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МЕЖДУНАРОДНЫЙ СОВЕТ ПО ВОПРОСАМ ПАМЯТНИКОВ И ДОСТОПРИМЕЧАТЕЛЬНЫХ МЕСТ

Our Ref. GB/EG/1744_Add.Inf

Charenton-le-Pont, 20 September 2024

H.E. Mr Ahmad Pakatchi
Ambassador, Permanent Delegate
Permanent Delegation of the Islamic Republic of Iran to UNESCO
Maison de l'UNESCO
1, rue Miollis
Paris Cedex 15 75732

World Heritage List 2025 – Additional Information
Prehistoric Caves and Falak-ol-Aflak Ensemble of Khorramabad Valley (PCFEKV), (Iran (Islamic Republic of))

Dear Ambassador,

ICOMOS is currently assessing the nomination of the "Prehistoric Caves and Falak-ol-Aflak Ensemble of Khorramabad Valley (PCFEKV)" as a World Heritage property and an ICOMOS technical evaluation mission has visited the nominated property to consider matters related to its protection, management and conservation, as well as issues related to its integrity and authenticity.

In order to allow us to further evaluate this property, we would be grateful if the State Party could provide ICOMOS with additional information on the following points:

Description
The history of the Falak-ol-Aflak Ensemble (component part 7), as provided in the nomination dossier, mainly focuses on the history of the city itself. ICOMOS considers that a detailed account of the historic development of the ensemble itself, including the initial construction and alteration such as addition, expansion, and demolition, as well as important historic events associated with the ensemble, should be provided in order to better understand the historic development of this component part. Furthermore, ICOMOS would appreciate if a conservation history of the four buildings and two bridges of the ensemble could be provided.

As indicated in the nomination dossier, the Haji Ali Asghar Khorram Abadi Bridge has an inscription indicating the dates of its construction and inauguration (p.105). Could the State Party please provide ICOMOS with these dates?

ICOMOS would also be pleased if a detailed account of the historic events, history of conservation, current conservation measures, and information on the presentation and interpretation of the Shekaste Bridge (Shapouri Bridge) could be provided.

Nomination strategy
The State Party has adopted a serial nomination strategy and has nominated eight component parts of two different types: one type covers the five prehistoric caves and one rock shelter (component parts 1 to 6), and the other includes the architectural ensemble of the Falak-ol-Aflak Castle complex and the Shekaste Bridge (component parts 7 and 8). Each type conveys different values. According to paragraph 137 of the *Operational Guidelines for the Implementation of the World Heritage Convention*, for a serial nomination, "*[c]omponent parts should reflect cultural, social, or functional links over time that provide, where relevant, landscape, ecological, evolutionary or habitat connectivity*".

Based on this requirement, these two types of component parts are connected by the narrative that human occupation in the Khorramabad Valley has been continuous and lasted over an exceedingly long period. However, chronological continuity of occupation by different cultural groups or civilisations cannot be considered representative of cultural, social or functional linkages.

Therefore, the current serial nominated property provides two different sets of values and attributes that appear disconnected from one another: the prehistoric caves and shelters that testify to an important turning point in human evolution in the region, and the buildings and monuments that reflect the high architectural achievement in the region. Paragraph 137 of the *Operational Guideline for the Implementation of the World Heritage Convention* also states that "*[e]ach component part should contribute to the Outstanding Universal Value of the nominated property as a whole in a substantial, scientific, readily defined and discernible way, and may include, inter alia, intangible attributes. The resulting Outstanding Universal Value should be easily understood and communicated*." While the current nomination as a whole does not meet this requirement, each sub-series appear more coherent.

ICOMOS would appreciate it if the State Party could provide further explanations with regard to the underlying reasons and rationale that have led the State Party to combine in one single nomination two rather different themes and sets of heritage assets.

Boundaries
ICOMOS would appreciate a more detailed explanation of the rationale for the delineation of the boundaries of the nominated property and the buffer zones.

Legal protection
In section 5.b.10 of the nomination dossier and on the provided maps, a set of regulations of human activities are reported to have been tailored for each component part and buffer zones. ICOMOS would be interested to know what is the legal or managerial status of these regulations, whether they are approved already, and which institutions are responsible for their implementation and monitoring.

As indicated in the nomination dossier, "*according to a Cabinet decision adopted in 2001, all public organizations must conduct studies to assess the cultural-historic impacts of major development projects at the earliest feasibility study stage and to comply with the recommendations of such studies during design and implementation*" (p. 337). ICOMOS would like to know the reference number, date and name of this cabinet decision, and some more information about the content of this decision, to understand whether it can be considered as a legal provision for Heritage Impact Assessment.

Conservation principles and standards
ICOMOS notes that considerable conservation interventions have been undertaken at the component parts. ICOMOS would be grateful if the State Party could clarify the conservation principles that have been followed in the conservation, restoration, repair, and maintenance activities.

ICOMOS acknowledges that a brief description has been given in the nomination dossier on the conservation standards in Iran for the interventions on the tangible fabric of historic heritage (p. 324). Nonetheless, a clarification on their legal status and the main contents would help ICOMOS to understand better these standards and the roles they play in management and conservation interventions of the nominated property.

Management plan
ICOMOS would be pleased if the State Party could indicate what is the legal status of the management plan. In particular, could the State Party provide information on when this plan was approved, and by whom? Has this plan been implemented? If this is the case, what is the progress made for the actions listed under the "Short Term Plans" (p.81)?

Tourism plan
In the nomination dossier, a set of tourist routes to the component parts have been defined in several maps (pp. 366-378). These maps indicate “Tourism Plan”. The same set of maps also appears in the management plan (pp. 89-101). ICOMOS would be interested to know what these “Tourism Plans” are, what are their main objectives and activities, and whether they are already approved. ICOMOS would also appreciate if the State Party could indicate whether Heritage Impact Assessment has been conducted on them, and to what extent these Tourism Plans have been implemented.

Other clarifications
ICOMOS notes that several calendars for dating the component parts and the historic development have been used in the nomination dossier. This multiple system often creates confusion. ICOMOS would appreciate it if the State Party could provide a table showing all the years in the nomination text expressed as AH, Solar Hijri, SH, and SL, along with their equivalent Gregorian years (CE).

The nomination dossier refers to the “Islamic Period”, which has been subdivided into early, middle and late periods. ICOMOS would appreciate it if the State Party could provide the specific dates of these different periods.

Finally, ICOMOS notes that there appears to be an inconsistency in the nomination dossier regarding the number of the remaining arches of the Shekaste Bridge. It is stated on page 107, that five arches remain, whereas six arches are mentioned on page 299. ICOMOS would welcome clarification from the State Party on this matter.

We would be grateful if you could provide **ICOMOS** and the **UNESCO World Heritage Centre** with the above information by **Monday 4 November 2024 at the latest.**

ICOMOS appreciates that the timeframe for providing this additional information is short. Brief responses are required at this stage, and can be discussed further with the State Party if needed during the ICOMOS World Heritage Panel.

We look forward to your responses to these points, which will be of great help in our evaluation process.

Please note that the State Party shall submit a copy of the additional information to the UNESCO World Heritage Centre and a copy to ICOMOS so that it can be formally registered as part of the nomination dossier.

We thank you in advance for your kind cooperation.

Yours faithfully,

Gwenaëlle Bourdin
Director
ICOMOS Evaluation Unit

Copy to The Office of Vice Minister and Deputy Minister for Cultural Heritage of the Iranian Ministry of Cultural Heritage, Tourism and Handicrafts (IMCHTH)
UNESCO World Heritage Centre

Islamic Republic of IRAN
The Iranian Ministry of Cultural Heritage, Tourism and Handicrafts
IMCHTH

Nomination of

Prehistoric Caves and Falak-ol-Aflak Ensemble of Khorramabad Valley(PCFEKV)

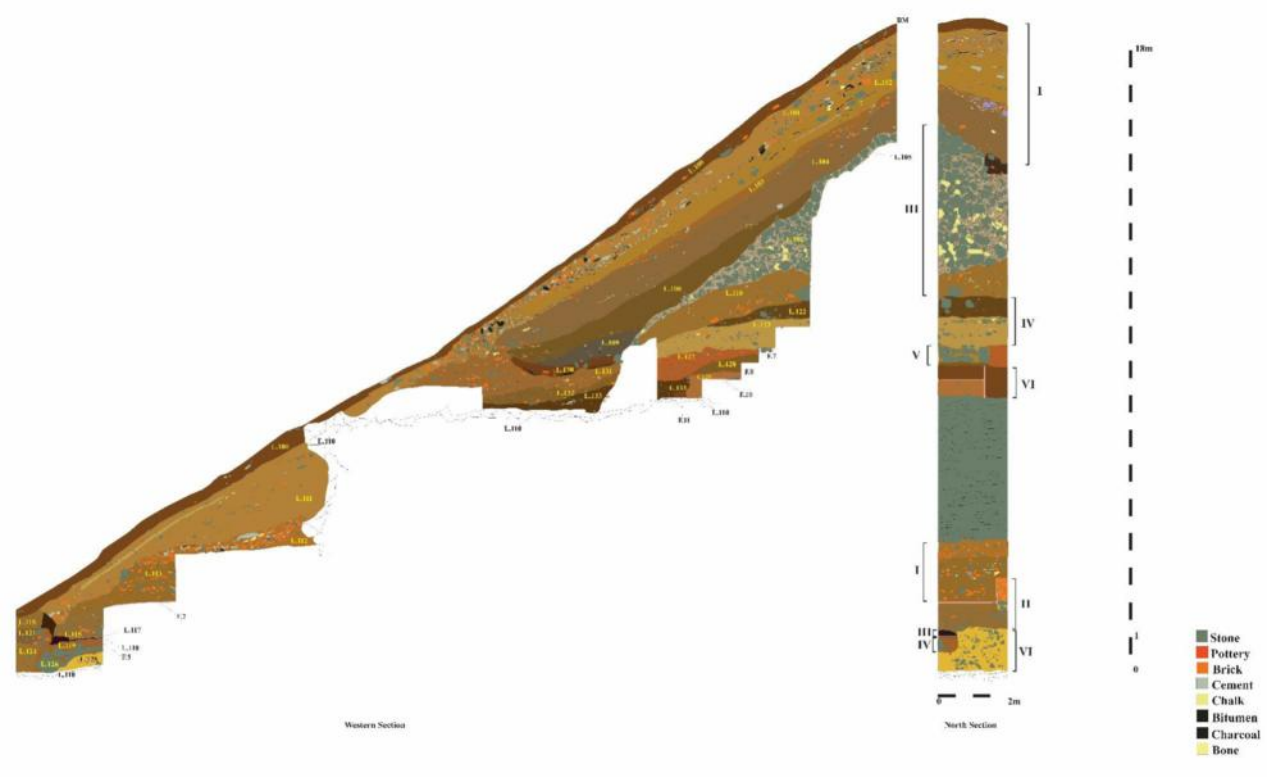
“Additional Information”

TEHRAN 2024

1. Description

1-1. History of the Falak-ol-Aflak ensemble

Concurrent with the evidence of human settlement in a number of pre-historic caves in the Khorramabad valley during the Neolithic and Chalcolithic periods, human communities, upon settling into the Khorramabad valley, selected a rocky outcrop in the middle of this valley for habitation. The selection of this rocky outcrop, known as the Falak-ol-Aflak hill, by these communities was due to the existence of the Karst spring of Golestan at the foot of this rock as the largest aquifer in the Khorramabad valley, providing security and necessary resources such as water and food, and the hill's encirclement of the entire Khorramabad valley due to its strategic position in the valley. Therefore, the construction of the Falak-ol-Aflak castle on this Karst outcrop is one of the most significant examples of the remarkable connection between humans and Karst resources during the transition of settlements from caves into the valley in general a sense.
On the Falak-ol-Aflak mound, ceramic types and architectural finds indicate the existence of a large mud-brick fortress atop this mound, proving the importance of the Khorramabad valley during the Bronze Age and Iron Age. It seems that these architectural remains were utilized in the subsequent period (Iron Age) for building on the rock and reusing in a large fortress. The existence of these architectural remains indicates the habitation of the fortress in the Iron Age. After this period, the Falak-ol-Aflak mound was once again the focus of attention in the Achaemenid period. The subsequent period evident on this hill is the Parthian period. This period, with a thickness of 2.5 meters, is one of the most important settlement periods of the site. In the Sassanian and early Islamic periods, historical sources have also referred to the importance of the Shapur khast fortress in this location. (Bahrami, Sajjadi, & Rajabi, 2014) After the Sassanian period, in the early Islamic centuries, especially the 4th century AH, coinciding with the power of the Al-Hasnavie (the family of Badr bin Hasnavie), the site was given attention."



Section of the trench excavated in the Falak-ol-Aflak mound (Ghobadi-Zadeh 2024)

Architectural discoveries made during archaeological excavations at the Falak-ol-Aflak mound (Ghobadi-Zadeh 2024)

From around the mid-fourth century AH(961 AD), during the time of Abu al-Najm Badr ibn Hasnavie, the Shapur Khast (Falak-ol-Aflak) castle became the place where the treasures of his government were kept.
The choice of the Shapurkhast castle by Badr ibn Hasnavie was due to its location on the communication route from north to south (Hamadan to Khuzestan) and also from east to west (the central plateau of Iran to Mesopotamia), which can be considered from two perspectives. These two Shahrah(highways) were of great importance during this period, and the position of Lorestan and the Khorramabad valley was also very vital and strategic at this historical juncture (Hamovey, 2001:75).
The Khoramabad valley experienced a relatively calm period during the Seljuk period. From the second half of the sixth century AH (580 AH) (1184 AD), Lorestan came under the control of the Atabeks of Lesser Lor, led by Shaja al-Din Khorshid. (Ghazanfari, 1998) During this period, the Falak-ol-Aflak fortress was chosen as the governmental citadel of the Atabeks of Lorestan (Farzin, 2001:17).
In the Timurid period, in the years 788 (1386 AD) and 795 AH (1392 AD), the city of Khorramabad was attacked by Timur twice. In the first attack, Timur's army faced serious resistance. Amir Timur suffered greatly to conquer this fortress and succeeded in capturing the fortress in the second attack. (Ghazanfari, Maleki, et al., 1991:54)
In the final years of the Atabeks' rule, which coincided with the rule of the Safavid rulers in Iran, despite all the tensions that occurred between the two, Khorramabad experienced normal urban growth, and some buildings such as the Gap Bridge were founded at this time.

Painting by Baron Debode, late February 1842

During the rule of the Afsharid, Zand, and Qajar dynasties over Lorestan and Khorramabad, despite the great turmoil, the Falak-ol-Aflak castle and the city were relatively calm. The Falak-ol-Aflak castle, which had suffered damage up until the Qajar period, was restored under the orders of Mohammad Ali Mirza. He also constructed a Divan khane (hall of audience) and barracks at the base of the castle. After him, Zel ol-Sultan[1], who had witnessed the damage to the fortress, ordered repairs to the building. (Mahmood Mirza, 2020) After the restoration of the castle by

[1] Governor of Lorestan during the Qajar period"

Mohammad Ali Mirza, a small room was built on top of one of the eastern towers of the castle facing the river. From then on, the name "Falak-ol-Aflak" has remained attached to it until today. (Dalvand, 2005, p. 69) Baron Debode visited Khorramabad in 1842. The most important feature of this report is the presence of a picture. His painting of the Falak-ol-Aflak hill and castle is the first visual document of this work. (Debode, 1992: 396) The tower or foreign hat, known as Falak-ol-Aflak, which was built by Mohammad Ali Mirza Dolatshah, is clearly visible on top of the castle.

"Chericoff, as the head of the Russian delegation of the Iran-Ottoman border demarcation commission, spent a week in Khorramabad in September 1950. He created the first detailed map of the Falak-ol-Aflak ensemble from a military perspective.
During the Pahlavi era, buildings such as the Officers' club, Guard house, and barracks 1 and 2 were constructed.
In 1951, a flood hit Khorramabad, destroying the middle piers of the Gap Bridge.
In 1953, the Haji Bridge was built by Ali Asghar Khorramabadi over the Khorramabad River in the southern part of the city to establish a connection. (Ghasemi, 2015, p. 458)
With the transfer of the Falak-ol-Aflak ensemble to the Ministry of Culture and Art in 1970, a new chapter in its history began. After many years, the Falak-ol-Aflak ensemble was registered as a national heritage site under number 883. (Izadpanah, 1998, p. 54)"
After the restoration of the castle, efforts were made to change the use of the castle from military to cultural and artistic. In 1975, a regional ethnographic exhibition was held. This activity was pursued on a larger scale in 1977, and the Museum of Ethnography, the Museum of Bronzeware of Lorestan, and the Museum of Islamic Metalwork were opened in the Falak-ol-Aflak castle. In 1976-1977, a documentation center and specialized library were established at the castle.
In the 1980s, during the Iran-Iraq war, one of the western towers was hit by a war bomb, but it was immediately restored. In the 1990s, two museums, one for ethnography and the other for archaeology, were reopened in the castle. In the 2000s, the Army and Lorestan University were evacuated from the northern side, and the Golestan garden and spring were handed over to the cultural heritage organization. In the middle of the same decade, the shops in the northwest were acquired. Also, during this decade, a part of the reinforcement operation of the castle was completed. In the late 1990s, the surrounding wall of the castle was reconstructed and restored. In the early 1990s, the restoration of the barracks 1 and the revival of the Golestan and Sarvestan gardens were carried out. In the early 2020s, the southern part of the ensemble was also acquired by the cultural heritage organization. In 2024, a new archaeology museum of Lorestan, titled "100,000 Years of Lorestan History," was opened, displaying objects from prehistoric caves in the Khorramabad valley and objects from archaeological excavations of Lorestan sites in new showcases for different audiences and tourists. In the same year, stratigraphic excavations were conducted on the southern side of the Falak-ol-Aflak hill to identify settlement layers.

1-1. Conservation History

The buildings of Sarbazkhaneh 1(Barracks ۱), Bashgah-e Afsaran (Officers' Club), Dezhbani(Guardhouse), and the Gap and Haji Bridges were registered in the National Heritage List in 2001, 2003, 1999, and 2019, respectively. Moreover, the entire complex was also inscribed on the National Heritage List in 2023 under the number 33987. Additionally, the zoning regulations and buffer zones of these complexes were issued to the province by the Ministry of Cultural Heritage, Tourism, and Handicrafts in 2023, under the number 17895/14022100. The Gap and Haji Bridges, as well as Barracks Two, are in good condition.

1-1-1. Conservation Measures Gap Bridge

- A restoration and revitalization plan for this bridge was prepared in 2009.
- Restoration of the western cutwater of the bridge
- pointing and replacement of deteriorated and damaged materials
- Installation of an introductory sign
- Foundation consolidation and strengthening of the central spans

1-1-2. Conservation and Restoration activities of the Bashgah-e Afsaran Building

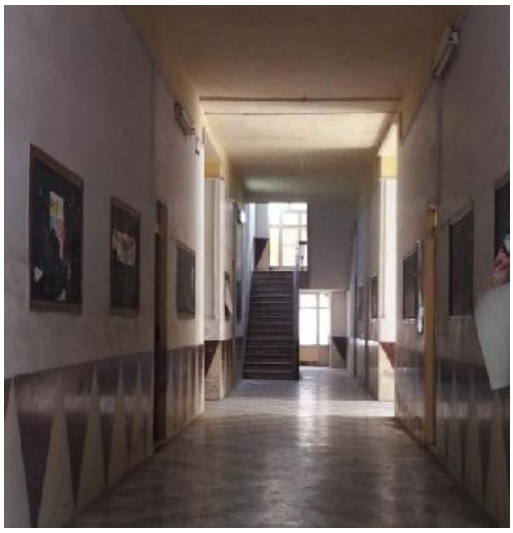
2018

- Removal of additions
- Complete structural reinforcement
- Moisture control and drainage system installation
- Removal of the deteriorated ceiling timber, and restoration base on the original pattern
- Removal of interior deteriorated plaster and exterior cement layers
- Replacement of deteriorated facade materials
- Replacement of deteriorated windows

2019

- Restoration of the first-floor ceiling and roof reinforcement
- Replacement of deteriorated flooring
- Application of internal plaster
- Replacement of wiring and improvement of the electrical system

After Restoration	Before Restoration
	
	
	



1-1-3. Conservation and Restoration Activities of Sarbaz-khaneh 1

2020 and 2021

- Removal of additions
- Complete structural reinforcement
- Moisture control and drainage system installation
- Removal of the deteriorated ceiling timber, and reconstruction adhering to the original pattern
- Removal of interior deteriorated plaster
- Removal of exterior cement layers
- Replacement of deteriorated facade materials and facade restoration
- Replacement of deteriorated windows

Restoration Activities in 2022 and 2023

- Construction of the first-floor ceiling and roof reinforcement
- Replacement of deteriorated flooring
- Application of plaster
- Installation of a suspended ceiling
- Replacement of wiring and improvement of the electrical system
- Reorganizing of the surrounding area

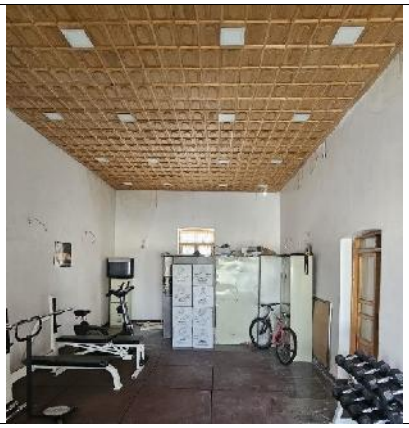
After Restoration	Before Restoration
	
	
	

1-1-4. Restoration activities on the Dezhbani Building in 2015 and 2016

Here’s a detailed translation:

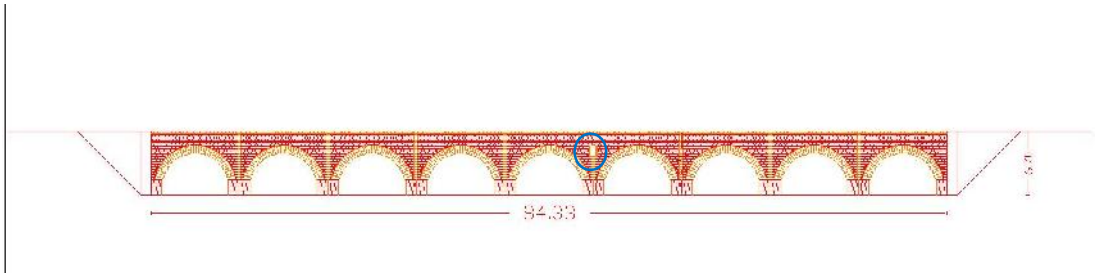
- Removal of additions and re-plastering
- Flooring with traditional material
- Restoration and Replacement of deteriorated some of the doors and windows
- Reinforcement of the roof and installation of a suspended ceiling
- Upgrade and safety of the electrical system

After Restoration	Before Restoration
	
	
	



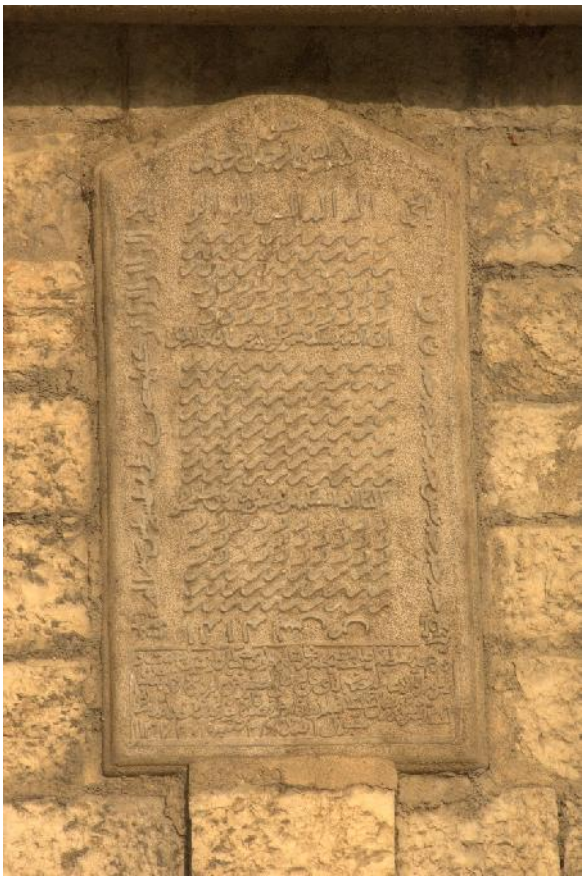
1-2. Explanations related to the Haji Bridge inscription

On the eastern side of the bridge, between the fourth and fifth piers, there is an inscription containing verse 41 of Surah Fatir, the Quranic introductory letter, and the phrase 'During the reign of His Imperial Majesty Reza Shah Pahlavi, this bridge was constructed through the efforts and funds of the great Mr. Haji Ali Asghar Khorramabadi, beginning on the middle of Sha'ban 1372 (April 29, 1953) and completed in 1374 (1954). May it be accepted as ongoing charity in the sight of God, the Almighty. Wednesday, May 5, 1953.



The Position of Haji Bridge Inscription

The Position of Haji Bridge Inscription



Haji Bridge inscription

1-3. The Shekasteh Bridge:

The Shekasteh Bridge was constructed over the Khorramabad River (Gelal River). Currently, the remains of 27 piers are all that remain. The bridge is oriented east-west. The location of the two remaining piers at the western end of the bridge is difficult to discern.
In terms of connectivity, the bridge was located on the Baghdad route, connecting the roads of Isfahan and even Ray to Ctesiphon or Baghdad via Khorramabad and crossing the Kashkan and Sartarehan bridges.
The first reports of the Shekasteh Bridge date back to the 19th century. (Debode, 1992, p. 161) (Najm al-Mulk, 1983, p. 17, Bishop, p. 244) (Demorgan, 1960, p. 214). These reports primarily refer to the condition of the bridge and provide an image of a bridge that was undoubtedly in a damaged state, which is why the bridge was named after its condition.
However, the first archaeological investigations of the bridge were carried out at the beginning of the 20th century by Ernst Hertzfeld, who attributed the construction date of the bridge to the findings of the buried city adjacent to the bridge. (Hertzfeld E. 1929.P. 73).
Of course, architectural and archaeological studies were also conducted on this bridge in subsequent years by other archaeologists and architects, and most of them attributed the construction date of the bridge to the Sassanian period (Kleiss, W, 1975, PP, 136-139) (Mollazadeh, Kazem, 1990, p. 212 citing Kleiss, 1994, P.249-51).
This attribution is based on two aspects: comparative analysis with other bridges in Lorestan and archaeological investigations.
Earlier reports indicate that the Shekasteh bridge had about 29 or 30 piers (Herzfeld reported 29 arches, Emami and Shoushtari reported 30 arches, and Hamid Eizadpanah reported 28 arches). Currently, 27 piers are discernible. Due to their distance from the water, the eastern piers not only have smaller spans but are also quadrilateral in shape. Eleven eastern piers were constructed without any splashguards. The smallest span is between the first and second piers, measuring 2.5 meters. The spans gradually increase from east to west, with the largest span belonging to the middle piers (14 and 15) at approximately 7.8 meters.
The bridge piers were constructed using gray stones on the outer foundation and rubble stones with lime mortar on the interior (Technical and Soil Mechanics Laboratory of the Iranian Ministry of Roads and Urban Development, Tehran, April 1976, as cited by Ehsan Yarshater, Iranica, p. 452).
Currently, five arch spans remain on the bridge. The arches of the Shekasteh bridge were constructed using local materials, including stone and a type of gypsum, and possibly using wooden formwork for the larger spans. The height of the arches from the ground level to the apex is approximately 8.6 meters, and the average width of the arch spans is 7.5 meters.

