the participation of all public and private actors must take place actively and throughout the preventive conservation cycle, from the design of the project to the control phase, monitoring and evaluation.

The implementation of the Permanent Plan for the Safeguarding and Development of the Protected Area of the Valley (PPSMVSS) is one of the preventive measures that has proven effective in ensuring the sustainability of the heritage. Its implementation terminated the anarchic urban and architectural transformations that disfigured the visual aspect of the M'Zab Valley, the anarchic urbanisation of oases and the encroachment on the structures of the traditional system of water sharing. The PPSMVSS has allowed the multiplication of restoration operations of several monuments and historic spaces. However, although heritage approaches are put in place to protect the sector, barriers to its management remain, since, sometimes it is difficult to intervene when it comes to constructions on private plots that do not comply with the local style and heritage regulations. This is why there are some concerns about the future of the region, related to social changes, and the difficulty of the community to automatically adhere to political decisions.

The operation of housing rehabilitation in the ksour of M'Zab prevents the weakening of traditions and ancestral values and works to preserve the urbanistic and architectural character of the region. The collaborative work between the housing department of the wilaya of Ghardaïa, design offices, the Office for the Protection

and Promotion of the Valley of M'Zab, the Ministry of Culture and Arts, the municipalities, and the wilaya of Ghardaïa contributed to the realisation of the works in an efficient way. To date, several houses have been completed respecting the architectural and aesthetic character of the region. Nevertheless, contractors are responsible for accelerating the pace of completion of the work by strengthening the workshops with qualified human resources in order to compensate for significant delays in the conduct of the work.

We argue that it is necessary to involve the Office for the Protection and Promotion of the Valley of M'Zab in all interventions in the preserved sector as a guarantor of the local and artisanal architectural and urban heritage, under the supervision of the Algerian Ministry of Culture. The combination of efforts undertaken with their engagement is a major element in the good management of the safeguarded sector. In addition, heritage conservation education is also associated with their missions, it opens access to training for learning restoration and rehabilitation techniques, offers theoretical and applied internships and scientific visits to the M'Zab Valley as part of national and international scientific exchanges and organises days of scientific meetings as part of heritage month. The Office organises awareness days and exhibitions open to the public, and also publishes brochures and audiovisual materials to promote the importance of heritage preservation and protection.

The revitalisation of the community and the involvement of the associative movement in the M'Zab Valley fight against the threats of destruction of the material heritage, intangible, natural and cultural, and facilitate the activities of public institutions in the application of heritage law. In addition, the work of specialised and neighbourhood associations contributed to the creation of the new ksour. These projects are the only ways to stop the anthropogenic degradation of palm groves and to transfer local knowledge while reconciling tradition and modernity. Heritage education also takes place in the associative movement in Ghardaïa, the various associations try to make known the Mozabite cultural heritage through the organisation of heritage activities for young people and children during national holidays, the organisation of construction schools for the training of master craftsmen specialised in the maintenance and restoration of heritage. They also organise training on intangible cultural heritage (traditional weaving, traditional fabric tint etc.), they launch periodic educational tourist programs on all the heritage of the M'Zab Valley.

CONCLUSION

The results of this research reveal that the preventive heritage conservation approach used in the M'Zab Valley is based on non-destructive methods to the heritage values of the places. Based on the main management actions invested in the Mozabite region, a proposed preventive conservation methodology has been outlined as the following. According to the implementation of the permanent plan for the safeguarding and development of the protected area of the M'Zab Valley, it is essential to take into account not only monuments, sites and historic buildings. All the contexts associated with the daily life of people, in particular the urban landscape, the extramural environment of the ksour, the palm groves, the oases, the natural airs, and the outer territory of the protected sector must also be considered. This represents one of the contemporary principles of cultural heritage conservation. Li and Tang (2024) confirm: *"The scope of cultural heritage conservation is not limited to conserving the heritages themselves but also involves conserving their surrounding environments to coordinate the relationship between them and their surroundings in terms of economic, social, and ecological aspects"*.

The launch of the rehabilitation operations of the historic ksour of the M'Zab Valley reveals that in these types of operations, care should be taken to maintain the authenticity of buildings and their integrity to the environment while adapting them to the current needs of users. This ensures a balance between conservation and reuse. The major actions carried out by the Office for the Protection and Promotion of the Valley of M'Zab incite that each historic region of a country should be encouraged to create at least one institution guaranteeing the preservation of its cultural heritage. Its mission will be to ensure compliance with legislation on the protection, conservation, restoration, rehabilitation and enhancement of historical treasures, it will be committed to raising awareness among the local population about the conservation of these heritage sites, and will participate in improving heritage protection regulations.