1-3-1. Protection and Conservation:

The Shekasteh Bridge was registered as a national heritage list on August 27, 1973, under the number 2/1058. Additionally, the regulations for the site and buffer zone of the Broken Bridge were approved and issued on December 6, 2023, under letter number 14022100/17895.
In 2009, the Base conducted laser scanning, photogrammetry, and conservation of the bridge, along with the organization of the buffer zone of the Shekasteh Bridge in Khorramabad to enhance monitoring, protection and conservation.
The acquisition of lands around the Shekasteh Bridge and their conversion into green areas (as a protective buffer zone) in 2015 was another conservation measure implemented for the Shekasteh Bridge.

Before reorganizing around the bridge

After reorganizing around the bridge

Restoration activities:

- **2008:** Restoration of the bridge's splashguards(cutwater).
- **2008:** Restoration of a portion of the carved stonework on the body of the bridge.
- **2008:** Emergency conservation of the bridge's arches.
- **2009:** Application of a mud and straw plaster.
- **2010:** Completion of restoration of the bridge arches.

Restoration of the bridge's splashguards(cutwater) - after restoration

Restoration of the bridge's splashguards - before restoration

Implementation of the protective structure of arches - after

Implementation of the protective structure of arches – before

restoration of bridge arches -after

restoration of bridge arches – before

Explanation:

As mentioned on page 107 of the nomination dossier report, currently, 5 arches of the Shekasteh Bridge remain. However, on page 299, Wilhelm Eilres describes the bridge in his visit, stating that there were 6 arches at that time (Eilres.w.1941.P.29). It seems that one of the remaining arches was destroyed due to a flood in the 1950s.

2.“Nomination Strategy”

The Prehistoric caves, rock-shelter, and the ensemble of the Falak-ol-Aflak contain significant archaeological evidence that collectively elucidates various archaeological phases in the Khorramabad Valley, providing a comprehensive understanding of the region's Prehistoric and historic occupations. The nominated caves and rock shelters of Khorramabad Valley in Central Zagros provide compelling evidence of Paleolithic communities settlements. Particularly during the Upper Paleolithic period, these sites showcase the archaeological remains of some of the most advanced communities in the Zagros region and Iran characterized by a sophisticated cultural framework that encompasses intricate symbolic behavioral patterns (e.g. Otte et al., 2007;2011; Shidrang 2015; 2018). The evidence of complex lithic industries and artistic-symbolic expression from this era indicates a significant leap in human societal structures and cultural identity, underscoring the valley's role as a critical center for human innovation and adaptation during the Upper Paleolithic. However, the significance of these caves extends beyond the Paleolithic era; they continued to be utilized by prehistoric and historical populations in Khorramabad Valley even after main human settlements transitioned from the caves to the valley floor. Archaeological findings reveal the presence of substantial fortifications from the Bronze Age atop the karst outcrop of Falak-ol-Aflak and the mound situated beneath Falak-ol-Aflak Castle (e.g. Bahrami 2022; Ghobadi-Zadeh 2024), while one of the cave, Kunji Cave, served as a prominent burial site for Bronze Age communities in the region (Emberling et al., 2002). Consequently, the archaeological record from Falak-ol-Aflak Castle, coupled with the rich burial contexts of Kunji Cave, offers valuable insights into the settlement patterns of the Bronze Age in Khorramabad Valley. From a broader perspective, the eight nominated cultural heritage sites within the Khorramabad Valley exhibit interconnections arising from their settlements' development in specific landforms shaped by the karst system. The karst landscape of the valley offers distinctive geological features, such as prominent caves and outcrops, which have facilitated human habitation during various prehistoric and historical periods. The elevated terrain, along with favorable morphological and hydrological conditions, has rendered these locations conducive for settlement.

- Three primary reasons have motivated us to submit the current collection of sites for inclusion on the World Heritage list. These reasons are summarized in the following sections:

1. The most compelling evidence of the main archaeological settlements in the Khorramabad Valley: These archaeological settlements in the Khorramabad Valley provide compelling evidence for the sustained presence of human populations from various Prehistoric, Historical, and Islamic periods up to the present day. This strategically significant location offers a comprehensive illustration of the cultural change, technological evolution, and adaptive strategies employed by its inhabitants, particularly within the context of the Karst system. The evidence indicates that humans have occupied this valley for at least 63,000 years, and the abundant cultural artifacts and remnants they have left behind, particularly in comparison to adjacent regions, highlight the Khorramabad Valley's distinctive status as a unique ecological and cultural niche within the Zagros.

2. Outstanding archaeological value of each component of the collection: Prehistoric caves in the Khorramabad Valley serve as valuable repositories of information regarding the life strategies and technological advancements of early human populations at both regional and inter-regional levels. Notably, during the Upper Paleolithic period, the Khorramabad Valley was home to some of the most sophisticated Baradostian communities in the Zagros Mountains and Iran, characterized by intricate cultural practices that included the manifestation of complex symbolic behaviors. In close proximity to these caves lies the prominent karst formation of Falak-ol-Aflak, which contains archaeological evidence spanning the late Neolithic, Chalcolithic, Bronze Age, Iron Age, and historical and Islamic periods (e.g. Mousavi Haji et al., 2014; Bahrami 2022; Ghobadi-Zadeh 2024). Although the caves themselves have yielded limited evidence from these later periods, they nonetheless reflect the evolving settlement patterns of human societies in the Khorramabad Valley over time (e.g. Hole and Flannery 1967; Hole 1970; Bazgir et al., 2014, 2017). A particularly significant connection between the archaeological findings in the caves and the archaeological mound of Falak-ol-Aflak is represented by the discovery of Bronze Age tombs and burials within Kunji Cave (Speth 1971; Emberling et al., 2002). The Bronze Age burials found in Kunji Cave are distinctive, as they represent the only known Bronze Age tombs located within a cave in Iran, containing a substantial number of human remains along with remarkable burial artifacts. Kunji Cave tombs in association with Falak-ol-Aflak mound provide us with the best evidence of the Bronze Age settlement pattern in the region.

3. Interconnected values: Another essential value that unifies the different components of this collection of sites within the Khorramabad Valley—encompassing both Prehistoric settlements, Historical and Islamic architectural heritages—lies in the unique morphological and hydrological characteristics of this karst valley, along with its associated natural resources (e.g. Moradipour et al., 2020). This region has cultivated a dense and distinctive biosphere in the central Zagros, serving as both a cradle for human habitation and a vital corridor for population movements across north-south and east-west axes. Khorramabad Valley stands out as one of the most strategically significant valleys in the Zagros Mountains, having been inhabited by humans from Prehistoric times to the present. It provides a crucial link between settlement areas located in the northern Zagros and those in the southern regions, facilitating access to the Iranian plateau as well as to the lower elevation areas of Khuzestan and Mesopotamia. The Prehistoric caves and the underlying mound of the Falak-ol-Aflak castle are closely associated with the karst formations of the valley. Their elevated positions and proximity to reliable freshwater sources render them prime locations for archaeological evidence of human settlement throughout various periods. This valley is recognized as one of the few verdant oases in a predominantly semi-arid region, characterized by its abundant water resources, which have significantly influenced the patterns of habitation and resource utilization by past human populations.

- In the letter of additional information request, ICOMOS highlighted that according to paragraph 137 of the *Operational Guidelines for the Implementation of the World Heritage Convention,* the Component parts should reflect cultural, social, or functional links over time, that provide, where relevant, landscape, ecological, evolutionary or habitat connectivity".

In this regard, in PCFEKV, we have proposed eight cultural heritage sites for inclusion on the World Heritage list which comprise five caves and a rock shelter featuring multiple layers of occupation that span the Prehistoric, Historical, and Islamic Periods. These sites are associated with the Falak-ol-Aflak complex, particularly the archaeological mound situated beneath the castle, which shares similar archaeological stratigraphy with the sequences found within the caves (e.g. Mousavi Haji et al., 2014; Bahrami 2022; Ghobadi-Zadeh 2024). Collectively, these sites are recognized as a significant settlement area for human populations, ecologically linked to a singular geological formation—the karst system of the Khorramabad Valley—along with its associated natural resources. The unique characteristics of this narrow valley, particularly its abundance of karst-related water resources and the rich ecosystems they support, have rendered it a densely populated habitat for humans from the Middle Paleolithic period to the present in compare to other regions of central Zagros. This landscape illustrates the dynamic evolution of human settlement patterns over time. Notably, as time progressed, the significance of the caves as primary habitation sites (particularly during the Paleolithic era) diminished as communities began to establish settlements in the karst outcrops located closer to the valley floor, such as those beneath the Falak-ol-Aflak Castle. Despite this shift, the caves continued to serve important roles for communities in the Khorramabad Valley in more recent historical contexts.

A prominent exemplification of this transition in settlement patterns is observed in the archaeological remains from the Bronze Age in Khorramabad Valley. Here, Kunji Cave shifted its function from a habitation site to a burial location, reflecting changes in the use of space and the cultural practices of the period (e.g.Emberling et al. 2002). Concurrently, Falak-ol-Aflak Castle remained an active settlement, likely serving as a fortified location offering defensive capabilities during the same time frame. This interplay between the caves and above-ground settlements underscores the intricate relationships between human habitation, cultural practices, and the ecological dynamics of the Khorramabad Valley over millennia.

The prehistoric significance of the nominated caves and rock shelters within Khorramabad Valley is particularly pronounced during the Paleolithic era. A substantial number of excavated archaeological sites from this period, recognized as reference sites for Iranian Paleolithic archaeology, are located within this narrow valley. This region is notable for its rich Paleolithic archaeological record, which underscores its historical significance and provides compelling reasons for its nomination for World Heritage status.

The Khorramabad Valley has revealed important evidence related to the culture of Upper Paleolithic hunter-gatherers, particularly in terms of their behavioral patterns and lithic technologies. These discoveries position the valley as a key area for understanding the Upper Paleolithic period in both Iran and Southwest Asia. What distinguishes the Upper Paleolithic Baradostian communities of Khorramabad from other areas in the Zagros Mountains and throughout Iran is their use of a variety of symbolic artifacts that are not found elsewhere in the region. Among these unique items are pendants made from deer canines and shells from the Persian Gulf, located approximately 500 kilometers from Khorramabad Valley (e.g.Otte et al., 2007; Shidrang 2007;2018). Given the density of Upper Paleolithic sites and the rich, distinctive evidence of Baradostian cultural practices, Khorramabad Valley stands out as an unparalleled location for examining the behavioral patterns of Upper Paleolithic societies—especially those linked to the Baradostian culture—on a global scale. This exceptional collection of archaeological findings emphasizes the valley's significance in the broader story of human cultural and technological evolution during the Upper Paleolithic era.

Conversely, the Bronze Age in the Khorramabad Valley is significantly illuminated mainly by two key archaeological sites: Kunji Cave and the remnants of fortifications located at the mound beneath Falak-ol-Aflak Castle. These findings are instrumental in reconstructing the settlement patterns characteristic of this period in the area.

The archaeological evidence from Kunji Cave is particularly compelling. In addition to revealing Middle Paleolithic settlements and transient habitation from the 4th millennium BCE, the cave has yielded Early Bronze Age funerary evidence. Notably, remains of 33 individuals have been excavated, alongside 62 remarkable pottery vessels, various metal artifacts, and an array of decorative beads and grave offerings. The existence of these tombs and significant burial practices within Kunji Cave affirms the ethnic identity of the communities inhabiting the Khorramabad Valley during the third millennium BCE. These groups constructed their ethnic sepulchers in elevated locations, strategically positioned to oversee crucial communication routes, while maintaining a distinct separation from their residential areas, which may have been located on the outcrop and the mound beneath Falak-ol-Aflak Castle.

Given the critical role that Khorramabad Valley plays in contributing to our understanding of a pivotal chapter in human history—extending beyond Iran to encompass Southwest Asia—it is imperative that these invaluable archaeological resources be preserved and supported. The unique cultural and historical significance of this region warrants both protection and recognition in the broader discourse of heritage conservation.

Attached to this response letter is a supplementary file providing further archaeological details regarding the aforementioned points.

3. Buffer Zone And Nominated Property Boundary

Important component to delineation of buffer zone of caves and rock-shelter

The buffer zone of the prehistoric caves and rock-shelter has been defined in order to protect the values of the property, including the physical and natural values related to prehistoric caves and shelters.

- **Conservation of Important component for prehistoric occupation such as:**
- Water sources
- Animal diversity
- Plant diversity
- **Conservation of cave structure from:**
- Mining
- Road development
- Development of urbanization
- Pollution such as air pollution or dust pollution
- **Conservation of environment that linked to prehistoric occupation**

Basis of buffer zone delineation of caves and rock-shelter

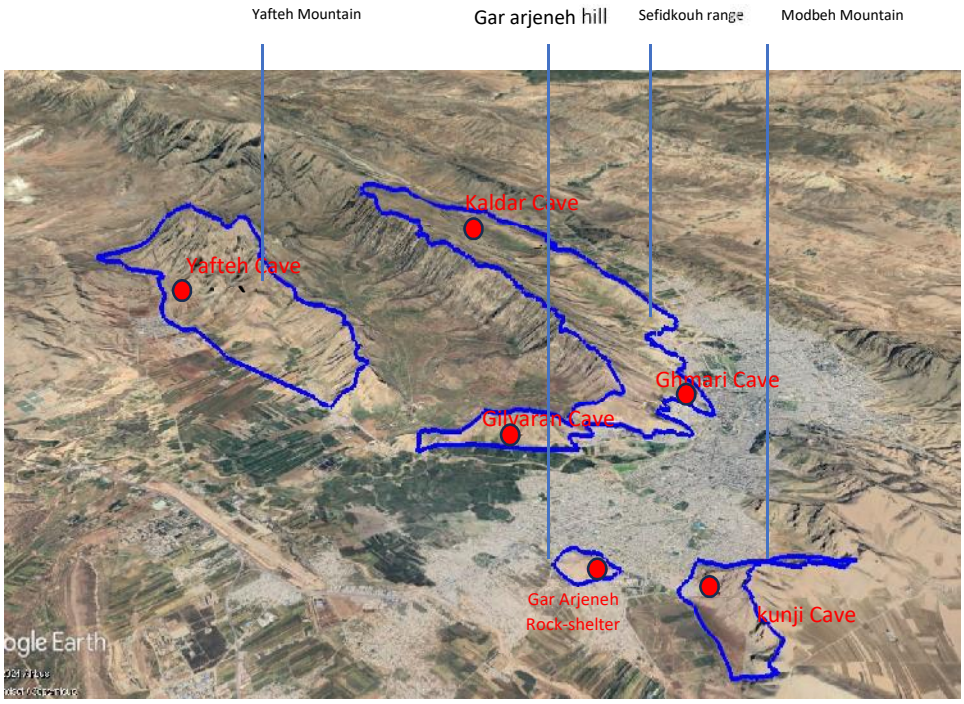
Buffer zone consist of one side of mountain that overlooking the Khorramabad Valley

- Sefidkooh range
- Yateh mountain
- Modbeh mountain

Because:

- Prehistoric occupation and its basic component occurred in one side that overlooking the Khorramabad Valley
- To monitoring of buffer zone needed to line of buffer zone be recognized by natural topography

The buffer zone of caves and rock-shelter extends from the crest-line of the mountain to the thalweg of the valley.



Regulation of Prehistoric Caves and Rock-Shelter Buffer Zone:

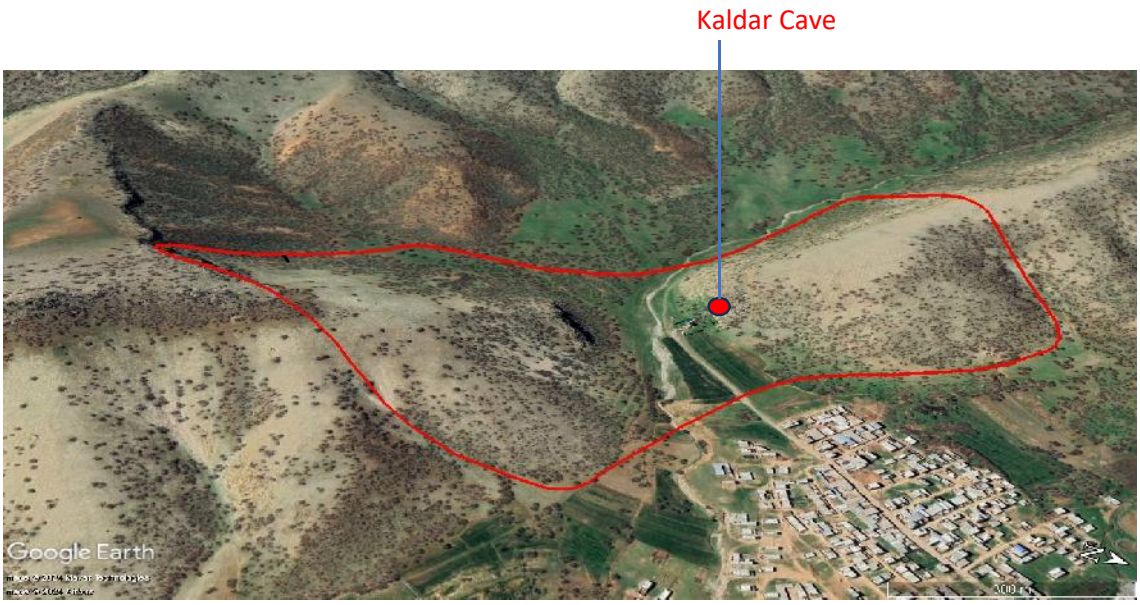
1-Construction of any kind of large factories or workshops, industrial facilities, polluting industries, excavation activities, mining, installing of vibratory equipment etc. which have the potential to harm the function, structure and landscape integrity of Prehistoric Caves and Rock-shelters of Khorramabad Valley is forbidden.

2-Any kind of harming or damaging natural and animal habitats within the boundaries of the Buffer Zone is not allowed. (Natural protected areas must be protected according to the regulations of the Department of Environment).
3-Any change, damage or harm to vegetation, endangering the floral variety or planting species not indigenous to the region within the limits of the property is prohibited.
4-Changing the path of rivers, streams, waterways, etc. which constitute an integral part of Paleolithic cave settlements is not allowed.
5-Any developing or building activity, expanding road networks as well as urban or rural infrastructures, installation of poles, electricity transmission cables, etc. is subject to acquiring a permit from the IMCHTH.
6-Any urban and rural development within the area should take place based on an optimal plan verified by the above-said IMCHTH.
7- Regulations pertaining to the core zone of the property also apply to all Caves and rock-shelters within its buffer zone.
8- Setting up facilities for tourist attraction and site introduction is only allowed after provision of a plan approved by IMCHTH and operating under its supervision.
5- Farming activity is allowed only if it does not harm the landscape, structural and functional integrity after the approval of the IMCHTH.
10- The maximum authorized height for any construction inside the buffer zone determined according to the approved urban and rural detailed plan

Important component to delineation of nominated property of caves and rock-shelter
The core zone has been outlined in such a way that it not only covers the main physical body of the caves and rock-shelter but also major areas related to prehistoric settlement in it.
It's important to conserve all value of nominated property.

- **Conservation of Important component for prehistoric occupation such as:**
- Water sources
- Stone sources such as flake core
- **Conservation of cave structure and its adjacent area**
- **Conservation of environment that linked to prehistoric occupation**
- **Considering authenticity and integrity of nominated property**

1- Basis of core zone delineation of Kaldar cave
As the cave overlooks a gorge which satisfied the security and subsistence needs of cave dwellers, the whole gorge has been added to the core zone because it played a key role in cave dwelling. Therefore, the southern section of the core zone passes through the ridge line of the hill overlooking the gorge containing points
The entire elevation north of the gorge and the hill containing the cave, has been specified as the core zone as far as the break point of the two elevations



Regulation of Core Zone:

1- The following activities as well as any other interventions within the area harming the foundation of the property are strictly prohibited: Any kind of construction, instalment of poles and electricity transmission cables as well as any changes in the topography of the cave or its entrance (as well as its obstruction), accumulation of earth, mining (i.e., stone mining), excavation for mines, relocation of rocks, hammering nails into cave walls, carving or writing graffiti on them.

2- Any kind of human settling, animal husbandry, starting a fire, temporary residence or any other human activity damaging the foundation of the property is banned whether inside or outside of the cave.

3- Preventing the habitation of animals which naturally dwell in cave and rock-shelters is prohibited.

4- Any research activity including archaeological excavations, conservation, restoration and revitalization is permitted only after the provision of an approved plan and acquiring the permit of the IMCHTH.

5- Any alteration in those interior or exterior water sources which serve as historical constituents of the cave is forbidden.

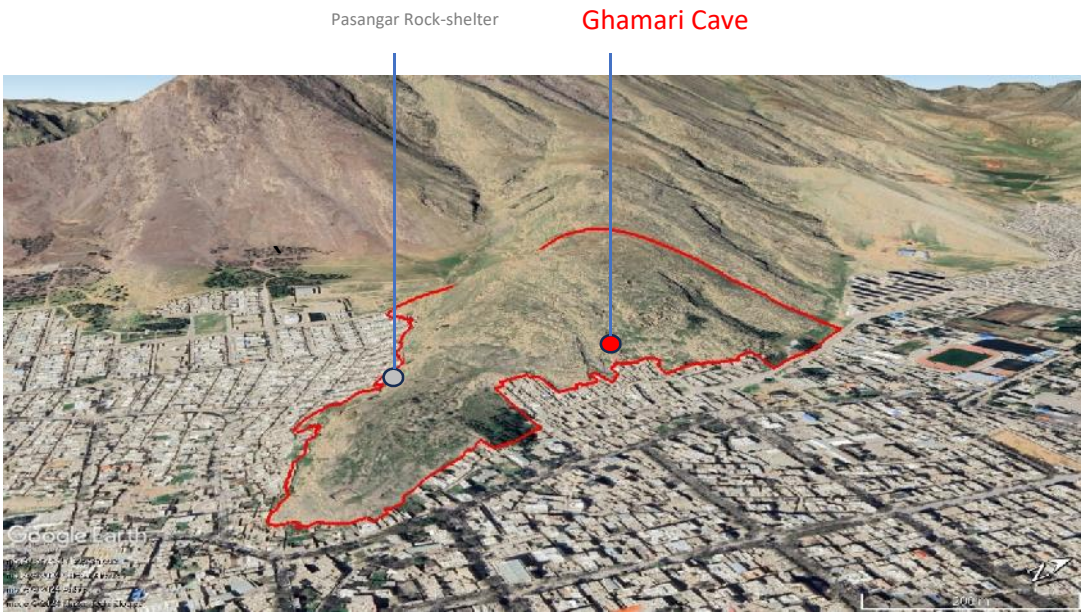
6- Existing building of the environment protection Base inside the core zone will remain untouched due to the importance of protecting native plants and animals but its expansion within the core zone is forbidden.

7- Any change of land use in the Core zone is forbidden.

2- Basis of core zone delineation of Ghamari cave

The area encompasses a gorge in its north and a hill in its south of which the southern hill overlooks the valley and has served as the venue for prehistoric settlement including the Pa-Sangar area.

This area located within the eastern limits of the core zone on the edge of the urban area and cover the natural virgin lands. In addition, it’s in the south on the edge of the urban area and upon the thalweg of the hill



Regulation of Core Zone:

1- The following activities as well as any other interventions within the limits of the property harming its foundation are strictly prohibited: Any kind of building construction, instalment of poles and electricity transmission cables as well as any changes in the topography of the cave and rock-shelter or their entrance (as well as their obstruction), accumulation of earth, mining (i.e. stone mining), excavation for mines, relocation of rocks, hammering nails into cave walls, carving or writing graffiti on them.

2- Any kind of human settling, animal husbandry, starting a fire, temporary residence or any other human action damaging the foundations of the cave and the rock-shelter is banned whether inside or outside of them.

3- Preventing the habitation of animals which naturally dwell in cave and rock-shelters is prohibited.

4- Any research activity including archaeological excavations, conservation, restoration and revitalization is permitted only after formulating an appropriate plan and obtaining the permit of the IMCHTH.

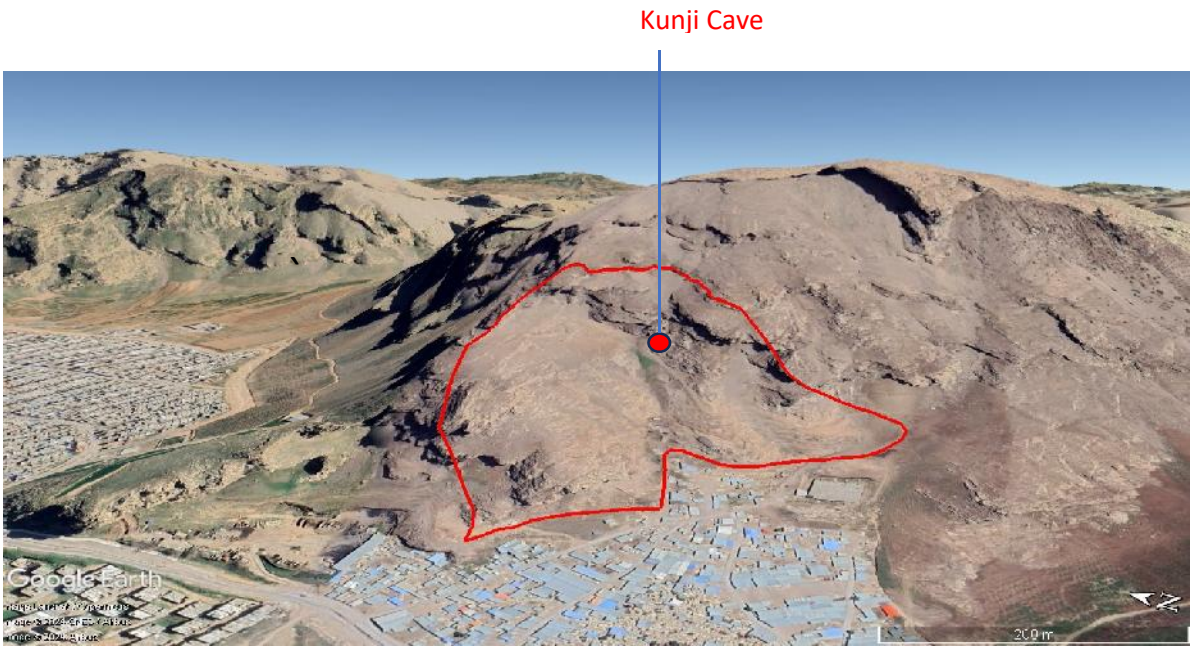
5- Any alteration in those interior or exterior water sources which serve as part of the core zone of the property existing in the cave and the rock-shelter is forbidden.

6- Any change of land use in the Core zone is forbidden.

3- Basis of core zone delineation of Kunji Cave

The core zone of Kunji cave includes the body of the cave as well as its surrounding area which is considered the main place to supply the basic needs for living in this area.

This area includes a gorge that not only provided access to the cave from the valley but also supplied necessary resources for living in the cave as well as security.



Regulation of Core Zone:

1-The following activities as well as any other interventions within the area harming the foundation of the property are strictly prohibited: Any kind of construction, instalment of poles and electricity transmission cables as well as any changes in the topography of the cave or its entrance (as well as its obstruction), accumulation of earth, mining (i.e., stone mining), excavation for mines, relocation of rocks, hammering nails into cave walls, carving or writing graffiti on them.

2-Any kind of human settling, animal husbandry, starting a fire, temporary residence or any other human activity damaging the foundation of the property is banned whether inside or outside of the cave.

3- Preventing the habitation of animals which naturally dwell in Caves and Rock-Shelter is prohibited.

4-Any research activity including archaeological excavations, conservation, restoration and revitalization is permitted only after the provision of an approved plan and acquiring the permit of the IMCHTH.

5-Any alteration in those interior or exterior water sources which serve as historical constituents of the cave is forbidden.

6- The development of the cemetery in the core zone is prohibited.

7- Any change of land use in the Core zone is forbidden.

4- Basis of core zone delineation of Gilvaran cave

The core zone of the cave covers its physical body as well as its circumferential areas which served as the main source of livelihood for cave dwellers.

This area encompasses water sources as well as temporary shelters which had direct relation with human dwelling in the cave.

The line of core zone is located on the ridge line of the cliff above the cave and in south its on a historical stream flowing south of the cave.

Regulation of Core Zone:

1- The following activities as well as any other interventions within the limits of the property harming its foundation are strictly prohibited: Any kind of building construction, instalment of poles and electricity transmission cables as well as any changes in the topography of the cave and rock-shelter or their entrance (as well as their obstruction), accumulation of earth, mining (i.e. stone mining), excavation for mines, relocation of rocks, hammering nails into cave walls, carving or writing graffiti on them;

2- Any kind of human settling, animal husbandry, starting a fire, temporary residence or any other human action damaging the foundations of the cave and the rock-shelter is banned whether inside or outside of them;

3- Preventing the habitation of animals which naturally dwell in cave and rock-shelters is prohibited;

4- Any research activity including archaeological excavations, conservation, restoration and revitalization is permitted only after formulating an appropriate plan and obtaining the permit of the IMCHTH.

5- Any alteration in those interior or exterior water sources which serve as part of the core zone of the property existing in the cave and the rock-shelter is forbidden.

6- Any change of land use in the Core zone is forbidden.

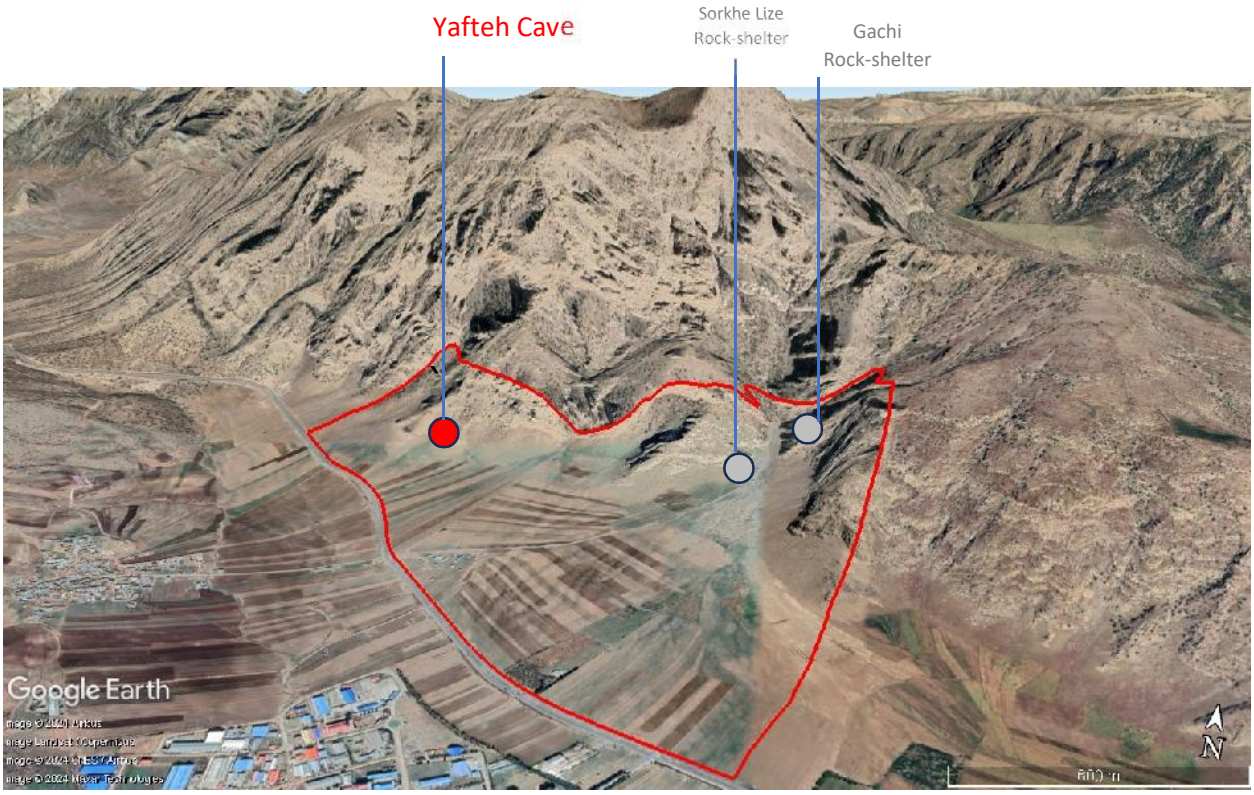
5- Basis of core zone delineation of Yafteh cave

The core zone includes the body of the cave as well as its surrounding area which is considered the main place to supply the basic needs of those living in this area.

In this area, in addition to water resources, there are hunting grounds and temporary Rock-Shelters like Sorkhe lizeh and Gachi that were directly linked to living in this cave.

All of them are located in a gorge, which is considered the main source of livelihood in this area.

The south of the core zone is located in the edge of the Khorramabad Road to Koohdasht. The north of the core zone is located on the ridge line of a rock overlooking the gorge and the Yafteh Cave.



Regulation of Core Zone:

1- The following activities as well as any other interventions within the limits of the property harming its foundation are strictly prohibited: Any kind of building construction, instalment of poles and electricity transmission cables as well as any changes in the topography of the cave and rock-shelters or their entrance (as well as their obstruction), accumulation of earth, mining (i.e. stone mining), excavation for mines, relocation of rocks, hammering nails into cave walls, carving or writing graffiti on them.

2- Any kind of human settling, animal husbandry, starting a fire, temporary residence or any other human action damaging the foundations of the cave and the rock-shelters is banned whether inside or outside of them.

3- Preventing the habitation of animals which naturally dwell in cave and rock-shelters is prohibited.

4- Any research activity including archaeological excavations, conservation, restoration and revitalization is permitted only after formulating an appropriate plan and obtaining the permit of the IMCHTH.

5- Any alteration in those interior or exterior water sources which serve as part of the core zone of the property existing in the cave and the rock-shelters is forbidden.
6- Any change of land use in the Core zone is forbidden.

6- Basis of core zone delineation of Gar Arjeneh Rock-Shelter

The core zone of Gar Arjeneh includes the body of the Rock-Shelter as well as its surrounding area, which is considered the main place to provide the basic needs of living in this area.
Because the Rock-Shelters are located in the wall of a height, their core zone also includes its natural bed.
The line of core zone is extended on the crest line of a cliff where the shelter is located. Its also located in the south of the core zone on the thalweg of the hill.

Regulation of Core Zone:

1-The following activities as well as any other interventions within the area harming the foundation of the property are strictly prohibited: Any kind of construction, instalment of poles and electricity transmission cables as well as any changes in the topography of the Rock-Shelter or its entrance (as well as its obstruction), accumulation of earth, mining (i.e., stone mining), excavation for mines, relocation of rocks, hammering nails into cave walls, carving or writing graffiti on them;
2-Any kind of human settling, animal husbandry, starting a fire, temporary residence or any other human activity damaging the foundation of the property is banned whether inside or outside of the Rock-Shelter;
3- Preventing the habitation of animals which naturally dwell in cave and rock-shelters is prohibited;

4-Any research activity including archaeological excavations, conservation, restoration and revitalization is permitted only after the provision of an approved plan and acquiring the permit of the IMCHTH.

5-Any alteration in those interior or exterior water sources which serve as historical constituents of the Rock-shelter is forbidden.

6- Any change of land use in the Core zone is forbidden.

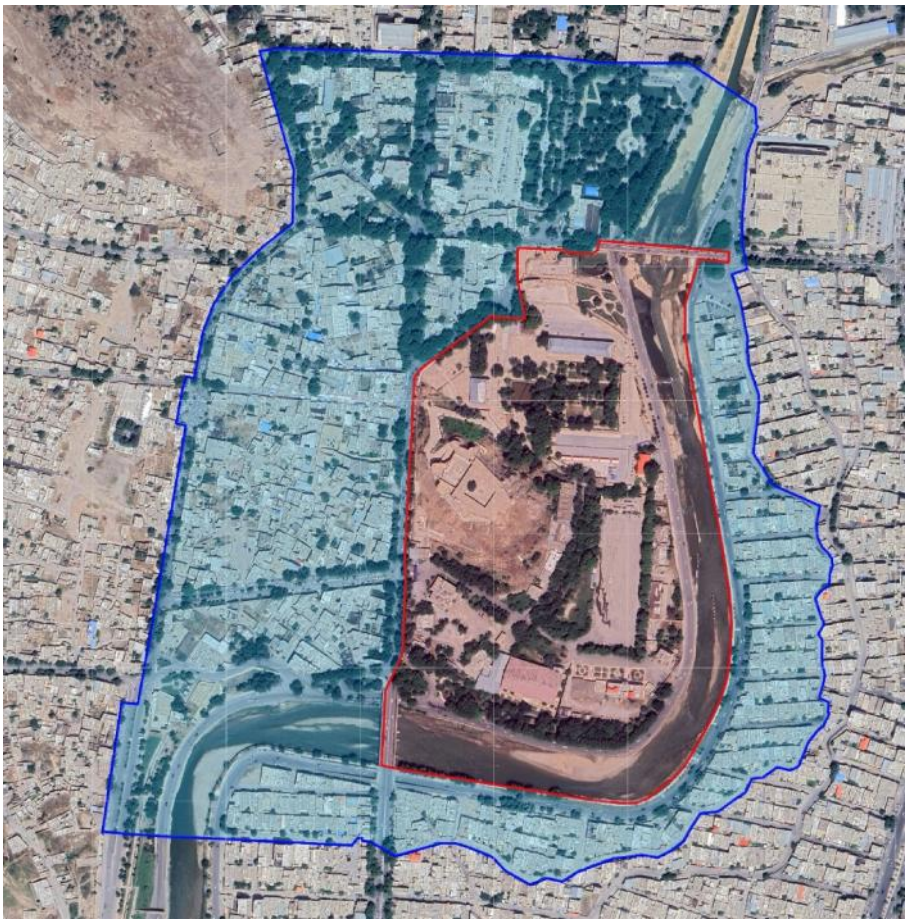
7- Basis of Buffer zone delineation of Falak**-ol-Aflak Ensemble**

According to the topography of the castle, which is located on top of a natural hill, the east of the ensemble has a large height difference with its west.

Also, to the west of the castle is the historical fabric of the city of Khorramabad. As a matter of fact, part of the interactions of the Ensemble was with this urban fabric.

Because of the topography of the castle and the height difference in its east and west, the boundaries of the buffer zone in parts A and B have different height regulations and various specific criteria.

- The line of buffer zone is located in the west of the Falak-ol-Aflak ensemble at a greater distance from the ensemble in order to provide physical, landscape and functional conservation. They also include that part of the historical fabric of the city of Khorramabad which was related to the castle.
- The line of buffer zone in the east of the ensemble are closer to it due to the height difference between the east and the west of the ensemble; this implies physical, functional and visual conservation of the ensemble



Regulation of Buffer Zone:

1- Any construction, disturbing activities such as pollutant industrial actions, installing vibrating devices, poles and electricity transmission lines, changing the topography, cutting trees, or any activity that damages the integrity of the property and its foundation is strictly prohibited.

2- Various development activities, including the provision of urban equipment and facilities, as well as introduction of novel facade designs and types of materials in new constructions, require consultation and coordination with the IMCHTH.

3- Any change of the function, distribution or unification of plots is prohibited in this area.

4- Obstructing, polluting or modifying the course of the Gelal river is illegal.

5- Maximum permitted height of construction in zone A of the buffer zone, situated at the east of the property, is 10.5 meters from the floor of the adjacent route. But in zone B, which is located west of the property, it is 7.5 meters from the floor of the adjacent path.

6- Widening the paths going through zone B is prohibited.

Regulation of Core Zone:

1- Any construction, installation of poles and power transmission lines, changes in the topography, digging water wells, polluting the river and the natural spring, mining, excavation, installation of vibrating and polluting devices, cutting trees in this area is forbidden if the integrity and authenticity of the property is harmed.

- Note: If providing tourism facilities, removal of non-valuable structures, construction or development of new structures is urgent, it will be allowed only after devising a proper plan and with the permission and supervision of the IMCHTH.

2- Any changes in the condition of the gardens of the ensemble, blocking the Golestan spring, polluting the spring water, cutting down trees and changing the course of streams are prohibited.

3- Any type of research activity including archaeological excavations as well as any kind of conservation, restoration and revitalization will only be allowed with the permission of the IMCHTH.

4- Changing the river course, blocking and/or polluting the Gelal River which is regarded as part of the integrity of the property is forbidden.

8- Basis of Buffer zone delineation of Shekaste Bridge

The buffer zone of the Shekaste bridge has been determined according to the values of the property as well as the characteristics related to it.

The buffer zone boundaries of the Shekaste bridge have been formulated in such a way that, in addition to the physical, visual and functional conservation of the bridge, it can also be easily recognized.

The line in the east of buffer zone, extend from the vicinity of the riverside as far as the end of Shapuri Park parallel to Baharestan Boulevard.

Also, the extension of line in the north of buffer zone has continued parallel to Behesht Bridge.

In the west of buffer zone, the extension of line continues parallel to the end of farmlands.

Regulation of Buffer Zone:

1- Performing any constructions and/or disturbing activities such as pollutant industrial actions, installing vibrating devices, poles and electricity transmission lines, changing the topography,

cutting trees, or any activity that might damage the integrity of the property and its foundation is prohibited.
2- Any alteration of the function as well as division or aggregation of plots is prohibited in this area.
3- Blocking, polluting or changing the course of the Gelal river is illegal.
4- It is prohibited to build a new path, to widen the existing paths and to pave the dirt road in this area.
5- Farming activity is allowed only if it does not harm the landscape integrity after the approval of the IMCHTH.
6- Installing property introduction boards and tourism guide kiosks is allowed only after preparing the plan, acquiring the approval of the IMCHTH and implementing under its supervision.
7- Any alterations in the riverbed and the riverside as well as throwing garbage and construction waste into the river is forbidden.
8- Dredging the river will be allowed only with coordination and permission of the IMCHTH.

Regulation of Core Zone:

1- Any kind of constructions, installation of poles and/or power transmission lines as well as changing the topography, polluting the river and using vibration machinery or any instruments polluting the environment in the area is prohibited.
2- Any type of research activity including archaeological excavations as well as any kind of conservation, restoration and revitalization will only be allowed with the permission of the IMCHTH.
3- It is forbidden to change the river course, to block and/or pollute Gelal River which is considered an integral part of the property.

4- Legal Protection

Prehistoric Caves and Falak-ol-Aflak ensemble in Khorramabad valley were approved on December 6, 2023, and was notified to the province by the Iranian Ministry of Cultural Heritage, Tourism, and Handicrafts under number 14022100/17895. Within this area, before any intervention, the Khorramabad Municipality must request a permit from the Lorestan Provincial Department of Cultural Heritage, Tourism, and Handicrafts.

Feasibility studies for large-scale industrial projects within this area will be conducted to measure the impact of such projects on the universal and national values of this area. If the projects have a negative impact on the universal and national values, the permit will not be issued."

جمهوری اسلامی ایران

وزارت میراث فرهنگی، گردشگری و صنایع دستی

در اجرای بند دوازدهم از ماده سوم قانون اساسنامه سازمان میراث فرهنگی کشور، مصوب ۱۳۶۷ و مواد مربوطه از قانون راجع به حفظ آثار ملی مصوب ۱۳۰۹ و مقررات نظام نامه اجرایی آن ، بدینوسیله **حدود حریم و ضوابط معماری و حفاظتی داخل حریم** آثار ملّی فرهنگی-تاریخی **«غارهای پیش از تاریخ و مجموعه فلک الافلاک دره خرم آباد»** واقع دراستان **لرستان**، شهرستان **خرم‌آباد** که به شرح ذیل در فهرست آثار ملی ایران به ثبت رسیده است تعیین و ابلاغ می گردد:

۱: «غار یافته»	به شماره ۴۱۴۵	در تاریخ ۱۳۸۰/۰۷/۱۰
۲: «غار کلدر»	به شماره ۱۸۷۹۶	در تاریخ ۱۳۸۵/۱۲/۲۸
۳: «غار اشکفت قمری»	به شماره ۴۱۴۴	در تاریخ ۱۳۸۰/۰۷/۱۰
۴: «غار کنجی»	به شماره ۴۱۴۳	در تاریخ ۱۳۸۰/۰۷/۱۰
۵: «پناه گاه صخره‌ای گیلوران»	به شماره ۵۹۷۱	در تاریخ ۱۳۸۱/۰۵/۰۸
۶: «پناه گاه سنگی گر ارجنه»	به شماره ۱۳۱۱۷	در تاریخ ۱۳۸۴/۰۵/۲۳
۷: «پناه گاه صخره‌ای گچی»	به شماره ۵۹۶۷	در تاریخ ۱۳۸۱/۰۵/۰۸
۸: «پناه گاه صخره‌ای سرخه لیزه»	به شماره ۵۹۷۳	در تاریخ ۱۳۸۱/۰۵/۰۸
۹: «غار آب زاده»	به شماره ۵۹۶۹	در تاریخ ۱۳۸۱/۰۵/۰۸
۱۰: «پل شکسته»	به شماره ۱۰۵۸	در تاریخ ۱۳۵۴/۰۲/۱۵
۱۱: «قلعه فلک الافلاک»	به شماره ۸۸۳	در تاریخ ۱۳۴۸/۰۷/۱۰
۱۲: «پل گپ (پل بزرگ)»	به شماره ۲۳۵۴	در تاریخ ۱۳۷۸/۰۳/۱۷
۱۳: « سربازخانه یک (ساختمان دانشگاه محوطه قلعه) »	به شماره ۳۷۶۵	در تاریخ ۱۳۸۰/۰۲/۱۸
۱۴: «باشگاه افسران و باغ ارم»	به شماره ۹۹۷۲	در تاریخ ۱۳۸۲/۰۶/۲۳
۱۵: «پل حاج علی اصغر خرم آبادی»	به شماره ۳۲۳۳۷	در تاریخ ۱۳۸۲/۰۶/۲۳
۱۶: « بنای دژبانی (ساختمان بانک تجارت در دانشگاه لرستان)»	به شماره ۹۹۷۱	در تاریخ ۱۳۸۲/۰۶/۲۳

حدود حریم و ضوابط معماری و حفاظتی داخل حرایم: **طبق نقشه و ضوابط پیوست**

شماره ابلاغ : ۱۴۰۲۲۱۰۰/۱۷۸۹۵

تاریخ ابلاغ: ۱۴۰۲/۰۹/۱۵

علیرضا ایزدی

مدیرکل ثبت و حریم آثار و حفظ و احیاء میراث معنوی و طبیعی

علی دارابی

قائم مقام وزیر و معاون میراث فرهنگی کشور

Notification of the Buffer Zone and Boundaries of Prehistoric Caves and the Falak-ol-Aflak Ensemble in Khorramabad Valley

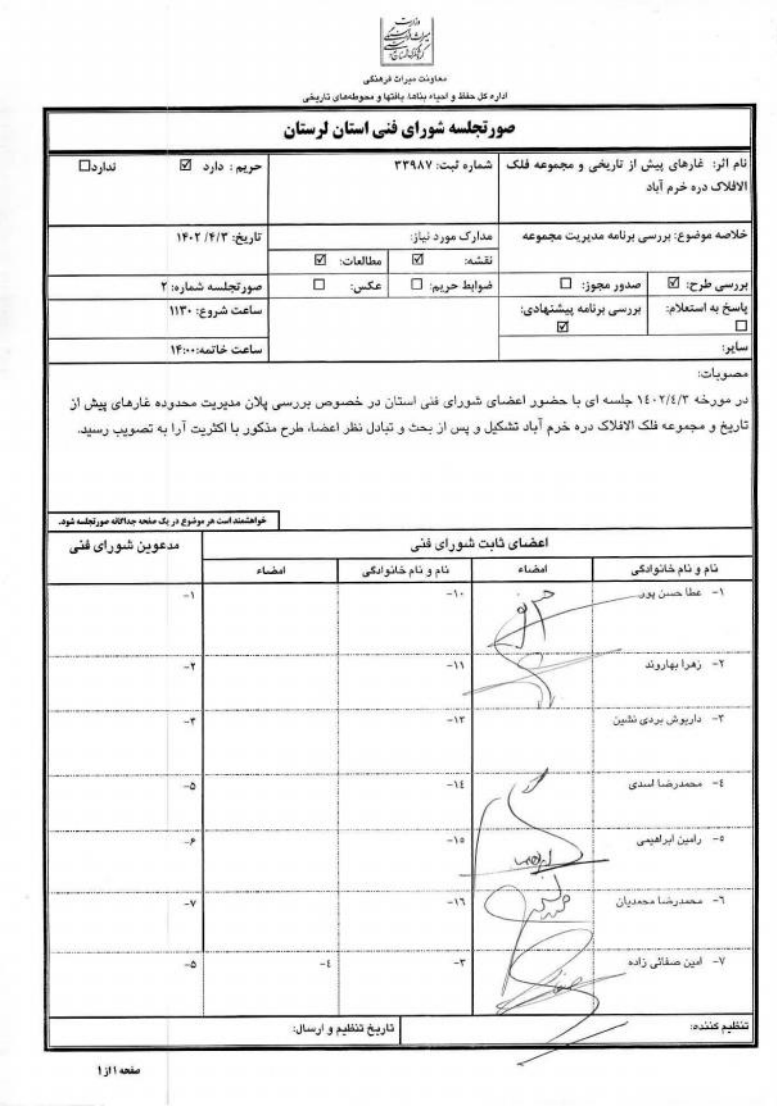
5. Principles and Standards of Conservation

The interventions and restoration activities carried out at the Falak-ol-Aflak ensemble are based on national guidelines and international charters such as the Venice Charter. Accordingly, restoration works have been carried out based on historical documents with an emphasis on preserving the authenticity of materials, construction techniques, and the original design. According to Article 3, Paragraph 11 of the Cultural Heritage Charter Law, it is the duty of the Cultural Heritage Organization to express an opinion regarding the feasibility of implementing all comprehensive and detailed development plans in order to prevent damage to historical monuments.

Furthermore, according to the regulations of Article 114, Paragraph (c) of the Fourth Development Plan Law, all executive agencies must conduct historical and cultural studies before starting construction operations and comply with the regulations and standards for the protection of historical and cultural heritage. Therefore, before initiating any construction projects within this area, the municipality must consult with the Lorestan Provincial Department of Cultural Heritage, Tourism, and Handicrafts, and implement the considerations announced by the department regarding the protection of historical monuments and tangible heritage.

6. Management Plan for the Prehistoric Caves and the Falak-ol-Aflak ensemble

The management plan for the prehistoric caves and the Falak-ol-Aflak ensemble was approved on 24/06/2023 by the Technical Council of the Lorestan Provincial Department of Cultural Heritage, Tourism and Handicrafts. This council comprises expert specialists in restoration, architecture, archaeology, and urban planning. To date, over 90% of the short-term plan has been implemented."



معاونت میراث فرهنگی
اداره کل حفظ و احیاء بناها، بافتها و محوطه‌های تاریخی

صورتجلسه شورای فنی استان لرستان

نام اثر: غارهای پیش از تاریخی و مجموعه فلک الافلاک دره خرم آباد	شماره ثبت: ۳۳۹۸۷	حریم: دارد ☑ ندارد ☐
خلاصه موضوع: بررسی برنامه مدیریت مجموعه	مدارک مورد نیاز: نقشه: ☑ مطالعات: ☑	تاریخ: ۱۴۰۲/۴/۳
بررسی طرح: ☑ صدور مجوز: ☐	ضوابط حریم: ☐ عکس: ☐	صورتجلسه شماره: ۲
پاسخ به استعلام: ☐ بررسی برنامه پیشنهادی: ☑		ساعت شروع: ۱۱۳۰
سایر:		ساعت خاتمه: ۱۴:۰۰

مصوبات:

در مورخه ۱۴۰۲/۴/۳ جلسه ای با حضور اعضای شورای فنی استان در خصوص بررسی پلان مدیریت محدوده غارهای پیش از تاریخ و مجموعه فلک الافلاک دره خرم آباد تشکیل و پس از بحث و تبادل نظر اعضا، طرح مذکور با اکثریت آرا به تصویب رسید.

خواهشمند است هر موضوع در یک صفحه جداگانه صورتجلسه شود.