It can take several decades to establish a fully competent conservation centre. This is why short-term measures are needed, including heritage education programmes and exchanges of teachers, experts and students at national, regional and international levels. Heritage education programmes can take several forms: specialised training in heritage management; organisation of cultural, artistic, physical and sports activities on themes related to cultural heritage; organising visits to historical and cultural sites; opening access to theoretical and applied university internships as part of national and international scientific exchanges; organisation of scientific and technical meetings on tangible and intangible heritage, organisation of construction schools for the training of master craftsmen specialised in local heritage.

From the survey with the local community and associations, it is deduced that the conservation of cultural heritage is also based on scientific and historical documentation. Historical information must not be destroyed. The identification of heritage values provides a basis for its sustainable conservation and allows it to contribute to society. Meanwhile, it is necessary to involve and educate the local community in heritage conservation through the organisation of cultural promotion and valorisation activities with the community and even mobilised them in all operations that concern their local heritage. Finally, we believe that in the perspective of future conservation, other actions can be integrated into the preventive conservation approach of the M'Zab Valley. Suggested activities: first, make an inventory of all the elements added by restoration or rehabilitation at different periods in order to distinguish them from the original elements which in turn must be recorded and respected. Second, conduct periodic

evaluation of training programmes by conservation professionals which is an absolute necessity. Third, increase international cooperation on heritage conservation to maintain cultural diversity. Finally, the use of new computer technologies will play an important role in the conservation of physical cultural heritage.

References

- Achig-Balarezo, M. C., Vázquez, L., Barsallo, M. G., Briones, J. C., Amaya, J. (2017) "Strategies for the management of built heritage linked to maintenance and monitoring. Case study of the San Roque neighborhood, Cuenca, Ecuador", *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XLII2/W5, pp. 755–761. <https://doi.org/10.5194/isprs-archives-XLII2-W5-755-2017>
- Alsubaie, M. S., Almutery, S. B., Almoufleh, A. A., Khalil, M. M. E., Sallam, A. (2024) "Architectural heritage conservation in the city of Qurh: assessing and stabilizing Islamic era mud brick structures", *Mediterranean Archaeology and Archaeometry*, 24(1), pp. 50–73. <https://doi.org/10.5281/zenodo.10559426>
- Azungah, T. (2018) "Qualitative research: deductive and inductive approaches to data analysis", *Qualitative Research Journal*, 18(4), pp. 383–400. <https://doi.org/10.1108/QRJ-D-18-00035>
- Barrera, P. N., Bartholomew, P. E. (2014) "Anthropology of design: how traditional Korean architecture expands the terms of conservation, collaboration, and sustainable management", In: Toniolo, L., Boriani, M., Guidi, G. (eds.) *Built Heritage: Monitoring Conservation Management*, Springer, Cham, Switzerland, pp. 283–298. https://doi.org/10.1007/978-3-319-08533-3_24
- Birkinshaw, J., Brannen, M. Y., Tung, R. L. (2011) "From a distance and generalizable to up close and grounded: reclaiming a place for qualitative methods in international business research", *Journal of International Business Studies*, Vol. 42, pp. 573–581, <https://doi.org/10.1057/jibs.2011.19>
- Bourdieu, P. (1974) "Sociologie de l'Algérie" (Sociology of Algeria), Edition Presses Universitaires de France, Paris, France. (in French)
- Bryman, A. (2012) "Social research methods", fifth edition, Oxford University Press, UK. [online] Available at: <https://ktpu.kpi.ua/wp-content/uploads/2014/02/social-research-methods-alan-bryman.pdf> (Accessed: 20 Jan 2024)
- Chekkhab-Abudaya, M. (2012) "Patrimoine architectural du Sud algérien: le "qsar", type d'implantation humaine au Sahara" (Architectural heritage of southern Algeria: the "qsar", a type of human settlement in the Sahara), doctoral thesis, University of Paris 1 Panthéon-Sorbonne, France. (in French)
- Corbin, J., Strauss, A. (2014) "Basics of qualitative research: techniques and procedures for developing grounded theory", fourth edition, London, UK.
- Della Torre, S. (2021) "Italian perspective on the planned preventive conservation of architectural heritage", *Frontiers of Architectural Research*, 10(1), pp. 108–116. <https://doi.org/10.1016/j.foar.2020.07.008>
- Elborombaly, H. (2016) "Urban conservation methodology for heritage area case study Qabel Street, Old Jeddah", ResearchGate. <https://doi.org/10.13140/RG.2.1.2823.1128>
- Gueliane, N. (2017) "The vernacular architectural heritage, lever of the development of a sustainable architecture", *International Journal of Human Settlements*, 1(3), pp. 25–35. [online] Available at: https://www.researchgate.net/publication/322274426_THE_VERNACULAR_ARCHITECTURAL_HERITAGE_LEVER_OF_THE_DEVELOPMENT_OF_A_SUSTAINABLE_ARCHITECTURE (Accessed: 25 Dec 2023)
- Haddad, N. A., Fakhoury, L. A., Sakr, Y. M. (2021) "A critical anthology of international charters, conventions & principles on documentation of cultural heritage for conservation, monitoring & management", *Mediterranean Archaeology and Archaeometry*, 21(1), pp. 291–310. <https://doi.org/10.5281/zenodo.4575718>
- Head of Government (2005) "Executive Decree No. 05-209 of 26 Rabie Ethani 1426 corresponding to 4 June 2005 on the creation and delimitation of the protected sector of the Oued M'Zab Valley", *Journal Officiel de la République Algérienne Démocratique et Populaire (JORADP)*, 44(39). [online] Available at: <https://www.joradp.dz/FTP/jo-francais/2005/F2005039.pdf> (Accessed: 3 May 2024) (in French)
- Cherifi, B. (2015) "Le M'zab études d'anthropologie historique et culturelle" (The M'zab studies of historical and cultural anthropology), edition Sédia, Algiers, Algeria (in French)
- Kayan, B. A. (2019) "Sustainable built heritage: maintenance management appraisal approach", *Journal of Cultural Heritage Management and Sustainable Development*, 9(3), pp. 266–281. <https://doi.org/10.1108/JCHMSD-10-2018-0074>