اعضای ثابت شورای فنی				مدعوین شورای فنی
نام و نام خانوادگی	امضاء	نام و نام خانوادگی	امضاء	
۱- عطا حسن پور		۱۰-		۱-
۲- زهرا بهاروند		۱۱-		۲-
۳- داریوش بردی نشین		۱۲-		۳-
٤- محمدرضا اسدی		۱٤-		٥-
٥- رامین ابراهیمی		۱٥-		٦-
٦- محمدرضا مجدیان		۱٦-		۷-
۷- امین صفائی زاده		۳-	٤-	٥-

تنظیم کننده: تاریخ تنظیم و ارسال:

صفحه ۱ از ۱

Minutes of the Provincial Technical Council regarding the approval of the management plan

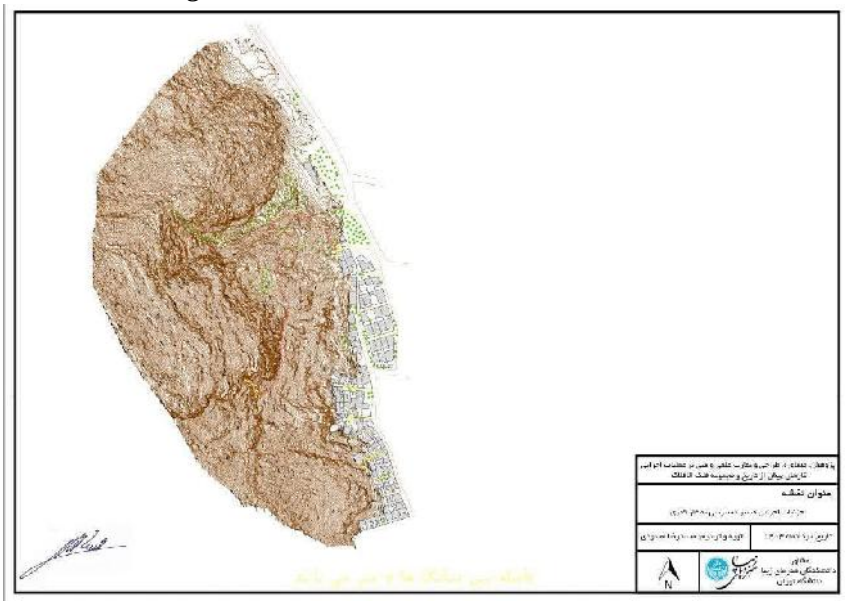
Short-Term Programs Physical Progress Table

Title	Program	Progress percentage
Research and documentation	Completion of excavation and stratification studies of the Falak-ol-Aflak Castle to achieve archaeological Locos and the sequence of its settlement periods	**100**

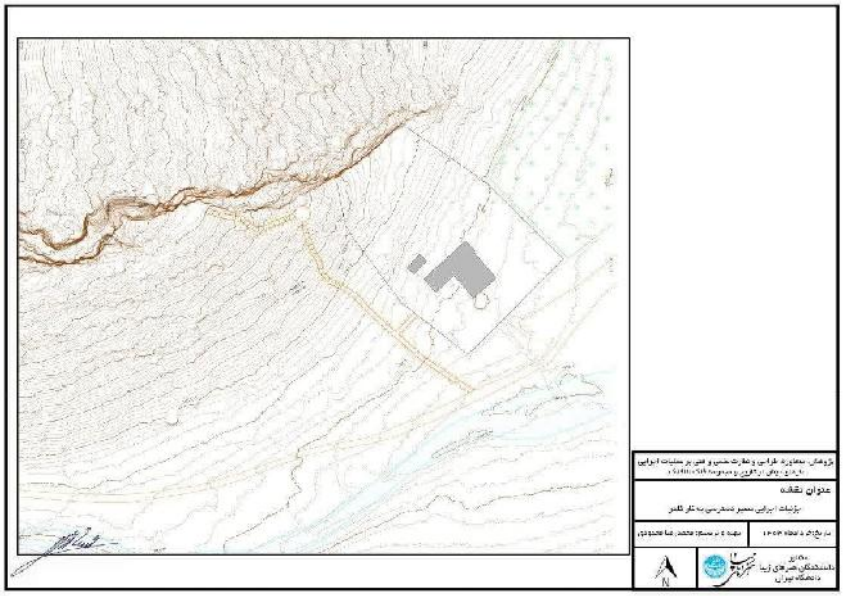
	Continued multidisciplinary research, archaeological excavations of prehistoric caves, Falak-ol-Aflak castle ensemble, karst formations, water resources including: springs, rivers.	**95**
	Establishment of a digital document center and museum of archaeology related to the PCFEKV.	**100**
	Continued aerial images of caves and sites with drone.	**100**
	Completion of laser scanning and photogrammetry maps of Khorramabad Valley caves and Falak-ol-Aflak ensemble	**100**
	Documentation of the emergency escape routes of the Falak-ol-Aflak Castle.	**95**
	Documentation of the Qanat system of the Falak-ol-Aflak Castle.	**85**
	Research and measurement of water discharge of Khorramabad karst springs as water supply sources for old settlements of Khorramabad valley and Falak ol-Aflak ensemble.	**95**
Conservation and restoration	Continued monitoring, documentation, conservation and maintenance of the PCFEKV including restoration of Sarbaz-Khaneh, Bashgah-e Afsaran, Dezhbani, bridges and garden.	**90**
	Preparation of a plan for organizing access routes to Kaldar, Ghamari, Yafteh, Kunji and Gilvaran caves and Gar Arjeneh Rock-Shelter.	**100**
	Monitoring of urban constructions (height and skyline of buffer zone)	**95**
	Preparation of a tourism route suitable for disabled people.	**100**
	Strengthening electronic monitoring.	**90**
	Preparation and implementation of inhabitants' training programs to prepare against the threats of floods and earthquakes.	**90**
	Preparation of an integrated conservation plan for historical fabric in the buffer zone.	**85**
	Continued monitoring and restoration of museum objects.	**100**
Introduction, education	Preparation of prehistoric cave designs to the museum site on the subject of prehistory human life.	**85**

	Preparation of lighting plan of prehistoric caves.	**100**
	Planning for night life and dynamism in the buffer zone.	**90**
	Setting up the handicrafts market in the Golestan area.	**100**
	Presenting a content plan of tourism routes for Khorramabad Valley caves.	**100**
	Publishing catalogs, brochures, posters for presenting PCFEKV.	**100**
	Expansion of Lorestan Travel app for tourists.	**100**
	Producing short and feature films about introducing PCFEKV and importance of Khorramabad Valley.	**100**
	Installation of signs in English and Persian for the PCFEKV.	**100**
	Introducing hidden aspects of the Falak-ol-Aflak castle including emergency escape routes.	**95**
	Continuation of meeting with NGOs, students, architects, archaeologists, anthropologist, authors and other related fields.	**90**
	Development of tourism infrastructure in Khorramabad valley.	**85**
	Strengthening NGO working groups and training tourist guides (historical, cultural, nature tourism, etc.).	**90**
	Raising awareness and capacity building of local communities on outstanding values of PCFEKV.	**90**

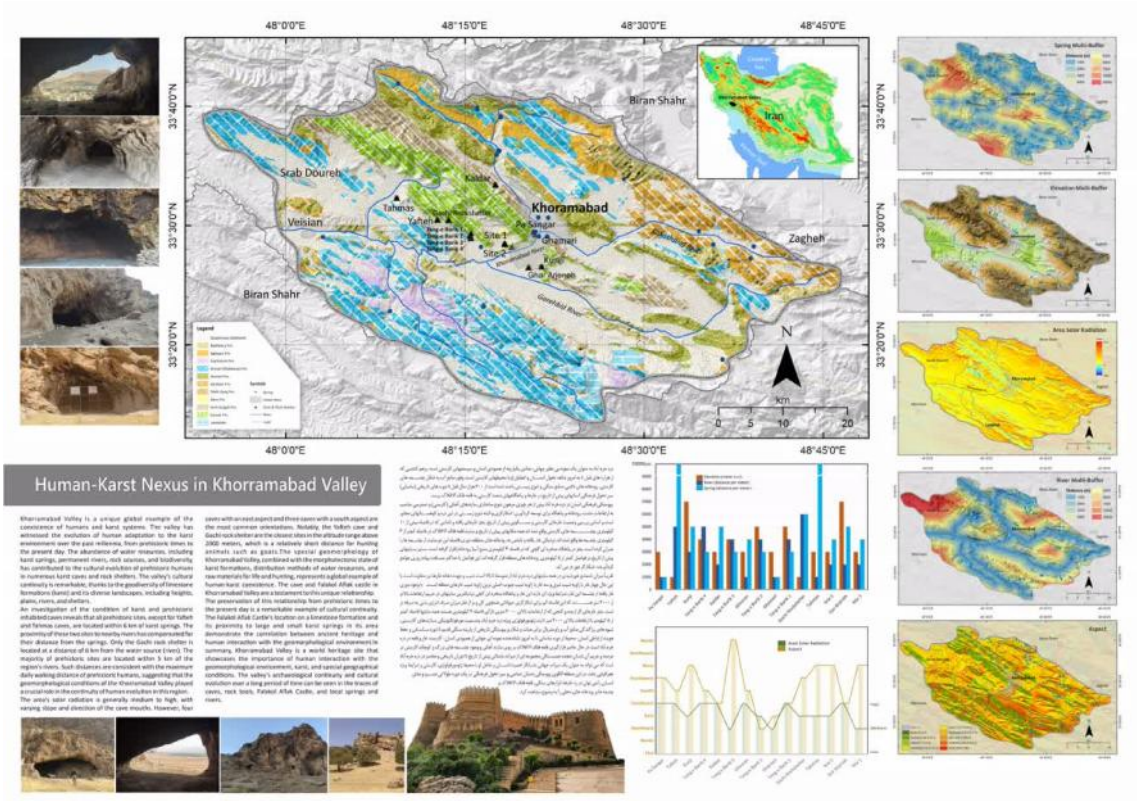
Archaeological excavations at the Falak-ol-Aflak Hill in 2024



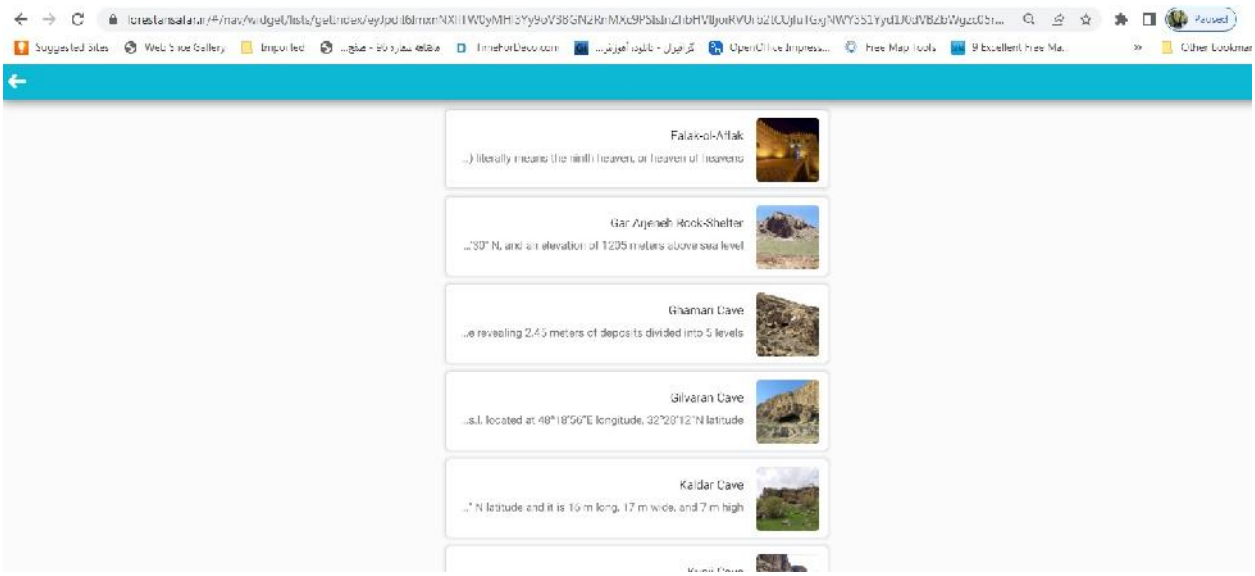
Development of an improvement plan for prehistoric cave tourism



Development of an improvement plan for prehistoric cave tourism routes-Caldar Cave



Carrying out investigations into karst phenomena in the Khorramabad Valley



Development of the Lorestan Tourism app

Aerial image acquisition of prehistoric caves and Falak-ol-Aflak ensemble

Completing studies on emergency escape routes in Falak-ol-Aflak Castle

Opening a museum for prehistoric cave discoveries at Falak-ol-Aflak castle

Illumination of prehistoric caves

وزارت میراث فرهنگی گردشگری و صنایع دستی

Lorestan Archaeological Museum

100,000 Years of Human History

The Lorestan Archaeological Museum stands as a witness to the region's rich and varied history, narrating a story that spans over one hundred thousand years. Home to a remarkable collection of 385 artifacts and fossils, the museum showcases the continuum of human habitation from the Paleolithic to the Islamic era. The represented cultural periods include the Paleolithic, Epipaleolithic, Neolithic, Chalcolithic, Bronze and Iron Ages, Seleucid, Parthian, Sasanian and Islamic periods, as well as archaeological findings from the excavations of the Falak-ol-Aflak mound.

Spread over 224 square meters, the museum is divided into four distinct galleries, each meticulously curated to provide visitors with insights into the prehistoric, historic, and Islamic eras of Lorestan.

Galleries 1-2: Prehistory

The first two galleries introduce visitors to the prehistoric world of Lorestan. Here, a series of maps outline significant archaeological sites across the region, while informative displays on the geomorphology of Khorramabad Valley provide the context for the artifacts to come. A highlight is a lifelike diorama depicting a Neanderthal man making stone tools alongside a child, offering a vivid glimpse into life over 40,000 years ago.

Flint artifacts from the Paleolithic and Neolithic Periods form the backbone of this gallery, but there are also fossils of long-extinct herbivores from the Late Miocene age, discovered in Deimeh Valley. The exhibition features stone tools from Neanderthal and modern human life, illustrating a time when early hunter-gatherers roamed the Zagros mountains. The oldest artifacts on display in the museum belong to the Middle Paleolithic period, the oldest of which is from the Homian rock shelter in the north of Kuhdasht, which is more than 100,000 years old. Most of the flint artifacts came from Ghamari, Konji, Kaldar caves, and Gar Arjeneh, Gachi, and Gilvaran rock shelters, as well as open-air sites on the slopes of the Kamar Siah mountain range northeast of Khorramabad city. This period coincides with the presence of Neanderthal humans in Zagros, and the exhibited flint artifacts were likely made by those early humans.

The Upper Paleolithic artifacts on display, which coincide with the arrival of modern humans in the region, include flint tools, animal remains, and bone tools that were found in the Yafteh cave and are between 30 and 40,000 years old. The Yafteh cave is one of the most important Upper Paleolithic archaeological sites in Iran and has yielded important information about the lifeways and symbolism of the Yafteh people. From the Epipaleolithic period, the last stage of hunting and gathering, flint artifacts have been displayed at the Pa Sangar rock shelter. With the end of the ice age, the people living in the region between 10 and 12 thousand years ago gradually turned to animal domestication, grain cultivation, and village settlement. The artifacts exhibited from this period include stone artifacts, animal remains such as a domestic goat, and a human skull from the Abdol Hossein mound in Delfan, which is between 9 and 10,000 years old. The goat bones on display are among the oldest pieces of evidence of domestication of this species in Iran. The human skull belongs to humans that exhibit deliberate (artificial) deformation. Tying bandages around his head when an infant created a flat surface on the forehead and a prominent and elongated back of the head, which gave his head an unusual and elongated shape. From about 7 thousand years ago, village life spread, and craftsmen started to use copper for the first time in the making of tools. This period, known as the Chalcolithic period, ended about 5400 years ago. The artifacts exhibited during this period are related to the sites of Cham Chokileh, Cheshme Rajab, and Farash in Seimareh Valley. Among the interesting artifacts from this period is the burial of an infant in a terracotta container from Cheshmeh Rajab, as well as potsherds with human motives dancing in a group from the Farash site.

Galleries 3-4: Historic Islamic Periods

Gallery 3 provides a general introduction to Falak-ol-Aflak castle and the archaeological mound beneath it, along with a limestone rock with pictographs found in Era Remla rock shelter within the Homian rock art site cluster. The rock depicts a hunting scene featuring a person on horseback shooting at an herbivore.

Gallery 4 showcases artifacts from the Bronze Age to the Qajar Period, narrating over five thousand years of Lorestan inhabitants› history. Bronze Age artifacts dating between 5400 and 3500 years ago come from sites like Masur, Daya Ardal, and Gilvaran, as well as artifacts with unknown origins. These artifacts include pottery and bronze vessels. The most significant objects in this gallery is a collection of bricks with Akkadian inscriptions from the Kani Joni site and Shineh Ghalal in Kuhdasht, providing crucial information about the local polities of Kimash and Hurti in the 3rd and 2nd millennium BC. Iron Age objects on display are found at the Khorramabad airport, Babajan in Delfan, Kalmakareh Cave in Poldokhtar region, Sangtarashan, Takht-e Kalash, and Homian. A standout exhibit from the Iron Age is the Kalmakareh treasure, featuring silver dishes, vessels, ornate animal-shaped containers, and intricate golden masks from the Neo Elamite period. Other collections include bronze objects from Sangtarashan, a ritual place in the Iron Age where votive gifts in the form of bronze objects were given by people from different regions. The objects found include weapons, dishes, and other items significant in terms of metalworking techniques and Iron Age art history.

While there are no Achaemenid objects in the museum, artifacts from the Seleucid period can be seen in this gallery from sites like Sorkh Dom-e Laki, Bagh-e Mo, Vizniar, Tilileh, and Choob Tarash (Chootash). One intriguing artifact is a bronze coffin containing a skeleton of a man with his eyes and mouth covered in gold sheets and a coin of Seleucus IV placed in his mouth or on his chest. Parthian period objects from Bagh-e No, Ghamari Cave, and Tilileh include pots and clay figurines. The Sassanid period is represented by beautiful objects from Ghaleh Gowri Ramavand and Barzeh Ghawaleh, showcasing diverse and magnificent stucco arrays with animal and plant motifs. Later period artifacts from the excavation of Falak-ol-Aflak mound relate to different periods from the Chalcolithic to the Islamic periods.

Guide to the Archaeological Museum of Falak-ol-Aflak

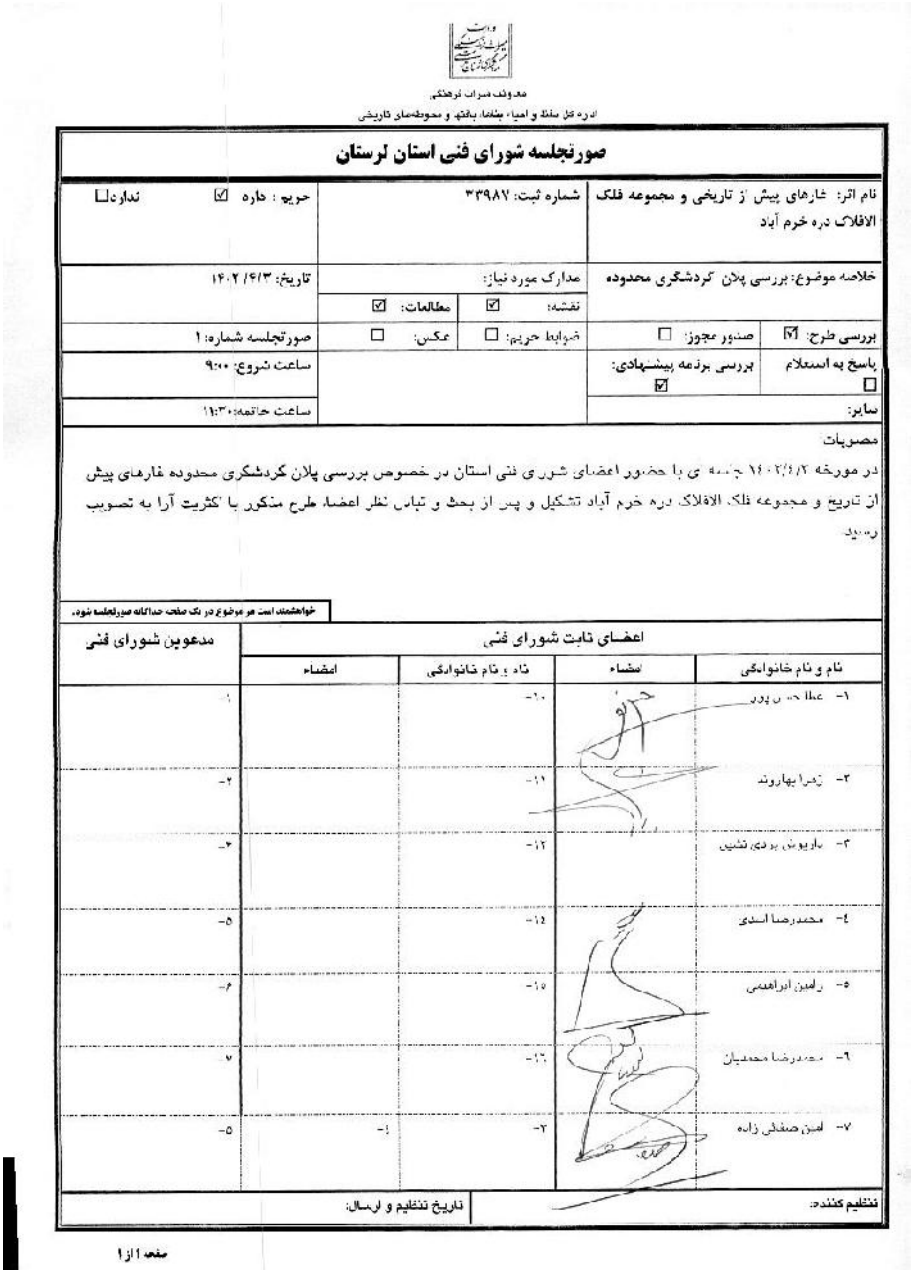
Text: Alia Hassanpour, Fereidoun Biglari, Hossein Davoudi, Sonia Shirbang, and Masoud Akbari
Photo: Mehdi Zeboli, Sara Feraydouni
Design and Layout: Parya Hajiloo
Publisher: General office of Cultural Heritage, Handicrafts and Tourism of Lorestan Province
1st edition, 2024

Preparation of brochures and catalogs

Installation of boards introducing works

7. Tourism plan

The tourism maps that are given on pages 366 to 378 and also in the management plan (pages 89 to 101) are the maps related to the tourist routes of Khorram Abad city. These plans have been approved by the Technical Council of the general directorate of Cultural Heritage, Tourism and Handicrafts on 6/24/2023.



صورتجلسه شورای فنی استان لرستان

نام اثر: غارهای پیش از تاریخی و مجموعه فلک الافلاک دره خرم آباد | شماره ثبت: ۳۳۹۸۷ | حریم: دارد ☑ ندارد ☐

خلاصه موضوع: بررسی پلان گردشگری محدوده | مدارک مورد نیاز: نقشه: ☑ مطالعات: ☑ | تاریخ: ۱۴۰۲/۴/۳

بررسی طرح: ☑ صدور مجوز: ☐ | ضوابط حریم: ☐ عکس: ☐ | صورتجلسه شماره: ۱

پاسخ به استعلام ☐ | بررسی برنامه پیشنهادی: ☑ | ساعت شروع: ۹:۰۰

سایر: | ساعت خاتمه: ۱۱:۳۰

مصوبات

در مورخه ۱۴۰۲/۴/۳ جلسه ی با حضور اعضای شورای فنی استان در خصوص بررسی پلان گردشگری محدوده غارهای پیش از تاریخ و مجموعه فلک الافلاک دره خرم آباد تشکیل و پس از بحث و تبادل نظر اعضاء طرح مذکور با اکثریت آرا به تصویب رسید.

خواهشمند است هر موضوع در یک صفحه جداگانه صورتجلسه شود.

اعضای ثابت شورای فنی				مدعوین شورای فنی
نام و نام خانوادگی	امضاء	نام و نام خانوادگی	امضاء	
۱- عطا حسن پور		۱۰-		۱
۲- زهرا بهاروند		۱۱-		۲-
۳- داریوش یزدی تشین		۱۲-		۳-
٤- محمدرضا اسدی		۱۳-		۵-
۵- رامین ابراهیمی		۱۴-		۶-
۶- محمدرضا محمدیان		۱۵-		۷
۷- امین صفائی زاده		۲-	۱-	۵-

تنظیم کننده: | تاریخ تنظیم و ارسال:

صفحه ۱ از ۱

Minutes of the technical council of the province regarding the approval of the tourism plan

7-1. The main reasons for designing tourist routes:

- **The Falak-ol-Aflak ensemble is the focal point of tourism in the Khorramabad valley.**
  Nearly all tourists who travel to the Khorramabad valley visit this Falak-ol-Aflak first. Moreover, due to the special conditions of the caves and shelters in the Khorramabad valley and in order to protect these historical attractions, it has been approved by the provincial tourism committee that visits to these caves must be purposeful, planned, and limited to tours of a maximum of 10 people. For this reason, a center called "Tourism Center" has been established in the Flak-ol-Aflak ensemble, where trained tour guides are stationed to register tourists who intend to visit the caves and historical shelters of the Khorramabad valley and conduct these visits in groups of 10 with the presence of trained guides.
- **Another factor that led to the design of tourist routes in the Khorramabad valley is that these routes have long been popular with tourists.**
  In recent years, infrastructures such as accommodations, catering facilities, service centers such as gas stations, emergency services, access roads, and signage have been established along these routes. The main advantage of these routes is that the necessary services and tourism facilities exist along these routes, and tourists have direct access to them and can use these services in the shortest possible time and at the lowest cost.
- **Considering that in the Khorramabad valley, in addition to the main attractions (candidates for world heritage)**,
  There are other natural, historical, and man-made attractions, the design of "routes" centered on the main attractions in a way that also includes other tourist attractions in the valley has been necessary so that tourists can visit a larger number of attractions in a shorter time as part of a tourist tour.

7-2. The primary objectives of designing and managing tourist routes are:

- Management and protection of historical sites.
- Given that the Yafteh and Caldar caves are located in protected environmental areas, the management of tourist routes contributes to the enhanced protection of these areas.
- Saving tourists' time, ultimately increasing their satisfaction.
- Encouraging tourists to visit these sites systematically and in groups.
- Studies have shown that the main motivation of people participating in these tours is to visit the main attractions (candidate attractions for world heritage). After surveying visitors, it was determined that these historical and cultural sites were the main reason for their trip to the Khorramabad valley. While visiting these routes, tourists can receive special services such as the use of on-site guides and services to facilitate the movement of the disabled and elderly.
- Some of the infrastructural measures taken along the defined routes include:
- Installation and completion of out-of-town signage

Installation and completion of in-city directional signage

Installation and completion of in-city directional signage

7-3. Organizing the visit route, lighting and redesigning the site's introduction boards

Preserving the natural environment and organizing the route

Illumination of the caves during the limited time of visit, the lighting of the cave is done only during the limited hours of the visit, so as not to hinder the life of the animals inside the cave.

The introduction boards inside the cave are in Persian and English

7-4. Managing Tourist Pressure During Peak Travel Seasons:

To manage the pressure caused by tourism at the Flāk-ol-Aflak ensemble, as well as the caves and shelters of the Khorram Abad valley, measures have been implemented to control the damage caused by a large number of tourists during peak travel seasons.

The following are done to guide and control tourists in Falak-ol-Aflak Ensemble

1- Increasing the number of tour leaders

2- Reduce visit time for each tour

3-Increasing the visiting time during the day from 10 hours to 12 hours

3- Holding cultural events in other parts of the city to reduce the number of visitors to Falak-ol-Aflak Ensemble

Increasing the number of tour leaders

Holding events in other parts of the city

Using attraction presentation boards

The following are done to guide and control tourists in

- Use of trained tour leaders

- Visiting is possible only by tour and in groups of 5 people. Visitors must register at the tourist center located in the Falak -ol-Aflak ensemble.

- Visiting time for each group in each cave is ۱۵ minutes

- Visiting from 10 am to 12 am and 2 pm to ۵ pm (summer); Visiting from 10 am to 12 am and 1 pm to 4 pm (winter)

-Visitors must follow the environmental restrictions.

- Using attraction presentation boards

Training of tourist guides

Training of tourist guides

Training of tourist guides

Visiting is possible only as a tour and in groups of 10 people

Using attraction presentation boards

8. Other explanations are requested

8-1. Date conversion table

explanations	page	AD	Date
	115	680	61CE
	116	912-1008	4th century Hijri
	116	1000-1105	5th century AH
	116	1031	423 AH
	116	1184	580 AH
	116	1224	621 AH
	116	1329	730 AH
	117	1300-1396	8th century (AH)
	117	1386	788 AH
	117	1392	795 AH
	117	1826	1242 AH
	117	1597	1006 AH
	117	1929	1348 AH
	117	1641	1051 AH
	117	1719	1132 AH
	117	1722	1135 AH
	118	1597-1722	1006-1335 AH
	118	1923	1342 AH
	118	1825-1827	1241-1243 AH
It is mentioned in the text of the 2019 report due to a typographical error	118	1883	1299 AH
	118	1882	1300 AH
	118	1825-1826	1241-1242 AH
	119	1836	1252 AH
	119	1842	1258 AH
	120	1849	1266 AH
	121	1855	1272 AH
	121	1857-1859	1274-1276 AH
	121	1859-1879	1276 to 1297 AH
	122	1879-1882	1297 to 1300 AH

	122	1881	1299 AH
	122	1882	1300 AH
	122	1897	1315 AH
The text incorrectly mentions September 1302	122	1923	1302 Solar Hijri
	122	1924	1303 Solar Hijri
	122	1970	1349 Solar Hijri
	122	1924	1303
	122	1927	1306 Solar Hijri
	124	1932	1311 (SH)
	124	1939-1940	1318 and 1319 (SL)
	124	1940	1320s Solar Hijri
	124	1949	1328 Solar Hijri
1930 SH is wrong in the text and 1330 is correct	124	1951	1330s Solar Hijri
	124	1951	1330 AH
	124	1956	1335 Solar Hijri
	124	1966	1345 Solar Hijri
	124	1970	1349 Solar Hijri
	124	1968	1347 Solar Hijri
	124	1975	1354 Solar Hijri
	124	1977	1356 Solar Hijri
	125	1976-1977	1355-1356 Solar Hijri

8.2. The Islamic Period

Period	Islamic period division
From the first century AH to the end of the sixth century	Early
From the seventh century to the end of the ninth century AH	Middle
From the 10th century Hijri to the present era	Late

Appendix

Supplementary Archaeological Information

The Khorramabad Valley, characterized by its prehistoric caves and the Falak-ol-Aflak castel, serves as a vital repository of archaeological evidence, reflecting one of the most densely inhabited regions in the Central Zagros, from prehistoric periods to modern times. This collection of archaeological sites in the dossier offers significant insights into the diverse cultures that have occupied the valley through various historical epochs.

The Middle Paleolithic period in Eurasia is notably marked by Neanderthal presence and the dissemination of associated cultural practices, particularly the Mousterian culture. The Zagros Mousterian has been recognized as an entity within the Zagros region and distinct from other Near Eastern lithic assemblages particularly those of the Levant. Understanding the nature and underlying causes of the matter of variability in intra-and the inter-regional contexts is based on the analysis of archaeological materials from sites in niche zones like Khorramabad Valley.

The discovery of Zagros Mousterian lithic assembalges in caves such as Kunji, Ghamari, Kaldar, Gilvaran, and the Gar-Arjeneh rock shelter highlights the region's importance in understanding the cultural attributes of Neanderthals prior to their extinction, particularly towards the end of their occupancy in Southwest Asia (e.g. Skinner 1965; Baumler and Speth 1993). The concentration of Middle Paleolithic sites within the valley provides a unique opportunity to analyze Neanderthal settlement patterns and reconstruct their cultural practices spanning from approximately 63,000 years to 40,000 years ago—overlapping with the arrival of anatomically modern humans.

Archaeological evidence indicates that modern humans replaced Neanderthals in Eurasia around 40,000 years ago, with documentation of their presence in the Khorramabad Valley dating back approximately 39,000 years, particularly from findings at Yafteh Cave (Otte et al., 2011). Furthermore, excavations in Kaldar Cave suggest the presence of modern humans as early as 54,000 to 46,000 years ago and between 44,000 and 42,000 years ago (Bazgir 2017; Bazgir et al., 2017).

The valley also provides substantial evidence relating to the cultural and behavioral patterns of Upper Paleolithic humans. Notable sites within the region, including Yafteh, Kaldar, and Gilvaran caves, reveal rich Upper Paleolithic settlements exhibiting complex Baradostian cultural practices. The Baradostian culture is distinguished by its lithic artifact production, notably bladelets produced from prismatic and carinated cores, with primary raw materials sourced from the Khorramabad River. Analysis of Yafteh lithic assemblages combined with stratigraphical information and information derived from other archaeological materials, suggested a three industrial phases for the Yafteh sequence (Shidrang 2015; 2018) (Fig. 2). The oldest phase contains a lower frequency of artifacts and the main characteristic of the assemblage is standard flat prismatic cores. These cores correspond to bladelets with a very straight profile and most probably moderate size blades from the initial stage of the reduction sequence. The toolkit is relatively

simple including Baradostian bladelets type A, Arjeneh points and retouched bladelets with a few retouched blades (Fig.1). The central phase of the Yafteh sequence is the main and the most intense occupation of the site (Otte et al. 2011; Shidrang 2018). In the middle phase, blades become more important and (a separate line of blade production) were used as blank for end scrapers, notches or typical retouched blades. There is a diversity of bladelet cores which display some degree of specialization for production of different bladelet types. Among other elements, a considerable number of Arjeneh points as well as end scrapers on blades, might indicate a base camp occupation specialized in hide working and piercing hides and ornaments in the middle phase of the sequence. The small twisted bladelets mainly had no retouch but some were retouched into Type B Baradostian Bladelets in the late phase of the sequence beside the high percentage of carinated burins (Fig.1). Contrary to bladelets which are frequent in the late phase, blades are less standard and lose their importance as the primary choice for end scrapers, being replaced by flakes. An analysis of the Pa Sangar rock shelter lithic assemblage also confirmed the reliability of the analysis results of the Yafteh sequence (Shidrang 2015; 2018).

Unique to this culture is the use of diverse symbolic objects, such as pendants fashioned from deer canines and shells, which were likely transported over considerable distances (Fig.3). The abundant Upper Paleolithic sites in Khorramabad make it a premier location for studying the cultural behaviors of Baradostian societies.

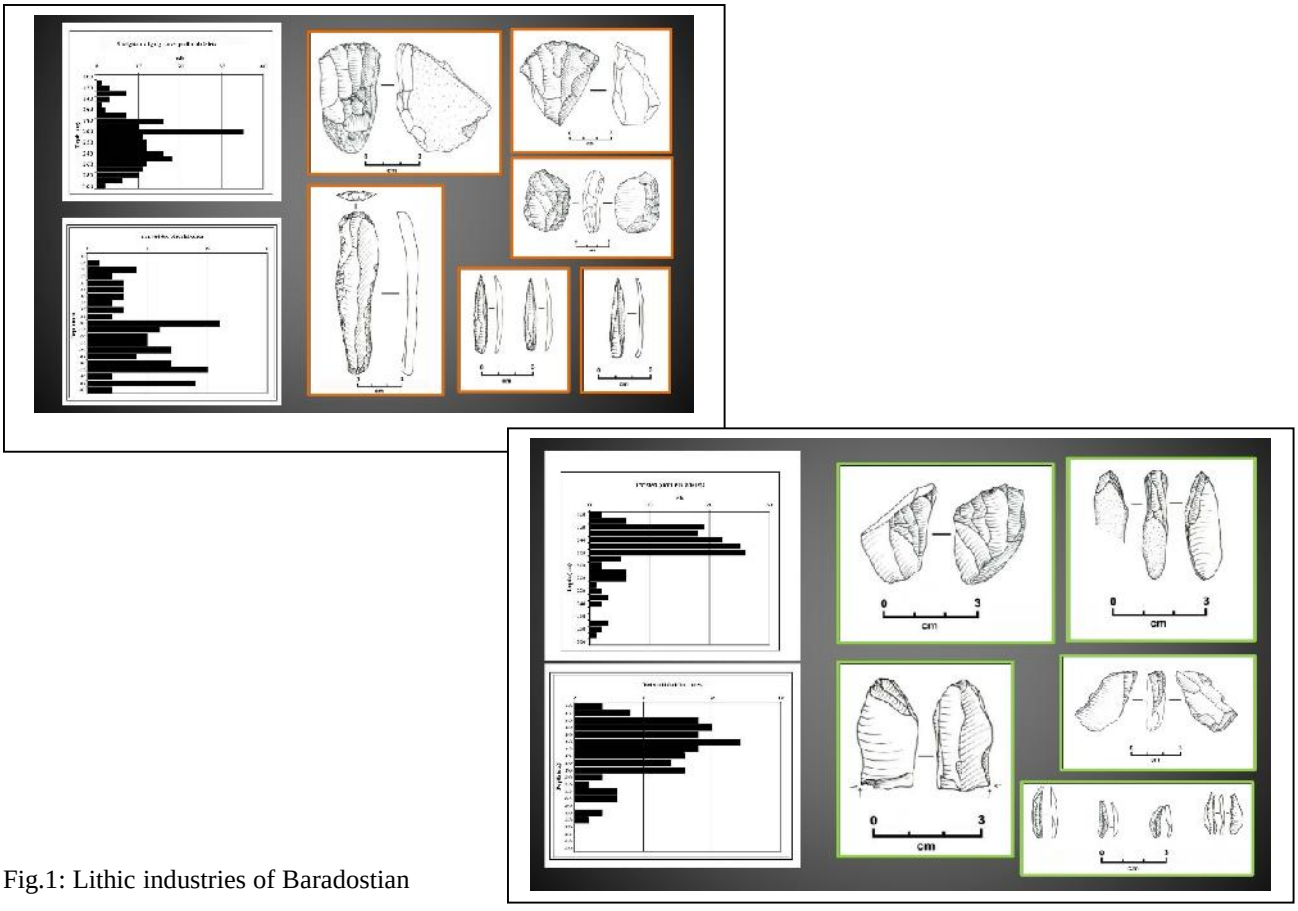


Fig.1: Lithic industries of Baradostian

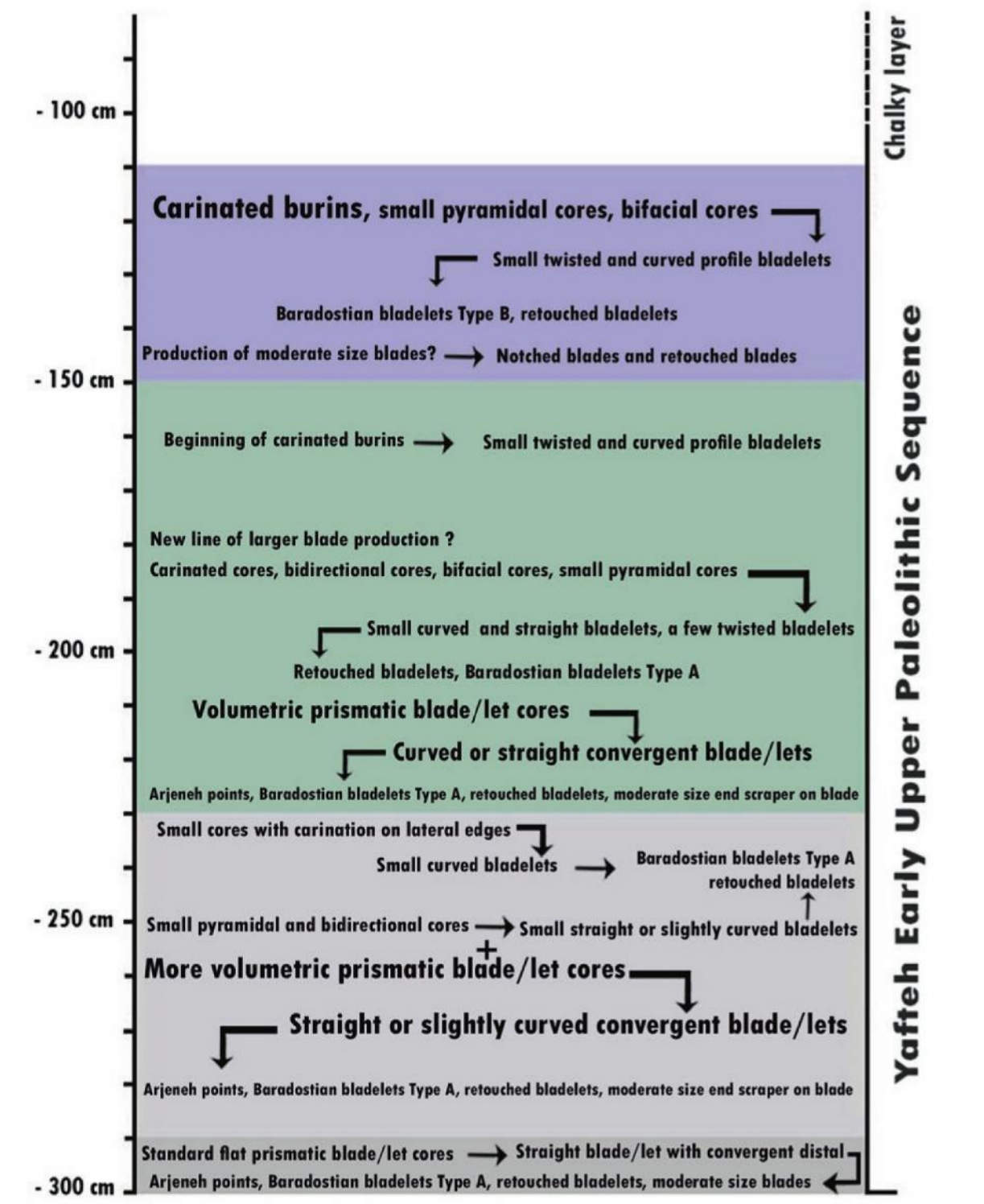


Fig. 2: Three lithic industrial phases of Baradostian in Yafteh cave

Fig.3: The earliest known evidence of symbolic and complex behaviors in Early Upper Paleolithic of Iran; Baradostian Culture.

Following the Upper Paleolithic period and during the last glacial maximum, the Zarzian culture emerged in the valley, as evidenced by findings at Pa-Sangar rock shelter. This culture is characterized by the production of geometric microliths, showcasing human resilience in adverse climatic conditions. Archaeological findings indicate a continuum of human occupation extending beyond the Paleolithic era into the Neolithic, Chalcolithic, and Bronze Age, and later periods as reflected by pottery and other archaeological remains discovered throughout the nominated sites.

The Falak-ol-Aflak Castle, situated atop an ancient mound, reveals significant archaeological layers dating to the fifth millennium BC, with indications of even earlier habitation during the Chalcolithic and Neolithic periods. Its strategic location provides an extensive view of the valley and access to abundant water resources, suggesting continuous settlement since the fifth millennium BC. Excavations have identified six distinct architectural phases, spanning from the Bronze Age through the modern era, alongside stratified deposits of earlier periods.

The excavations in Kunji Cave have unveiled Middle Paleolithic layers alongside evidence of significant burial practices from the Early Bronze Age, encompassing a wide range of artifacts, including distinctive pottery and grave goods. The pottery from Kunji Cave exhibits similarities to that from the Jamdat Nasr period and early Second Dynasty in Mesopotamia but primarily features geometric motifs differing from other regional styles. This suggests interactions between Bronze Age inhabitants of Khorramabad and lowland Mesopotamian cultures, likely facilitated by trade routes through Susa.

The continuous habitation and cultural evolution in the Khorramabad Valley underscore its role as a strategic corridor for population movement in the central Zagros region. This geographic and topographic advantage has facilitated interactions with the civilizations of the Iranian plateau and the lowlands of Khuzestan and Mesopotamia, shaping the cultural identity of the communities in this valley. The distinctive features of Khorramabad Valley in the region have preserved cultural traditions and sustained human settlements throughout history.

In the following sections, more details are presented on the archaeological evidence of Falak-ol-Aflak archaeological mound and the Bronze Age burials of Kunji Cave.

Additional Information on the Archaeological Mound of Falak-ol-Aflak

Since 2000, multiple archaeological excavations have been conducted at Falak-ol Aflak with the aim of elucidating the historical development of the mound underlying the present-day castle. The excavations undertaken in 2000 in the southern sector of the castle revealed structures and artifacts assigned to the Late and Middle Bronze Age (Sajadi and Farzin 2003). These findings were subsequently corroborated by further excavations conducted in 2007 and 2008.

In 2007 and 2008, archaeological excavations were conducted in the southwestern corner of the second courtyard of Falak ol-Aflak Castle, which unearthed significant remains and structures dating from the 8th to 9th centuries BC, encompassing mostly the Late Iron Age II, Seleucid, Parthian, Sassanian periods, and the Late Islamic Period. Among the discoveries, sections of a substantial mud-brick wall were identified at a depth of 6.30 meters, constructed directly on bedrock and featuring a stone foundation (Mousavi Haji et al. 2014; Bahrami 2022). Analysis of the artifacts, particularly Genre Luristan pottery (Fig.4), alongside architectural characteristics such as the dimensions of the mud bricks and the stone foundation, suggests that this structure is associated with a fortress of the Ellipi kingdom.

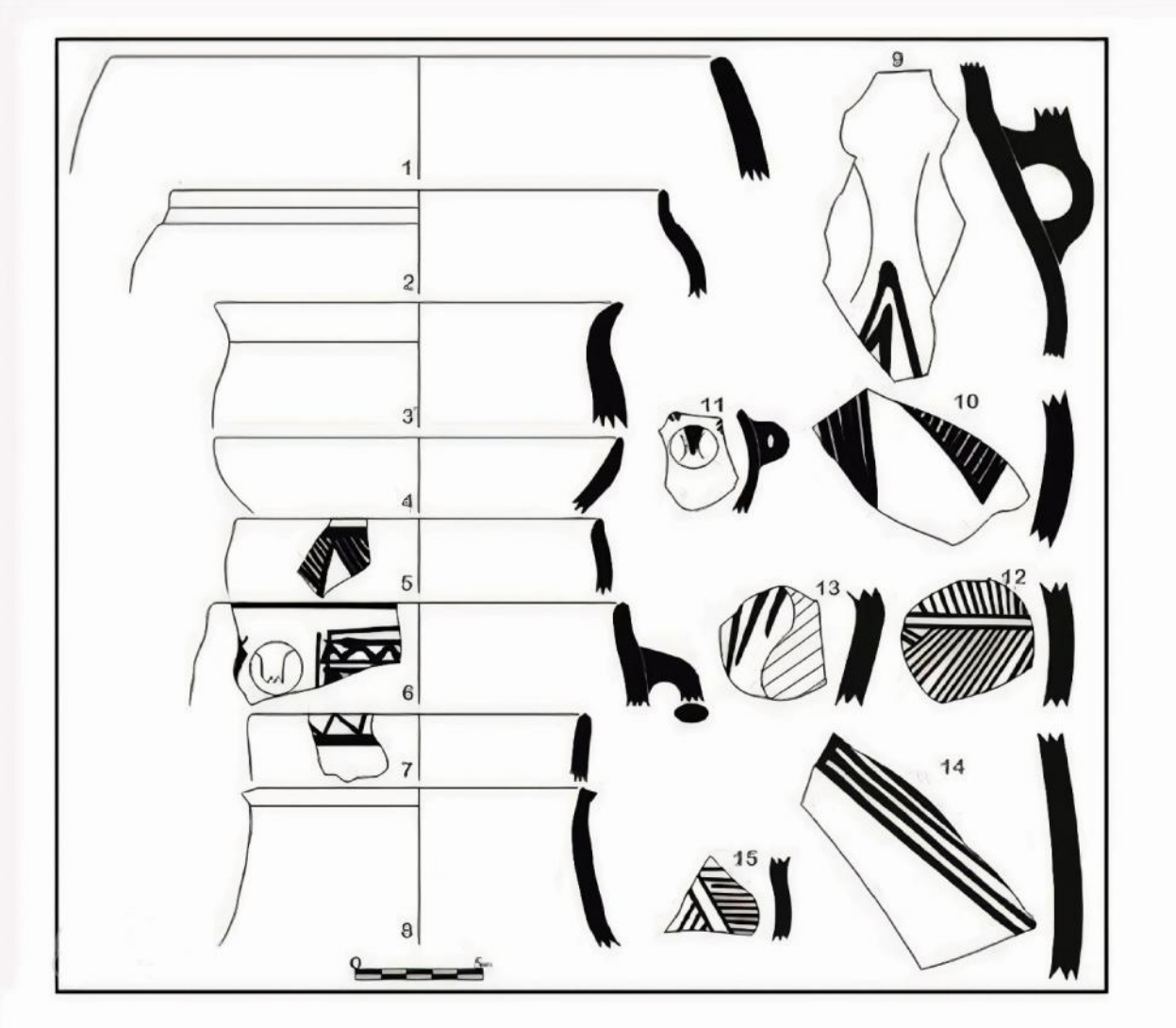


Fig.4: Sample of Genre Luristan pottery of Late Iron Age II from Falak-ol-Aflak mound excvations

This period is characterized by three distinct settlement layers, with the uppermost layer having been vacated as a result of extensive fire damage, presumably due to an attack. Evidence of this conflagration is conspicuously evident within this settlement layer, as well as in a test excavation conducted on the southern side of the Falak ol-Aflak fortress. In this sounding, remnants of the same wall reveal that both the exterior and the floor have been entirely charred (Fig.5).

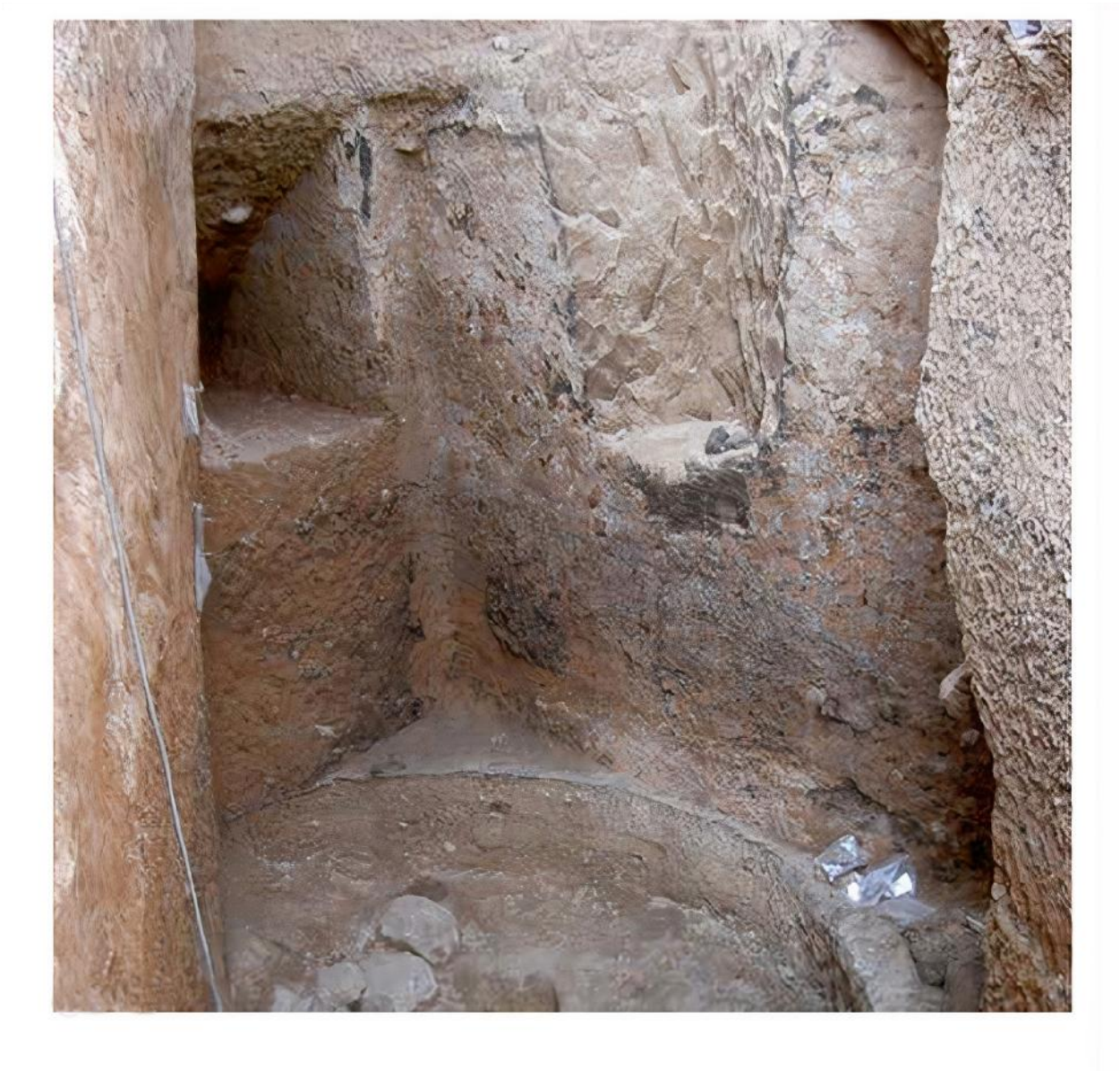


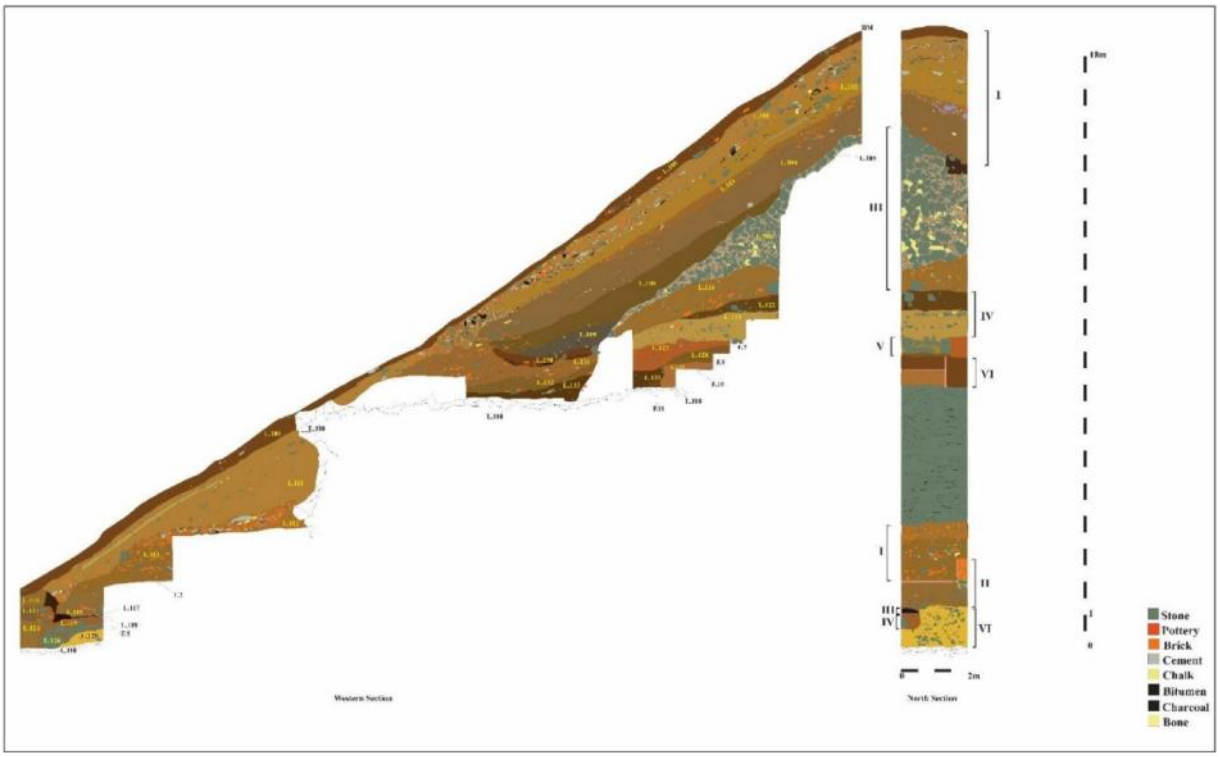
Fig.5: Burning evidence on the wall of the mud-brick Ellipi fortress

Approximately 5 meters of the underlying strata in this sounding are attributable to the Middle and Late Bronze Age (Godin III). However, a significant portion of the Godin III layers was not distinctly observed in the stratigraphic examination. This may be attributable to alterations made during the construction of the castle in the Ellipi period, which potentially involved the removal of these layers and the repurposing of their soil for the castle's foundations. The consistency of the exterior and burned surface of this wall is interrupted by vertical breaks, a feature comparable to that found in the fortified castle of Bābājan III in Delfan (Mousavi Haji et al. 2014; Bahrami 2022).