- Li, L., Tang, Y. (2024) "Towards the contemporary conservation of cultural heritages: an overview of their conservation history", *Heritage*, 7(1), pp. 175–192. <https://doi.org/10.3390/heritage7010009>
- Liang, W., Ahmad, Y., Mohidin, H. H. B. (2023) "The development of the concept of architectural heritage conservation and its inspiration", *Built Heritage*, Vol. 7, article 21. <https://doi.org/10.1186/s43238-023-00103-2>
- OPPVM (1975) "Le secteur sauvegardé de la vallée du M'Zab" (The protected sector of the M'Zab Valley). [online] Available at: https://www.opvm.dz/10_Articles/15_Le_secteur_sauvegard%C3%A9/74_Introduction/d (in French; accessed: 05 Mar 2024)
- Patissi, E., Neves, R. B. (2023) "Preventive conservation as a sustainable public policy strategy for built cultural heritage, contrasts between the Brazilian and Spanish cases", In: *ENSUS 2023 – XI Encontro de Sustentabilidade em Projeto*, Florianópolis, Brasília, pp. 297–308. [online] Available at: <https://repositorio.ufsc.br/handle/123456789/246986> (in Portuguese)
- Patton, M. Q., (2015) "Qualitative research and evaluation methods: integrating theory and practice", fourth edition, SAGE Publications, London, UK.
- Pavard, C., Bossu-Picat, C., Rollet, P. (1975) "Lumières du M'ZAB" (Lights of the M'ZAB), Delroisse, Boulogne, Billancourt, France. (in French)
- Rahaman, M. (2015) "Protection of traditional knowledge and traditional cultural expressions in Bangladesh", *Journal of Intellectual Property Rights*, Vol. 20, pp. 164–171. [online] Available at: <https://ssrn.com/abstract=2827043> (Accessed: 12 Jan 2024)
- Rezaei, N., Khouadja, A. (2022) "Living heritage sites in the M'Zab Valley (Algeria): community and continuity", *Journal of Cultural Heritage Management and Sustainable Development*, ahead-of-print. <https://doi.org/10.1108/JCHMSD-01-2022-0001>
- Sodangi, M., Khamdi, M. F., Idrus, A., Hammad, D. B., Umar, A. A. (2014) "Best practice criteria for sustainable maintenance management of heritage buildings in Malaysia", *Procedia Engineering*, Vo. 77, pp. 11–19. <https://doi.org/10.1016/j.proeng.2014.07.017>
- Tsang, K. K., Liu, D., Hong, Y., (eds.) (2019) "Challenges and opportunities in qualitative research: Sharing young scholars experiences", Springer Nature, Singapore, Singapore. <https://doi.org/10.1007/978-981-13-5811-1>
- UNESCO (1972) "Convention concerning the protection of the world cultural and natural heritage", General Conference, 17th session, Paris, France, pp. 1–16. [online] Available at: <https://whc.unesco.org/archive/convention-en.pdf>
- Viaro, M. A., Ziegler, A. (1983) "Habitat traditionnel dans le monde: éléments pour une approche" (Traditional housing around the world: elements for an approach), UNESCO, Paris, France. [online] Available at: <https://archive-ouverte.unige.ch/unige:24179> (in French)
- Wijesuriya, G. (2018) "Living Heritage", In: *Heritage, A., Copithorne, J. (eds.) Sharing Conservation Decisions Current Issues and Future Strategies*, ICCROM - International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), Rome, Italy, pp. 43–56. [online] Available at: https://www.iccrom.org/sites/default/files/2018-05/sharing_conservation_decisions_2018_web.pdf
- Xie, K., Zhang, Y., Han, W. (2024) "Architectural heritage preservation for rural revitalization: Typical case of traditional village Retrofitting in China", *Sustainability*, 16(2), article 681. <https://doi.org/10.3390/su16020681>