Based on the discovered architectural remains and pottery and assessing them in relation to the Babajan III phase, with absolute dating of the Babajilan site further corroborating the temporal attribution of the collected artifacts. Within the Babajan III context, a castle structure was identified, characterized by walls measuring 2-3 meters in thickness, with approximately 4 meters of vertical height preserved. At the conclusion of this period in Babajan, which is dated to the late eighth or early ninth century BC, a distinctive layer of combustion was observed covering the interior surfaces of the castle and a decorated room. Additionally, the thatched plaster coating on the walls exhibited charring to a depth of 5 centimeters, resulting in a transformation of color to a light orange-brown hue (Goff 1977).

In the uppermost settlement layer of this period at Falak ol-Aflak Castle, a similar burned layer was apparent on the thatched plaster of both the floor and wall surfaces. Goff previously assigned a date to this period in the eighth and seventh centuries BC. However, three radiocarbon dating samples from the Babajilan cemetery, in which Genre Luristan pottery was also discovered, as well as its proximity to Babajan, suggest a revised dating in the ninth century BC (Hassanpour 2012).

A recent excavation in 2023 has been conducted along a 25-meter-long and 2-meter-wide longitudinal trench on the southern flank of the mound beneath the castle, aligned parallel to Tower No. 3 and oriented in a north-south direction on a relatively steep slope. These investigations have yielded previously unrecognized archaeological artifacts, suggesting the presence of even older stratigraphic remains (Ghobadi-zadeh 2024).



The Section Stratigraphy of the Falak-ol Aflak Castle

Fig.6: The Stratigraphic section of the 2023 excavation in Falak-ol-Aflak mound

Based on the findings from this excavation, the following archaeological periods proposed for Falak-ol Aflak Tepe (Ghobadi-zadeh 2024):

- AD): In the ,After contemporary period there are remains of Late Islamic Period (۱۷۹۴-۱۹۲۵ southern part of the trench, at the foot of the slope, under a volume of alluvium from the contemporary period, part of a residential space was uncovered, including a brick wall, a plastered floor and a tanoor (oven), which probably dates from the late Qajar and early Pahlavi periods based on the finds on the floor. Historical photographs of this area show some of these .residential houses at the beginning of the slope of the tepe

Fig.7: Residential space of the Late Islamic period, including a tanoor (oven), plastered floor, and brick wall

Fig.8: Residential space of the Late Islamic period

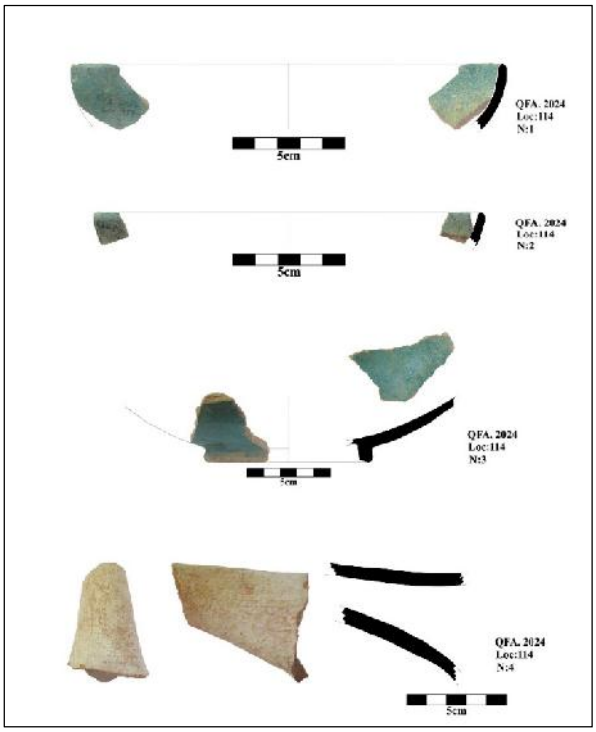


Fig.9: A number of Late Islamic period pottery sherds obtained from inside the tanoor (oven)

Fig.10: A cannonball obtained from Late Islamic period levels

- Ilkhanid period (1260–1335, AD): Below the debris from the contemporary period, the first intact deposit in the northern trench contained a significant amount of pebble deposits and remains of a ruined stone structure. It is likely that the pile of broken stones, together with the gypsum mortar, belong to a structure that was demolished before the castle was built and is now visible as rubble. Beneath this layer of rubble is a deposit about 2 metres thick, which follows the slope of the tepe and continues to the bedrock in the middle of the trench. The most important finds from this layer include pieces of tile and the characteristic T-shaped pottery from the Ilkhanid period.

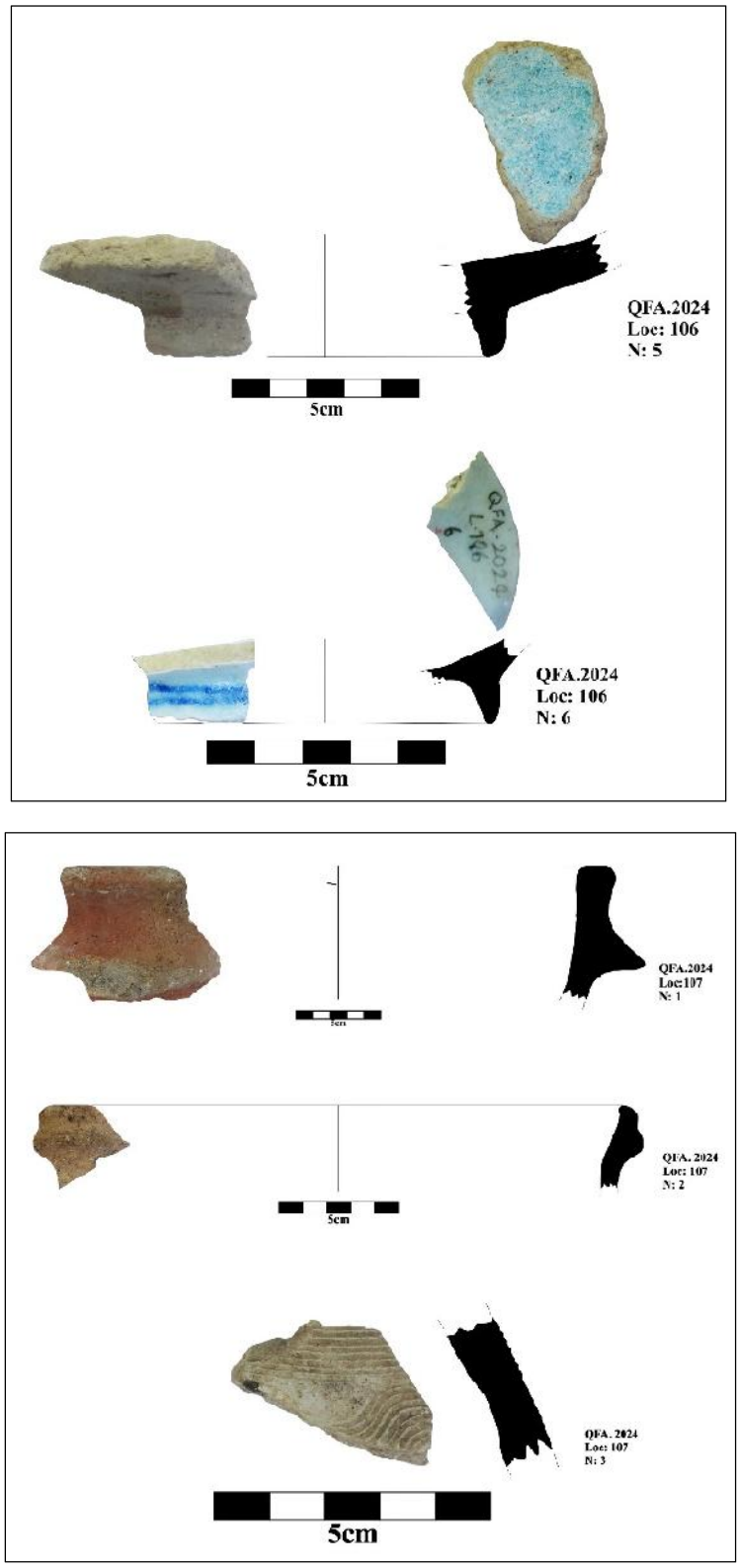


Fig.11: A number of pottery sherds from Ilkhanid period levels

- Seleucid (312-149 BCE), Parthian (247-224) and Sassanid periods (224-651, AD): Structural remains in the form of stone walls were found in these layers. Notably, a large number of decorated Seleucid and Parthian pottery was discovered in these deposits.

- Iron Age (1500-550, BCE): A stone wall with Iron Age pottery was discovered on the Bronze Age remains in the northern trench. In the southern trench, architectural remains from this period were found in the form of stone walls, with most of the identified finds from this period being pottery. This phase comprises Loc. 127 in the northern trench and Loc. 117 and 118 in the southern trench.

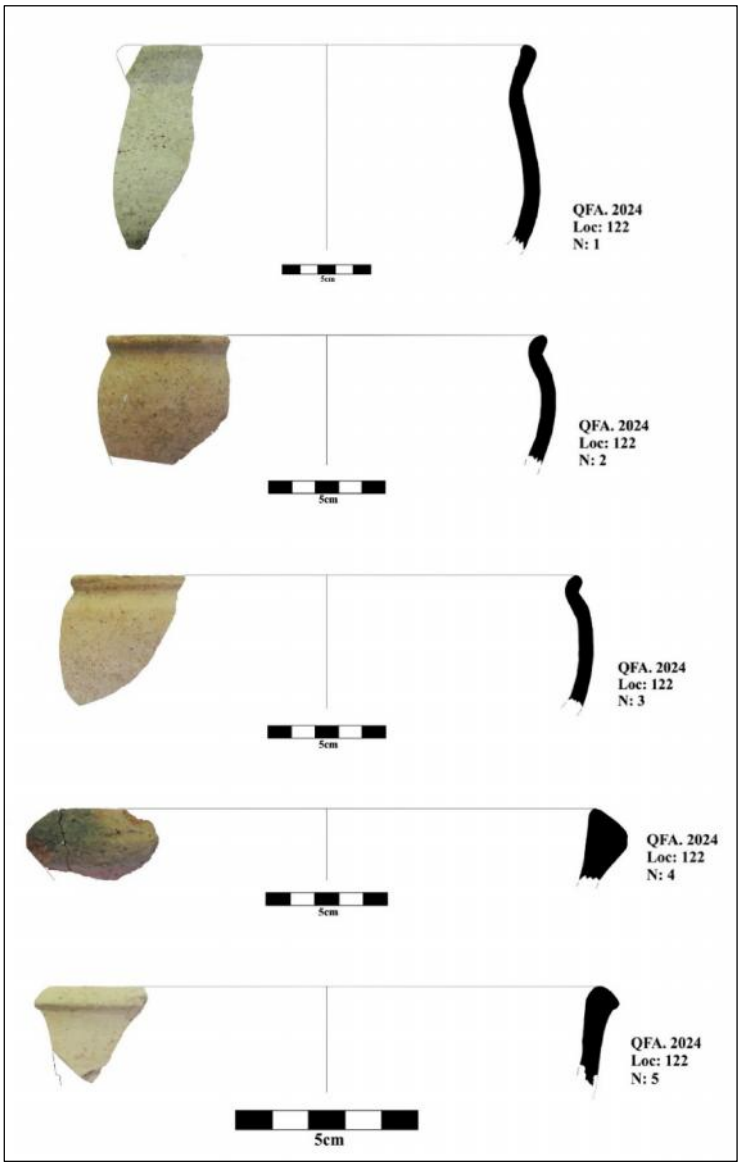


Fig.12: A number of Iron Age pottery sherds obtained from Iron Age Levels

Fig.13: Early Iron Age and partial Bronze Age structures found in Falak-ol-Aflak mound excavations

- Bronze Age (3000-1500, BCE): Bronze Age pottery of the Godin III type was found in the northern trench in Loc. 128 and 129; in the southern trench, it was found in Loc. 119. Additionally, two right-angled walls with a height of 30 centimeters and a clay-coated floor were identified. The inner surface of the walls was coated with an 8 mm thick layer of clay that was integrated with the clay floor.

Fig.14: Bronze Age structures found in Falak-ol-Aflak mound excavations

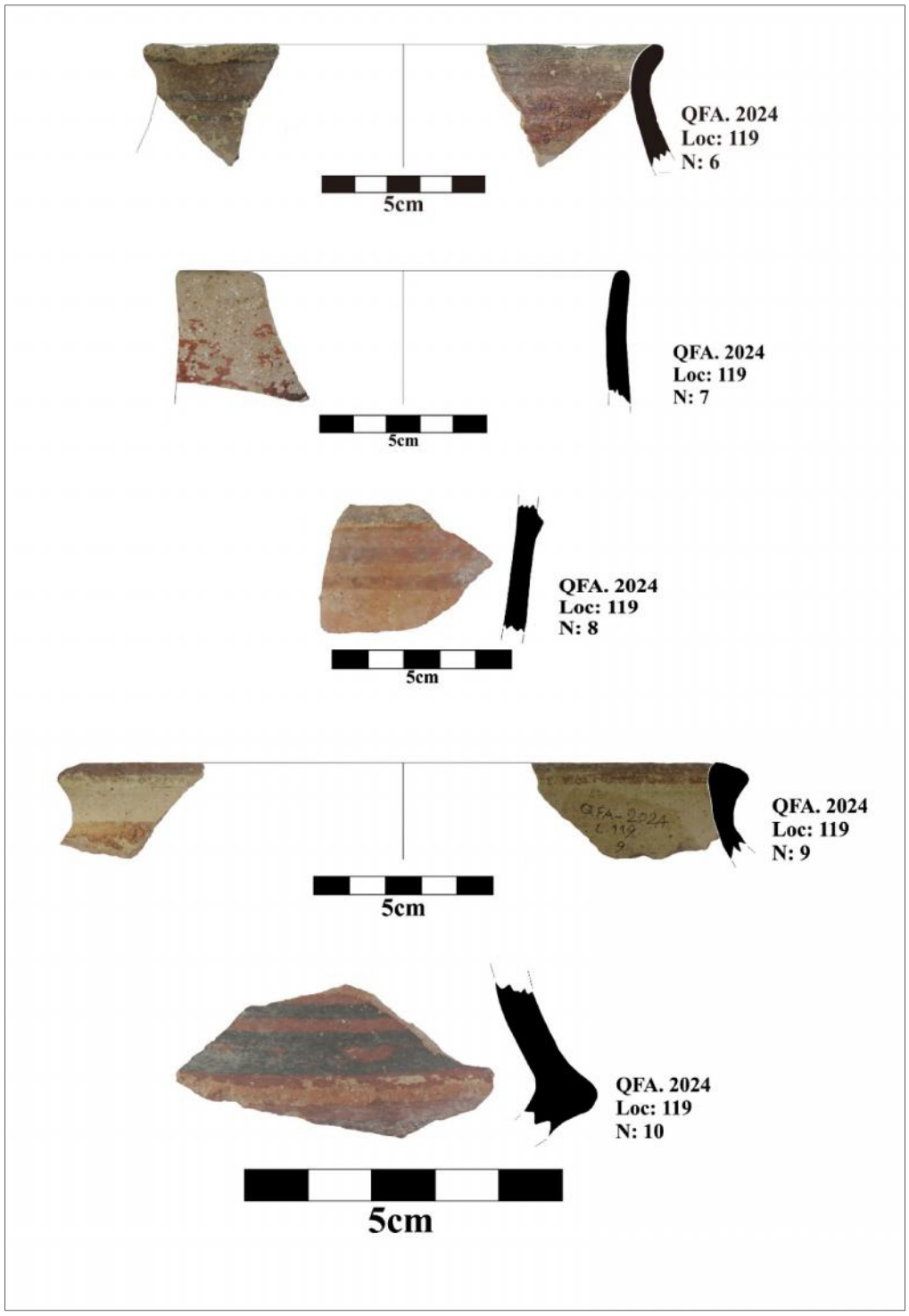


Fig.15: A number of Bronze Age pottery sherds

Fig.16: A metal object obtained from Bronze Age Levels

- Chalcolithic Periods (5000-3200, BCE): This period, representing the oldest identified remains in the southern trench on the bedrock, revealed the remains of a destroyed floor and about 20 centimeters of associated deposits. Additionally, characteristic Chalcolithic pottery was identified from this layer. Several pieces of Middle Chalcolithic pottery were found right on the rocky level, specifically below Loc. 125 and 126 in the southern trench and under Loc. 129 in the northern trench. More importantly, two chaff-tempered decorated pottery sherds were also found beneath Loc. 129, suggesting an earlier time spanning the Late Neolithic-Early Chalcolithic.

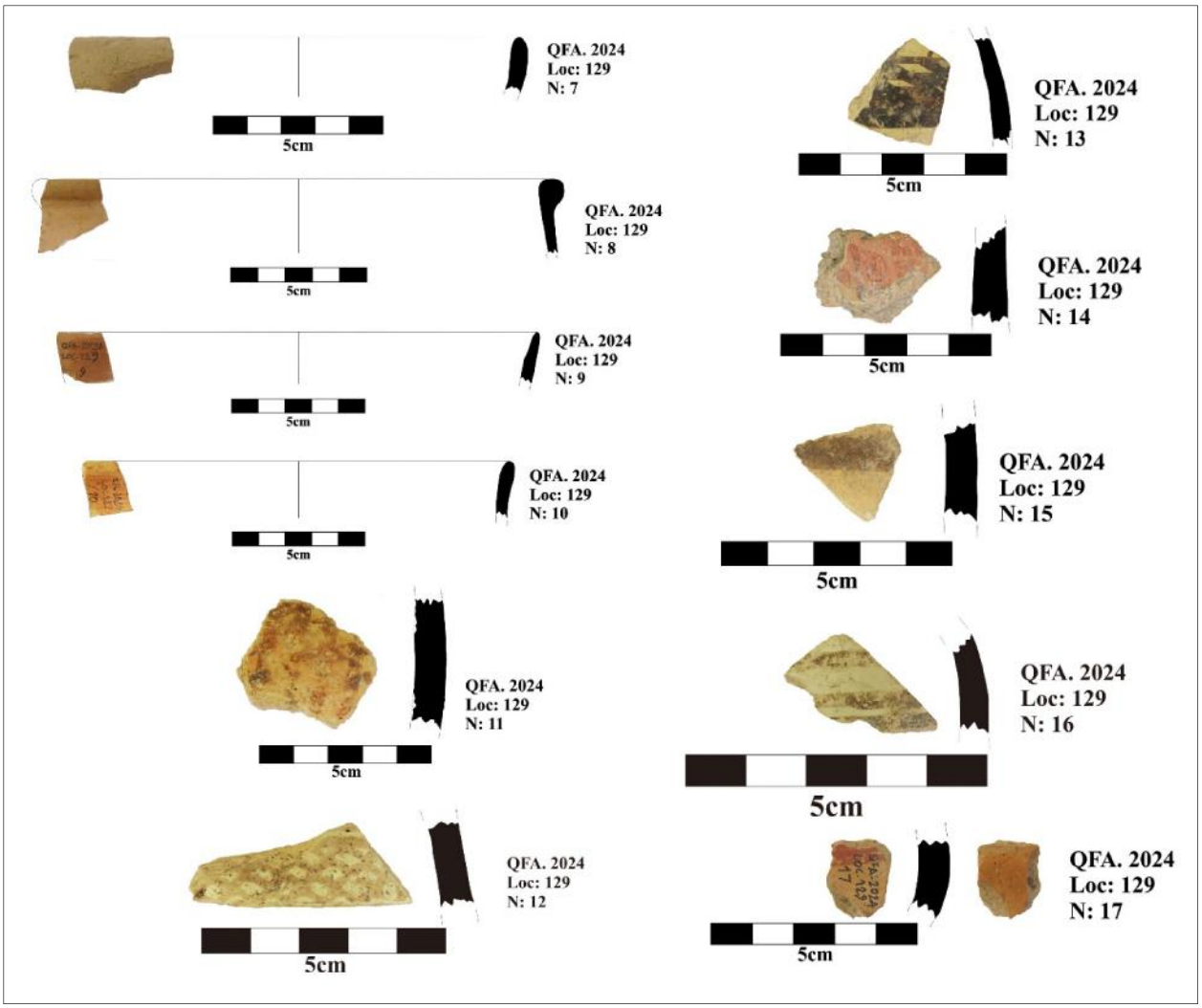


Fig.17: A number of pottery sherds from the Late Neolithic/Early Chalcolithic, Middle Chalcolithic and Late Chalcolithic periods.

Falak-ol Aflak Castle is situated on top of an ancient Tepe, and excavations of its layers have revealed that habitation at this site dates back to at least the fifth millennium BCE, corresponding to the Chalcolithic periods. Due to the strategic location of the Tepe, positioned in the center of the valley with a natural outcrop providing a view of the surrounding area, alongside the environmental potentials of the valley, this site seems to have been inhabited from the fifth millennium BCE to the present time (Ghobadi-zadeh 2024).

Additional information on the Bronze Age burials of Kunji Cave

The burials discovered in Kunji Cave are situated beneath a substantial talus cone at the cave's entrance. At least 33 individuals were interred within these deposits, utilizing two primary burial methods: single primary inhumation and collective secondary inhumation (Emberling et al.2002). The earliest burial features a middle-aged woman positioned flexed on her right side, accompanied by four intact ceramic vessels (designated as Burial D/F). Additionally, another potential single burial is suggested by an articulated knee that emerges from a nearby baulk. Within the Lower Mottled Brown layer, a distinct burial involved the deposition of skulls and long bones from at least four individuals, along with eleven pots and several beads (Burial H). This collective burial was disturbed during the Bronze Age, complicating the assessment of its original state. The next burial episode occurred either during or after the use of Burial H, marked by the construction of Burial A, located about two meters further inside the cave. Burial A contained at least seven individuals, predominantly disarticulated, but included a partially articulated adult male skeleton in the center and several blocks of vertebrae. Additionally, this burial featured thirteen ceramic vessels, a copper alloy dish, and approximately 150 beads.

No tomb was identified around Burial A; the partial stone alignments observed may either be remnants of a removed tomb or of natural origin. Burial A's dimensions exceed those of a typical tomb, suggesting it was unlikely all stones could be removed without disturbing the bones. Consequently, Burial A appears to have been a collective burial in a shallow pit. A distinct surface separates the Lower Mottled Brown from the Upper Mottled Brown layer, on which a tomb was built. This tomb measures 1.5 m wide, 0.5 m high, and over 4 m long, constructed from rough limestone slabs arranged in three to four irregular courses. Its full length remains unknown as only a portion was excavated (Emberling et al.2002).

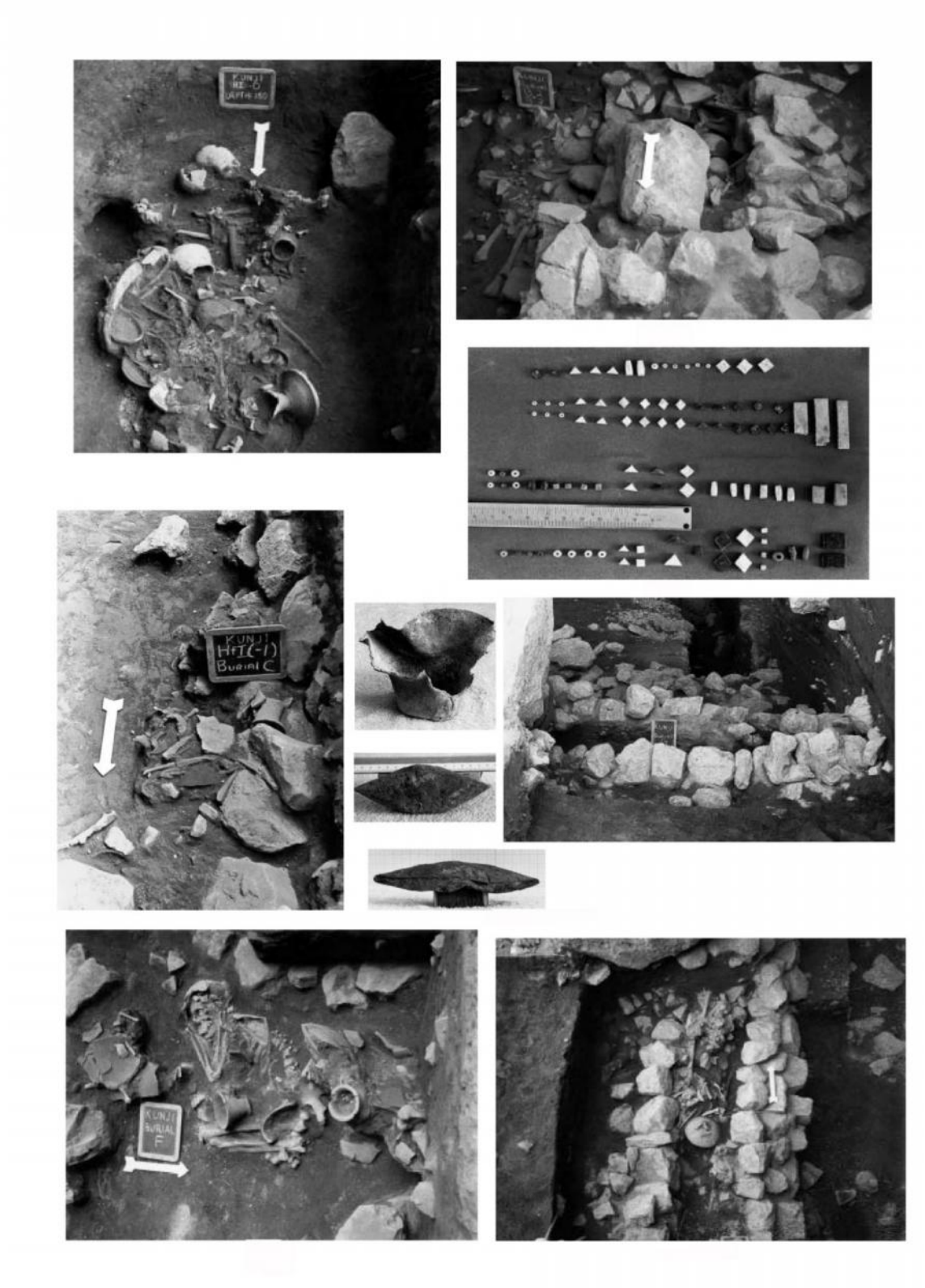


Fig.18: Burial practices from the Early Bronze Age at Kunji Cave

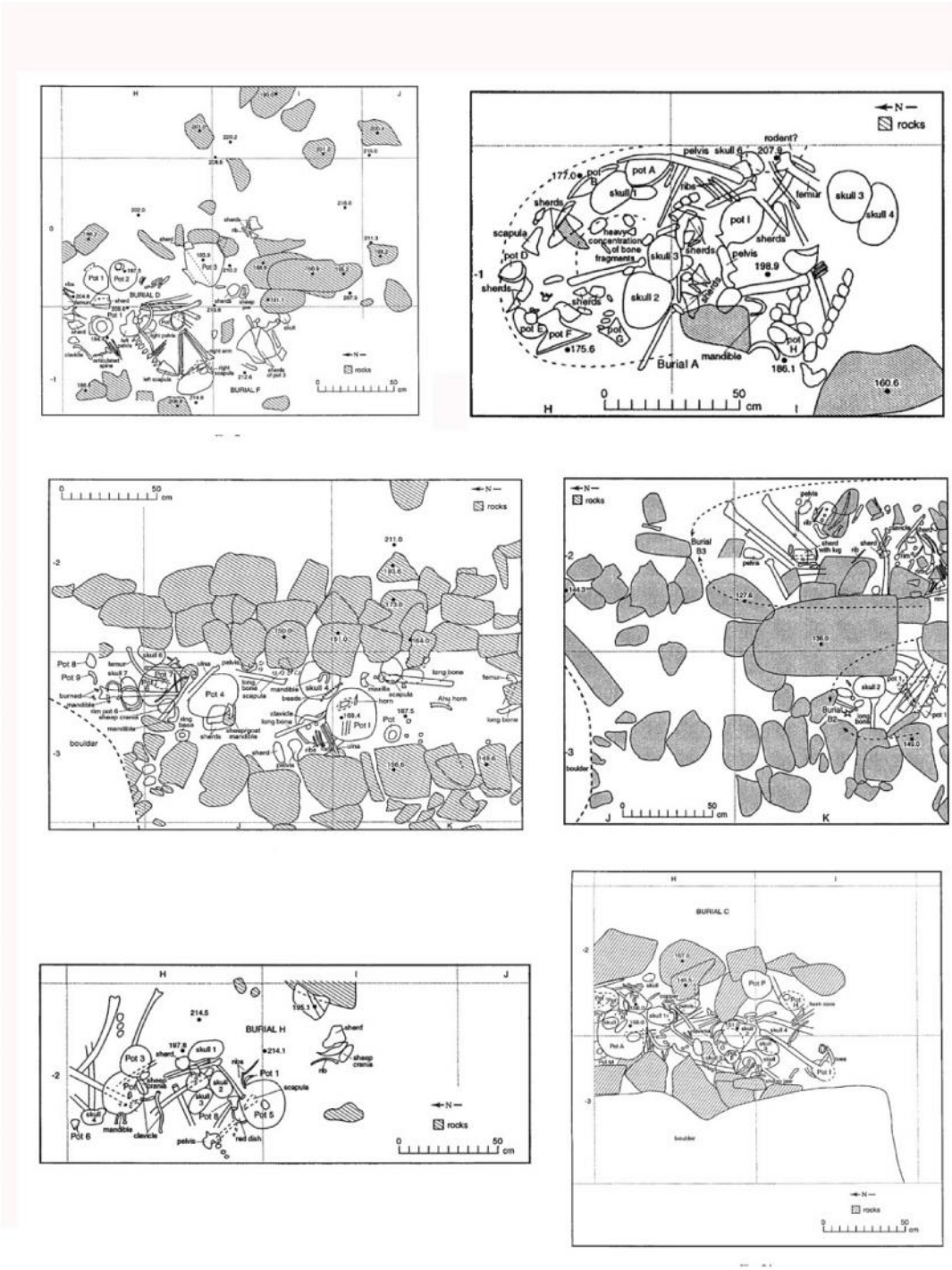


Fig.19: Plans of some of the burials of the Early Bronze Age at Kunji Cave

The tomb features slightly vaulted walls and is capped with at least one large stone. Inside, the tomb holds two clusters of bones and pottery, with none of the bones found articulated. At the southern end, Burials G and B2 contained the remains of at least six adult women and three adult men, along with ten ceramic vessels, one copper bowl, a lead cup, a copper alloy pendant, and about 250 beads. To the north, separated by an area with few remains, Burial E included four adult women, two adult men, and one individual of unknown sex, along with fourteen ceramic vessels and two copper alloy vessels(Emberling et al.2002).

Each burial cluster exhibited a notable presence of skulls compared to other bones, with no articulated remains. Skulls and intact ceramic vessels were typically positioned at the burial periphery, while broken vessels and other bones occupied the center. The varying preservation of bones suggests a pattern of successive inhumations, which may include secondary burials. Each new burial likely displaced earlier remains toward the edges, with skulls intentionally placed upright along the sides. At some point, bones, sherds, and stones were removed from the burials and scattered on the tomb walls. Burials B, B1, and B3, which include the only child remains at the site along with four ceramic vessels and a copper-bronze dish, were placed next to Burial G, likely representing material displaced during tomb openings. Burial C, a collection of miscellaneous bones from at least one adult woman, had no intact ceramic or metal vessels and was located near Burial E(Emberling et al.2002).

Fig.20: Photo showing one of the burials of the Early Bronze Age at Kunji Cave

The tomb's design reflects a widespread cultural practice rather than a distinctive local style. Its cave location is unique among Third millennium tombs in Luristan. The ceramic vessels are reddish to buff, made from clay with chaff, sand, and occasional grog (small pieces of sherds). Jars were crafted with separate rims and bodies, and their interiors were scraped and smoothed on a slow wheel. Similarly, the bowls and bases of fruit stands were made separately and appear wheel-formed. Many vessels are coated with red slip, differing from the paste color, while painted vessels feature layers of white, red, and black. Most show incomplete oxidation, indicating poorly controlled firing conditions. The vessels represent a limited range of forms compared to everyday use, with each burial containing variously decorated jars and at least one open form.

Jar decorations fall into three categories: appliqué dots and strips (sometimes incised), one to four painted bands, or more intricate monochrome and red-and-black designs on a white background. Many of these forms are primarily associated with lowland Mesopotamia. Complexly decorated vessels, such as Jemdet Nasr polychrome, Scarlet Ware, and Susa II pottery, were produced from the Jemdet Nasr to Early Dynastic II periods, mainly in the Zagros foothills. A few of these vessels have been found in Luristan, but their painted designs are generally more schematic than those from larger lowland cities (Carter 1987).

An unpublished neutron activation analysis of painted pottery from Kunji, Susa, and the Deh Luran plain confirms that Kunji pots are stylistically distinct from other groups (Emberling et al. n.d.). While the ceramic tradition features some figural decoration, Kunji pots are exclusively painted in geometric patterns. Fruit stands appeared in Early Dynastic II and continued into the Akkadian period, with additional examples found in the alluvial plain and Susa (Moon 1982, 1987; Bahrani 1989). Many Kunji fruit stands are simple and likely date to early ED III in Diyala (Delougaz 1952). However, some have unique decoration, with concentric rows of small incisions on the flattened rim, which is not seen elsewhere. A fruit stand from Qabr Nahi in southeastern Pusht-i Kuh has been reported but not illustrated (Haerinck 1987).

The burials contained five copper-bronze vessels, possibly including one made of lead, as well as a pendant shaped like a rosette with six shallow compartments. These vessels have parallels with the Vase à la Cachette, a large jar containing a collection of metal objects found at Susa from the Early Dynastic III period (Le Breton 1957; Tallon 1987). Overall, metal vessels are uncommon in the Pusht-i Kuh tombs excavated by Vanden Berghe, where metal objects are mostly weapons, and the few vessels do not closely resemble those from Kunji. The ceramic evidence suggests a date in the Early Dynastic II period, around 2700-2600 BC, when both painted jars and fruit stands coexisted in lowland Mesopotamia. Regarding contemporary styles, Kunji ceramics do not clearly relate to the monochrome painted jars of Godin III or the intrusive grey wares of Godin IV; their closest connections appear to be with lowland ceramics. This raises the question of why Zagros inhabitants used ceramic vessels so similar to those from the larger cities of Mesopotamia and lowland Iran. Chaff-limestone tempered ware with burnished surfaces and specific styling rules out direct trade of these vessels from the lowlands. However, the region likely had trade contacts with the lowlands, particularly at Susa, given known modern routes through the Zagros.

In three or four instances, skulls were adorned with bead strings, creating dense scatters and, in one case, articulated lines of beads nearby. Some skulls were even placed in flat redware dishes.

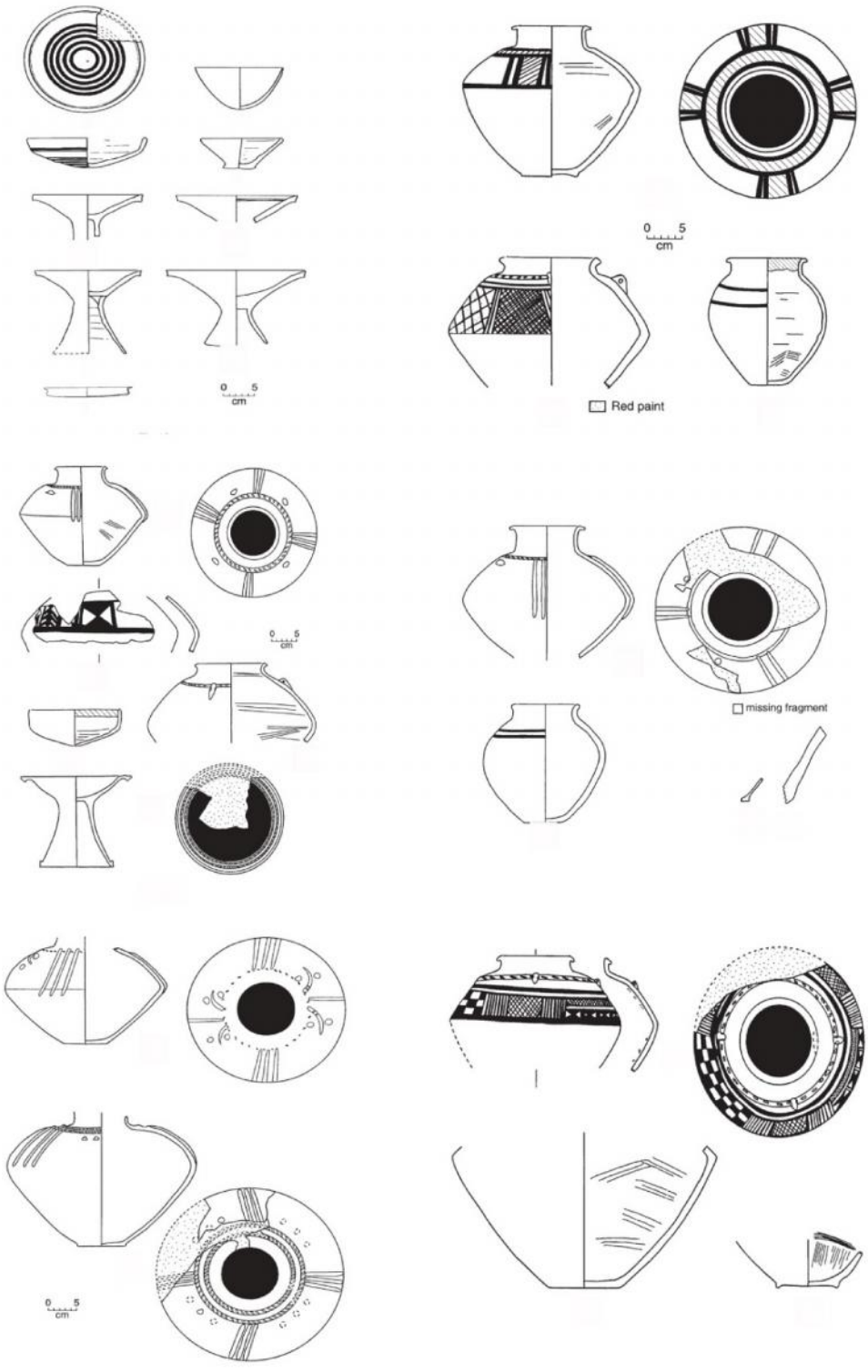


Fig.21: Distinctive pottery/ grave goods from burials of Kunji Cave

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Islamic Republic of IRAN
The Iranian Ministry of Cultural Heritage, Tourism and Handicrafts
IMCHTH

Nomination of

Prehistoric Caves and Falak-ol-Aflak Ensemble of Khorramabad Valley (PCFEKV)

“Additional Information (2)”

(Related to Interim Report)

TEHRAN, February 2025

1. Chronology of the Nominated Sites

While the general timeline of human occupation has been established in the dossier, here we provide two detailed chronology tables in order to better understand the levels of development that have been reached at each archaeological time period:

Table 1 provides a detailed chronology for Khorramabad caves summarizing all Radiocarbon and Thermoluminescence datings of the nominated sites.

Site	Depth	Date	Cal BP	Method	Layer/Period	Reference
Kunji Cave	Mousterian Level	>40,000	-	Radiocarbon	*Middle Paleolithic/* Mousterian	Hole and Flannery 1967
Kunji Cave	Mousterian Level	>40,000	-	Radiocarbon	*Middle Paleolithic/* Mousterian	Hole and Flannery 1967
Kaldar Cave	Layer 5 - S3	63044±6120	-	Thermoluminescence	*Middle Paleolithic/* Mousterian	*Bazgir et al. 2022*
Kaldar Cave		49,200 ± 1,800	54,400-46,050	Radiocarbon	Upper Paleolithic layer	*Bazgir et al. 2017*
Kaldar Cave		39,300 ± 550	44,200-42,350	Radiocarbon	Upper Paleolithic layer	*Bazgir et al. 2017*
Kaldar Cave		33,480 ± 320	38,650-36,750	Radiocarbon	Upper Paleolithic layer	*Bazgir et al. 2017*
Kaldar Cave		29,400	-	Thermoluminescence	Upper Paleolithic layer	*Bazgir et al. 2017*
Kaldar Cave		26,025	-	Thermoluminescence	Upper Paleolithic layer	*Bazgir et al. 2017*
Kaldar Cave		25,500	-	Thermoluminescence	Upper Paleolithic layer	*Bazgir et al. 2017*
Kaldar Cave		23,100	-	Thermoluminescence	Upper Paleolithic layer	*Bazgir et al. 2017*
Yafteh cave	125 cm	24470 ± 280	29252 ± 374	Radiocarbon	*Upper Paleolithic/Baradostian*	*Otte et al. 2011*
Yafteh cave	150 cm	33400 ± 840	38300 ± 1049	*Radiocarbon*	*Upper Paleolithic/Baradostian*	*Otte et al. 2011*
Yafteh cave	200 cm	34800 + 2900/-4500	-	*Radiocarbon*	*Upper Paleolithic/Baradostian*	Hole and Flannery 1967
Yafteh cave	201 cm	32500 + 2400/-3400	-	*Radiocarbon*	*Upper Paleolithic/Baradostian*	Hole and Flannery 1967
Yafteh cave	201 cm	29410 ± 1150	-	*Radiocarbon*	*Upper Paleolithic/Baradostian*	Hole and Flannery 1967
Yafteh cave	210.5 cm	33800 ± 330	38629 ± 528	*Radiocarbon*	*Upper Paleolithic/Baradostian*	*Otte et al. 2011*

Yafteh cave	212 cm	30860 ± 3000	-	*Radiocarbon*	*Upper Paleolithic/Baradostian*	Hole and Flannery 1967
Yafteh cave	213 cm	32190 ± 290	36755 ± 384	*Radiocarbon*	*Upper Paleolithic/Baradostian*	*Otte et al. 2011*
Yafteh cave	213.5 cm	33160 ± 240	37879 ± 450	*Radiocarbon*	*Upper Paleolithic/Baradostian*	*Otte et al. 2011*
Yafteh cave	226.5 cm	32900 ± 290	37584 ± 501	*Radiocarbon*	*Upper Paleolithic/Baradostian*	*Otte et al. 2011*
Yafteh cave	234 cm	33260 ± 300	37957 ± 473	*Radiocarbon*	*Upper Paleolithic/Baradostian*	*Otte et al. 2011*
Yafteh cave	236 cm	33430 ± 310	38118 ± 471	*Radiocarbon*	*Upper Paleolithic/Baradostian*	*Otte et al. 2011*
Yafteh cave	240 cm	35450 ±600	40510 ± 672	*Radiocarbon*	*Upper Paleolithic/Baradostian*	*Otte et al. 2011*
Yafteh cave	245 cm	33330 ± 310	38020 ± 474	*Radiocarbon*	*Upper Paleolithic/Baradostian*	*Otte et al. 2011*
Yafteh cave	250 cm	21000 ± 800	-	*Radiocarbon*	*Upper Paleolithic/Baradostian*	Hole and Flannery 1967
Yafteh cave	251 cm	31120 ± 240	35696 ± 388	*Radiocarbon*	*Upper Paleolithic/Baradostian*	*Otte et al. 2011*
Yafteh cave	258.5 cm	34360 ± 340	39437 ± 479	*Radiocarbon*	*Upper Paleolithic/Baradostian*	*Otte et al. 2011*
Yafteh cave	260 cm	32770 ± 290	37435 ± 491	*Radiocarbon*	*Upper Paleolithic/Baradostian*	*Otte et al. 2011*
Yafteh cave	260 cm	38000 ± 3400/-7500	-	*Radiocarbon*	*Upper Paleolithic/Baradostian*	Hole and Flannery 1967
Yafteh cave	266.5 cm	33520 ± 330	38212 ± 495	*Radiocarbon*	*Upper Paleolithic/Baradostian*	*Otte et al. 2011*
Yafteh cave	273 cm	34160 ± 360	39220 ± 518	*Radiocarbon*	*Upper Paleolithic/Baradostian*	*Otte et al. 2011*
Yafteh cave	278 cm	31760 ± 3000	-	*Radiocarbon*	*Upper Paleolithic/Baradostian*	Hole and Flannery 1967
Yafteh cave	280 cm	>36000	-	*Radiocarbon*	*Upper Paleolithic/Baradostian*	Hole and Flannery 1967
Yafteh cave	280 cm	34300 ± 2100/-3500	-	*Radiocarbon*	*Upper Paleolithic/Baradostian*	Hole and Flannery 1967
Yafteh cave	285 cm	>40000	-	*Radiocarbon*	*Upper Paleolithic/Baradostian*	Hole and Flannery 1967
Yafteh cave	290 cm	>35600	-	*Radiocarbon*	*Upper Paleolithic/Baradostian*	Hole and Flannery 1967

Table 2 presents a detailed chronology for the Khorramabad caves and rock-shelter, structured in accordance with the technological and typological characteristics of the artifacts identified at each occupational level across the various nominated sites.

Site	Chronology/ Period/Culture	Technology of artefacts	Typology of artefacts	Reference
Kunji Cave	>40,000/Middle Paleolithic/Mousterian	Less cores relative to retouched pieces. Cortical, naturally backed, Levallois, and other flakes are common. Unidirectional and radial, or a single reduction strategy designed to maximize both the early and late production of suitable tool blanks within the constraints of the size and shape of the raw material available for use.	High proportion of retouched pieces. Scrapers with regular retouch predominate over marginally retouched pieces, and tools with multiple worked edges (e.g., double and convergent scrapers, Mousterian points) are common.	Field 1951, Hole & Flannrey 1967, Speth 1971: Baumler & Speth1993
Kunji Cave	Upper Paleolithic/Epipaleolithic?	Production of Bladelets	Retouched Bladelets	Field 1951, Hole & Flannrey 1967, Speth 1971: Baumler & Speth1993
Kunji Cave	4th millennium BCE transient habitation	Uruk-Ubaid Pottery Godin VI	Uruk-Ubaid Pottery Godin VI	Speth 1971: Baumler & Speth1993; Emberling et al.2002
Kunji Cave	Early Bronze Age. Jemdet Nasr culture. Early Dynastic Period. The ceramic evidence of burials suggests mainly a date in the Early Dynastic II period, around 2700-2600 BC.	Two primary burial methods: single primary inhumation and collective secondary inhumation. The ceramic vessels are reddish to buff, made from clay with chaff, sand, and occasional grog. Jars were crafted with separate rims and bodies, and their interiors were scraped and smoothed on a	Burials: At least 33 individuals. Bronze Age Ceramic vessels, copper vessels, and beads.	Speth 1971: Baumler & Speth1993; Emberling et al.2002

		slow wheel. Similarly, the bowls and bases of fruit stands were made separately and appear wheel formed. Many vessels are coated with red slip, differing from the paste color, while painted vessels feature layers of white, red, and black. Poorly controlled firing conditions.		
Ghamari Cave	Level 5/ Middle Paleolithic/Mousterian	Flake Production Levallois technique Levallois byproducts. The low number of cores.	Limace, Mousterian points, Side scrapers	Hole&Flannery1967, Bazgir et al 2014
Ghamari Cave	Level 4/ Upper Paleolithic/Early Upper Paleolithic?	Flake production mainly. Byproducts of flaking sequences	Retouched blades Pointed flakes Side scraper	Hole&Flannery1967, Bazgir et al 2014
Ghamari Cave	Level 3/ Mixed Chalcolithic and Neolithic	Some bladelet technology and Pottery sherds mainly from Late Chalcolithic Period	A few flints and some potsherds. Decorated light brown pottery and plain pottery with straw temper, as well as bowls with everted rims	Hole&Flannery1967, Bazgir et al 2014
Ghamari Cave	Level 2/ Historical and Bronze Age potsherds.	Wheel-thrown pottery, Increased use of slip for painting, often in red or brown hues. Geometric patterns, some floral motifs, pottery.	A large number of historical and Bronze Age potsherds. Some metal objects and Godin III type pottery	Hole&Flannery1967, Bazgir et al 2014
Ghamari Cave	Level 1/ Islamic Period	Glazed wares potsherds, Polychrome glazes Fast wheel-thrown, evidenced by symmetrical	Islamic potsherds with geometric motifs and robust utilitarian forms	Hole&Flannery1967, Bazgir et al 2014

		shapes and thin walls.		
Gar Arjeneh Rock-Shelter	Middle Paleolithic/ Mousterian	Significant proportion of side-scrapers	Flake Production Levallois technique	Hole&Flannery1967, Bazgir et al 2014
Gar Arjeneh Rock-Shelter	Upper Paleolithic/Baradostian	Arjeneh points Baradostian retouched bladelets	Bladdelet Production	Hole&Flannery1967, Bazgir et al 2014
Gilvaran Cave	Level 5/ Sub-level 1: Middle Paleolithic/ Mousterian Sub-level 2: Mixture of Middle and early Upper Palaeolithic	Considerable number of Mousterian points Different kinds of points: Levallois points, Mousterian, limaces, and Tayac points. Side scrapers, déjeté scrapers, double-scrapers.	Different production of flakes mainly using the Levallois technique. Sub-level 2: Mixture of Middle Paleolithic and Early Upper Paleolithic elements.	Bazgir et al 2014, Roustaei et al 2002, Rousta et al 2004
Gilvaran Cave	Level 4/Upper Paleolithic/Baradostian	Retouched long blades and bladelets, side-scrapers, endscrapers Different types of pointed flakes. Arjeneh points Burins	Elongated flakes (mainly transformed into points) are manufactured using a hard hammer on facetted platforms found in the lower parts of the Level.In upper depths, more soft hammer elongated blades are seen which are the characteristics of Upper Paleolithic.	Bazgir et al 2014, Roustaei et al 2002, Rousta et al 2004
Gilvaran Cave	Level 3/ Mixed Neolithic and Chalcolithic	A few flints and some potsherds. Decorated cream pottery of Chalcolithic age	Mixture of Chalcolithic and Neolithic potsherds and a few bladelets	Bazgir et al 2014, Roustaei et al 2002, Rousta et al 2004
Gilvaran Cave	Level 2/ Historical and Bronze Age Periods	Historical and Bronze Age potsherds, Wheel-thrown pottery. Geometric patterns, some other motifs, pottery.	Historical and Bronze Age potsherds. Godin III type pottery	Bazgir et al 2014, Roustaei et al 2002, Rousta et al 2004
Gilvaran Cave	Level 1/ Islamic Period	Glazed wares potsherds, Fast wheel-thrown	Islamic potsherds with geometric motifs	Bazgir et al 2014, Roustaei et al 2002, Rousta et al 2004
Kaldar Cave	Layer 5/Middle Paleolithic/Mousterian	Various types of points such as Mousterian and	A high number of pointed and elongated tools	Bazgir et al 2014, Bazgir et al 2017, Bazgir et al 2022

	Thermoluminescence 63044±6120	Levallois points Pointed blades and side-scrapers	mostly made from flakes mainly using the Levallois technique.	
Kaldar Cave	Layer 4/Upper Paleolithic/Baradostian Radiocarbon: 49,200 ± 1,800 (cal. 54,400-46,050) 39,300 ± 550 (cal. 44,200-42,350) 33,480 ± 320 (cal. 38,650-36,750) 29,400 Thermoluminescence 26,025 Thermoluminescence 25,500 Thermoluminescence 23,100 Thermoluminescence	Different types of retouched Baradotain bladelets, burins, Arjeneh points, End scrapers	Production of flakes alongside blades, bladelets (including twisted bladelets), polyhedral, and bladelet cores	Bazgir et al 2014, Bazgir et al 2017, Bazgir et al 2022
Kaldar Cave	Layer 3/ Epipaleolithic, Neolithic including Pre-pottery Neolithic, Chalcolithic	Some flints (Bladelet production, traces of pressure teqnique) and some potsherds (Mainly Chalcolithic)	Retouched bladelets, and Decorated light brown pottery	Bazgir et al 2014, Bazgir et al 2017, Bazgir et al 2022
Kaldar Cave	Historical	Wheel-thrown pottery, Geometric patterns, some other motifs, pottery.	Historical and some Bronze Age potsherds. Godin III type pottery	Bazgir et al 2014, Bazgir et al 2017, Bazgir et al 2022
Kaldar Cave	Islamic	Fast wheel-thrown Glazed wares potsherds	Islamic potsherds with some geometric motifs	Bazgir et al 2014, Bazgir et al 2017, Bazgir et al 2022
Yafteh Cave	Upper Paleolithic/Baradostian Culture Datings Around 37000-39000 years ago	Oldest phase of the Baradostian Culture: Baradostian bladelet Production from flat prismatic bladelet cores. Production of long bladelets with strait profile.	Long Arjeneh points and long Dufour bladelets are the main tools. A few ornaments	Hole&Flannery1967, Ott et al.2007,2011,2012; shidrang2007,2015 , shidrangetal2020

Yafteh Cave	Upper Paleolithic/Baradostian Culture Datings Around 35000-37000 years ago	Middle phase of the Baradostian culture. Production of moderate size bladelets from carinated cores. Ornaments productions	Typical Arjeneh points, more curved Dufour Bladelets. Hight number of End scrapers on blades. Different types of ornaments	Hole&Flannery1967, Ott et al.2007,2011,2012; shidrang2007,2015 , shidrangetal2020
Yafteh Cave	Upper Paleolithic/Baradostian Culture Datings Around 29000-30000 years ago.	Late phase of the Baradostian culture. Production of twisted bladelets from carinated burins	Arjeneh points are disappearing and small twisted Dufour are common alongside small end scrapers	Hole&Flannery1967, Ott et al.2007,2011,2012; shidrang2007,2015 , shidrangetal2020
Yafteh Cave	Historical and Bronze Age Periods	Wheel-thrown pottery. Some geometric patterns.	Some Godin III type pottery	Hole&Flannery1967, Ott et al.2007,2011,2012; shidrang2007,2015 , shidrangetal2020
Yafteh Cave	Islamic Period	Potsherds include Fast wheel-thrown Glazed wares	Islamic potsherds with some motifs	

2. Additional Information on Comparative Analysis

In order to assess the position of the nominated prehistoric caves and rock shelter site in the context of similar sites in the Zagros Mountains region and in the wider region, we expand the comparative review to include similar sites of Middle to Upper Paleolithic transition and Upper Paleolithic period in the Zagros, Levant and Arabian Peninsula to position the nominated prehistoric caves and rock shelter of Khorramabad Valley in a wider prehistoric geo-cultural context.

2.1. Introduction

The dispersal of *Homo sapiens* out of Africa and their interactions with archaic hominins, particularly Neanderthals (*Homo neanderthalensis*), represent crucial events in human evolutionary history. Between approximately 120,000 and 40,000 years ago, these two species coexisted and occasionally interbred in Eurasia, with the Near East and Middle East serving as critical corridors for migration and cultural exchange. To be more precise, the expansion of recent anatomically modern humans which believed to have originated in Africa and expanded into Eurasia between 60,000 and 40,000 years ago (kyr BP) represents a crucial moment in human evolution, during which they supplanted all other hominin species. To understand the events and the process of these migrations, researchers examine the archaeological, genetic, and climatic data to explore the timing, routes, and cultural dynamics

of *Homo sapiens* migrations through all regions involved such as Levant, Zagros and Arabian Peninsula. Thus, the Middle to Upper Paleolithic transition was an important period of biological and cultural changes in human evolution. The disappearing of Neanderthals and the expansion of anatomically modern humans in Europe and south Western Asia, as well as the emergence of Early Upper Paleolithic technologies, which signals significant changes between roughly 55,000 and 40,000 years ago, are just some of the enigmatic aspects of this transitional period. It is not clear where the process of the changes initiated or whether it has been diffusion from a core area or local adaptation in different regions.

During this time, several Middle to Upper Paleolithic transitional entities appear across Eurasia which are traditionally attributed to the end of Middle Paleolithic, the Initial and then Early Upper Paleolithic, with different names such as the Emiran, Bohunician, Szeletian and then early Ahmarian or Proto-Aurignacian. The Initial Upper Paleolithic refers to industries that often encompass a combination of Levallois-Laminar technologies accompanying Upper Paleolithic retouch tools and sometimes Middle Paleolithic types and generally date to between 45,000 and 36,000 years BP. But the earliest appearances of true Upper Paleolithic characteristics manifest in Early Upper Paleolithic industries such as early Ahmarian or Proto-Aurignacian, with production of blade/ bladelet from prismatic cores and emphasis on the soft hammer technique. European evidence in particular suggests a relatively rapid and growing process of invention in different aspects of hunter-gatherer's life during this time span. Apart from blade/bladelet-based technologies, long distance procurement of raw materials, specialized hunting, complex settlement patterns, bone industries, the common use of personal ornaments and ultimately certain types of art are documented in some archaeological sites.

Several lithic industries traditionally grouped under the title of Aurignacian technocomplexes and were considered as the marker of anatomically modern human migrations. The scarcity of human fossils from Initial or Early Upper Paleolithic contexts compels researchers to rely mainly on cultural remains and particularly lithic technology in order to trace the expansion of Modern Humans thought Eurasia. Within this framework, the Khorramabad Valley has consistently occupied a prominent position in archaeological discourse, owing to its concentration of Early Upper Paleolithic material culture within stratified cave and rock shelter sequences, as well as its status as a significant Baradostian complex within the Zagros cultural sphere.

2.2 Levant

When examining the expansion and migration of Homo sapiens, or modern humans, into Eurasia, the Khorramabad Valley sites in the Zagros region is traditionally compared to the Levant as the first geographical area of interest. This is particularly true for the crucial period of shift between Middle and Upper Paleolithic. A recently discovered partial calvaria from Manot Cave in Western Galilee in Levant dated to approximately 54.7 ± 5.5 kyr BP, exhibits modern anatomical features that align it more closely with recent African and Upper Paleolithic European skulls than with other early modern humans in the Levant. This finding suggests that the Manot population may be closely related to the first modern humans who colonized Europe. Interestingly in Khorramabad valley, an Upper Paleolithic level at Kaldar Cave present a very early age of 49,200 ± 1,800 (54,400-46,050 cal. BP) for an early Upper Paleolithic industry which pre-dates all the Upper Paleolithic sites in Iran and quite close to the date presented for Manot Cave (Hershkovitz 2015).

The earliest Upper Paleolithic of Levant represents local modifications of lithic industries from Late Mousterian into the early Upper Paleolithic tradition of Early Ahmarian. Prior to Early Ahmarian, the best known MP-UP Levantine transitional lithic industry is called the Initial Upper Paleolithic, also known as the Emiran (Marks 1990). The Initial Upper Paleolithic industries of Levant date back roughly to about 45,000–38,000 BP and present two main variants, one with characteristic index fossil of the Emireh point and the other with the chanfrein pieces. The technological characteristics of these industries usually include production of non-Levallois blades and Levallois-like points, hard hammer blade production and Upper Paleolithic retouched tools.

Ksar Akil in northern Levant and Boker Tachtit in southern Levant are the best relevant reference sites showing evidence of continuity for the intermediate phase between Middle and Upper Paleolithic in Levant (Marks 1983; Ohnuma 1988). The continuity between the Initial Upper Paleolithic and the Early Ahmarian has also been recognized in several sites including those mentioned before (Marks 2003). This continuity is expressed by some similar technological characteristics, exemplified by the continued use of faceting as part of core preparation.

The Ahmarian is divided into Early (42,000–30,000 BP) and Late phase (30,000–23,000 BP) and is better known from open-air sites and semi-arid marginal zones. The Early Ahmarian is characterized by the production of blade and bladelet from several types of prismatic cores with the purpose of manufacturing blade/bladelet tools, particularly el-Was points. The other categories of tools, the cortical end scrapers and burins, seem to be also related to the same reduction sequence; their blank produced during the preparations and rejuvenations of blade/let cores (Goring Morris & Davidzon 2006). The Levantine Aurignacian is another Upper

Palaeolithic entity in Levant assigned to about 32,000–30,000 BP (Bar-Yosef & Pilbeam, 2000) and typo-technologically contains classical Aurignacian features. The European Aurignacian seems to present older dates (around 39,000–35,000 BP) and compared to its Levantine counterpart is a longer lived entity.

Contrary to Early Ahmarian, which is technologically based on production of straight to curve blade/bladelet, in the Levantine Aurignacian, blades are the dominant blank for tools and there is a production of small twisted bladelets from carinated pieces, while flakes make up the major part of the debitage (Goring-Morris & Belfer Cohen 2006). Due to the late, short-lived and geographically limited appearance of the Levantine Aurignacian, it doesn't play an important role in the debate of the Middle to Upper Paleolithic transition in Levant and is usually considered as a late intrusive culture.

As indicated in Otte et al. 2011, in general, radiocarbon estimations from EUP sites of Khorramabad appear to pre-date the chronological range of the Levantine Aurignacian, overlapping only with the dates from Kebara. At Ksar'Akil, radiometric results on charcoal indicate an age between 29,700 and 33,500 14C BP (Mellars and Tixier, 1989). Level D at Hayonim cave yielded ages between 26,600 and 30,700 14C BP obtained on bone samples (Bar-Yosef, 1991). A date on charcoal clearly associated with Aurignacian material from level III at Raqefet cave provided an age of 30,540 ± 440 14C BP (Lengyel et al., 2006). At Umm-el-Tlel, Syria, Levantine Aurignacian layer IIb has yielded abundant twisted Dufour bladelets and is dated to 32,000 ± 580 14C BP (Gif±A93212).

The Aurignacian assemblage from sector 5 could be compared to the Levantine Aurignacian A. The El Wad points seem absent Dufour bladelets of Dufour sub-type and of Roc-de-Combe sub-type coexist within the same assemblage. In Umm-el-Tlel, the TL and the 14C results obtained on the transitional levels indicate that the Aurignacian occupation took place between 32,000 and 30,000 14C BP (Soriano and Ploux, 2003).

We also note that radiometric ages from Khorramabad sites overlap or predate some of the Early Ahmarian dates. At Ucagizli, layer B is dated between 28,750 and 33,420 14C BP (Kuhn et al., 2009), and at Qseimeh I, dates on ostrich samples give an age of circa 34,000 14C BP. At the sites of Lagama IIID, VII and VIII, Qadesh Barnea 601B and 501, Abu Noshra I and Abu Noshra II, most of the dates range between 36,000 and 30,000 14C BP (Gilead and Bar-Yosef, 1993).

Comparative analysis of the techno-typological features of Early Ahmarian and Baradostian lithic assemblages usually reveals nuanced parallels and divergences within their respective technological traditions. The Early Ahmarian demonstrates a less variability in core types, particularly those geared toward blade and bladelet production, but in early Baradostian of

Khorramabad Valley as best evidenced at sites such as Yafteh, the technology is more complex and there are more core types such as Unipolar, Opposed platform, prismatic cores. Further distinctions become evident when comparing the use of symbolic objects across these cultures. The early Baradostian of Khorramabad's sites exhibits a greater degree of sophistication in its symbolic practices, in contrast to the Early Ahmarian culture, which demonstrates a less symbolic behavior.

Comparing the Levantine Aurignacian with the Baradostian assemblages of the Khorramabad region, while flakes and blades constitute the primary blanks for tool production in the Levantine Aurignacian (similar to Europe), the Baradostian of Khorramabad lithic tradition in Zagros sites prioritizes bladelets as the dominant blank type, reflecting regionally specific operational sequences. Notwithstanding these distinctions, the shared emphasis on bladelet production and curated toolkits across these industries suggests convergent manifestations of broader cultural adaptations linked to the expansion of *Homo sapiens* across Eurasia. These technological patterns likely represent regional adaptive strategies shaped by ecological and demographic factors, wherein distinct lithic traditions emerged as responses to localized resource availability and mobility demands. Such variability underscores the adaptive flexibility of Upper Paleolithic hunter-gatherer groups, as they innovated and refined technological systems within diverse environmental contexts. This synthesis supports the interpretation of the Baradostian culture of Khorramabad's nominated sites as regionally differentiated yet interconnected cultural trajectory within the wider dispersal of modern humans during the Late Pleistocene.

2.3 Zagros

To the east of Levant, the majority of our knowledge for the Iranian Early Upper Paleolithic comes from the Zagros region. Last two decades saw an increasing interest in Upper Paleolithic of the Zagros region, in particular its early phase, which has a potential to answer some of the questions regarding the expansion and migration of homo sapiens and Middle to Upper Paleolithic transition in Middle East. The resemblance of Baradostian lithic industries of Zagros with Aurignacian technocomplexes in Europe and Levant, and also the hypothesis that it evolved out of underlying Zagros Mousterian, engaged Baradostian as one of the potential candidates for ambiguous origin of Aurignacian. The current information comes from several cave and rockshelter sites, mostly in Iran (except Shanidar cave in Iraq), and more precisely in the intermountain valleys of Kermanshah and Khorramabad in the Western Zagros and some sites in Fars province in the southern Zagros, which all yielded Upper Paleolithic industries. Here we describe some of the well-known Upper Paleolithic sites of Zagros to provide a clearer understanding of the positioning of the Khorramabad valley sites within the region.

The definition of Baradostian has gradually formed and strengthened since its recognition in 1958 at the Shanidar Cave in the western foothills of the Zagros in Iraq (Solecki 1958). Evidence from limited radiocarbon dating at Shanidar indicates a minimum gap of 10,000 years between the uppermost part of level D, associated with the Middle Paleolithic, and the lowest part of level C, linked to the Early Upper Paleolithic. The upper boundary of level D is dated to around 47,000 BP, while the lower boundary of level C is dated to approximately 35,000 BP. Additional dates for level C's lower boundary range from about 35,000 to 28,700 BP (Becerra-Valdivia et al. 2017).

At level C in Shanidar, there is a notable transition in the lithic tool assemblage, shifting from the flakes and points characteristic of the Middle Paleolithic to the blade-dominated assemblages typical of the Upper Paleolithic. This latter group is defined by tools such as burins, scrapers, notched blades, perforators, and awls, implying a broadened spectrum of activities, including woodworking and leatherworking. In Khorramabad valley, dates from Early Upper Paleolithic level at Kaldar Cave present a very early age of 49,200 ± 1,800 (54,400-46,050 cal. BP) which pre-dates the 47000 BP date of Shanidar cave and from cultural point of view, Baradostian layers of nominated sites of Khorramabad Valley are more sophisticated from symbolic behavioral aspect and bladelet production.

Comparable materials to those identified at Shanidar Level C and nominated sites in the Khorramabad Valley have also been observed at some sites within the Iranian Zagros. However, many of these sites have experienced significant degradation due to looting and other forms of damage, including military activities. Notably, the Warwasi rock shelter in the central Zagros region appears to reflect a degree of occupational continuity from the Middle to the Upper Paleolithic, as suggested by one interpretation of the lithic assemblages present at the site (Olszewski and Dibble 1994; see also Braidwood et al. 1961; Olszewski 1993, 2009, 2017; Tsanova 2013). On the basis of similarities observed in Warwasi assemblages and Aurignacian techno-complex, the name “Zagros Aurignacian” suggested for Upper Paleolithic lithic industries and two main chronological phases described for it (Olszewski and Dibble, 1994). The earlier of these has been classified as the Early Zagros Aurignacian, and includes a combination of Upper and Middle Paleolithic tools, such as carinated end-scrapers, burins, Font-Yves points, Dufour bladelets, side-scrapers, and truncated-faceted pieces. Most of the tools are on flake blanks and some are on blade and bladelet blanks. The debitage is dominated by flakes, but prismatic blade technology is also present. Later phase has classified as the Late Zagros Aurignacian and it is most typical for having the characteristic types of the Aurignacian. There is a considerable number of carinated burins and Dufour bladelets, carinated endscrapers as well as Arjeneh points. Tools are made about equally on blade, bladelet, and flake blanks. Technologically, this assemblage is dominated by bladelet debitage (Fig. 1).

The Late Zagros Aurignacian at Warwasi appears to share broad similarity to assemblages of central Europe and the beginning of the Levantine Aurignacian (Olszewski & Dibble 2006).

At Warwasi, the faunal assemblage from the Upper Paleolithic period primarily consists of onager, while goat, sheep, cattle, and hare are also represented (Turnbull 1975; Uerpmann 1987). It appears that hunting onager (Equus hemionus) was the principal activity for the inhabitants of the rock shelter. Its location was advantageous for observing herds of animals, which might have included wild horse (Equus ferus), a larger equid than the onager.

Unfortunately, the Warwasi rock shelter lacks dating, and the site has sustained damage due to surrounding military activities. Nevertheless, studies of its lithic assemblage indicate that the early phase of the Upper Paleolithic sequence is predominantly characterized by flake production. In contrast, the early Baradostian horizon at the nominated sites in the Khorramabad Valley is primarily characterized by bladelet production. Furthermore, the Baradostian layers at the nominated sites of Khorramabad exhibit a greater sophistication in terms of symbolic behavior, a domain in which no corresponding evidence has been found at the Warwasi rock shelter.

In the Bisotun region the cave of Ghar-i Khar also presents some Upper Paleolithic cultural elements which includes a low density of lithic artifacts and not comparable to the very rich sequences of nominated Khorramabad sites (Young and Smith 1966; Shidrang et al. 2016), and with an emphasis on hunting of wild sheep and goat (Hesse 1989).

Aside from the Upper Paleolithic sites in Kermanshah, which differ significantly from the nominated sites in the Khorramabad Valley, particularly in terms of the sophisticated behaviors exhibited by Upper Paleolithic hunter-gatherers, including symbolic practices, in the Fars region in the southern Zagros, the surveys conducted by Sumner and Rosenberg (Rosenberg 2003; Dashtizadeh 2006) discovered some sites. Excavations at the cave site of Eshkaft-e Gavi (Rosenberg 1985) uncovered tool assemblages that exhibit similarities to those of the Upper Paleolithic of the central Zagros, while also displaying some unique differences, however the lithic materials never studied in details to be able to compare them with other sites of the region. Radiocarbon dating indicates a time span of 30,000 to 18,000 BP. Faunal remains from Eshkaft-e Gavi predominantly feature gazelle, along with sheep, cattle, and equids (Zeder 1991). Notably, hominin remains from Eshkaft-e Gavi include ten cranio-dental and postcranial pieces, several of which exhibit evidence of butchery by humans (Scott and Marean 2009) but unfortunately from disturb and unreliable context.

Another Upper Paleolithic sites in southern Zagros is Ghar-e Boof Cave, located in the Dasht-e Rostam-Basht region of the southern Zagros (Conard and Ghasidian 2011; Ghasidian 2014).

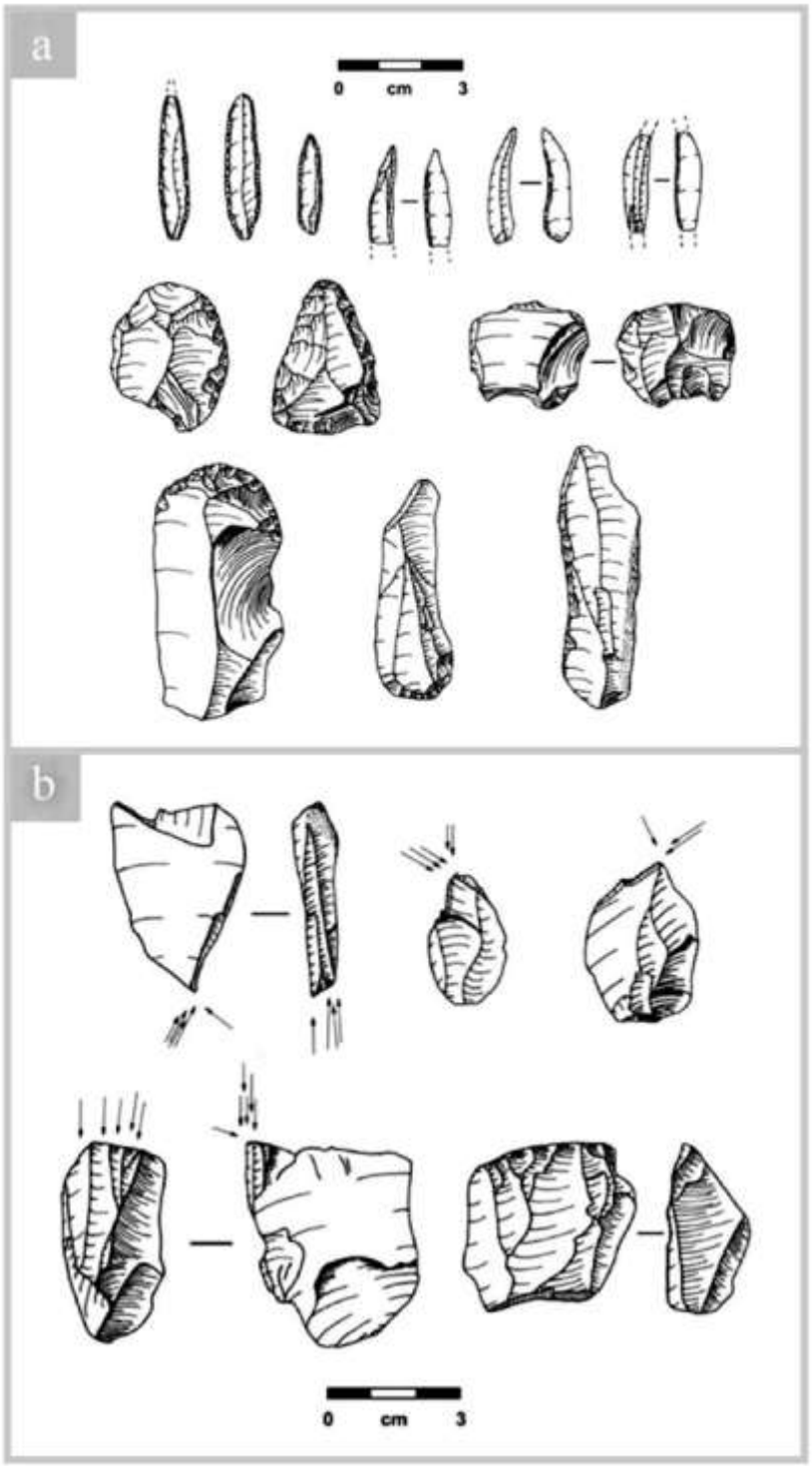

Fig. 1. Example of Early Zagros Aurignacian lithic artifacts (a) and example of Late Zagros Aurignacian lithic artifacts (b) at Warwasi (Olszewski and Dibble 2006)

Radiocarbon and luminescence dating at Ghar-e Boof indicate Upper Paleolithic occupation beginning from approximately 40,000 BP (Becerra-Valdivia et al. 2017: Heydari et al. 2021). Lithic artifacts tools from Ghar-e Boof indicative of a different Upper Paleolithic lithic tradition, which diverges from the Baradostian lithic assemblages of the Khorramabad nominated sites in central Zagros. This tradition has been termed the "Rostamian" tradition (Ghasidian 2014). A comparison of the techno-typological characteristics of the main Upper Paleolithic site in the Dasht-e Rostam-Basht region, Ghar-e Boof, with Upper Paleolithic assemblages from the nominated Khorramabad Valley's site reveals distinct technological traditions.

In the Rostamian tradition at Ghar-e Boof, knappers utilized blades and bladelets as blanks for tool production, though flakes also constitute a prominent component of lithic reduction strategies. This contrasts sharply with Baradostian assemblages from Khorramabad Valley sites, such as Yafteh Cave, where blade and bladelet production heavily dominates lithic technology, and flakes play a comparatively non or minor role in tool manufacturing. Notably, Yafteh Cave in the Khorramabad Valley demonstrates a highly variable and innovative production of symbolic objects, a phenomenon that has not been reported from any other site in Iran.

In Khorramabad valley, the Upper Paleolithic levels at Kaldar Cave present a very early age of 49,200 ± 1,800 (54,400-46,050 cal. BP) and 39,300 ± 550 (44,200-42,350 cal. BP) for an early Upper Paleolithic industry which pre-dates all the Upper Paleolithic sites in Iran and southwest Asia (Table 1&2). The archaeological materials of this site attest long-term use of the site as a basecamp for hunting of goat, boar, red deer and roe deer (Bazgir et al. 2017).

Also at Yafteh Cave in the Khorramabad valley, the Baradostian industry was recovered in association with grinding stones, the earliest ground stone tools from the region, probably used for ochre processing (Hole and Flannery 1968; Otte et al. 2007; Bordes and Shidrang 2009; Tsanova 2013; Shidrang 2018). Hearths and bone tools also occur at Yafteh, with 26 radiocarbon dates spanning 39,000 to 29,000 cal. BP (Otte et al. 2011). Yafteh Cave is one the key sites of the Upper Paleolithic in the southwest Asia in shaping our knowledge on several aspects of Upper Paleolithic life strategies. The Yafteh cave excavations for the first time yielded considerable evidence of personal ornaments including pierced marine shell beads and perforated vestigial deer canines, bone tools, with frequent use of ochre and other minerals alongside grinding stones throughout the sequence (Fig.2).

Fig.2. The earliest known evidence of symbolic and relatively complex behaviors in Early Upper Paleolithic of Iran (Photos: Shidrang & Biglari)

Such evidence is completely absent in the Middle Paleolithic of the Zagros, and their presence in the early Upper Paleolithic may point to considerable cultural differences in the behavioral patterns of the Middle Paleolithic and Upper Paleolithic hunter–gatherers of the Zagros (Shidrang et al. 2020).

Hunting activity at this cave was concentrated on small herbivores, and principally wild goats. Based on the faunal spectrum, Yafteh cave may have been surrounded by several ecological niches such as steppe lowlands, piedmont, cooler uplands and forested areas (Mashkour et al. 2009). Based on the presented results of the Yafteh cave assemblages, the earliest Baradostian was not as sophisticated as the evolved Baradostian of the middle phase.

In this industry, blades and bladelets were produced by soft hammers from single platform prismatic cores with plain platforms. The products were mostly pointed bladelets with straight profile and also moderate size blades from the initial stage of the same reduction sequence. The toolkit is quite simple including Arjeneh points and retouched bladelets with a few Dufour (Dufour subtype) and a moderate frequency of end scrapers on blades (Fig.3).

These characteristics can be found in Proto-Aurignacian of Europe and in part the Early Ahmarian industry of the Levant. Taking into the account the available dating for the Baradostian or other Upper Paleolithic cultures, we might assume that the similar diffusion trend (or agent) that made the Proto-Aurignacian and Early Ahmarian, spread into the Zagros roughly around 41,000 cal. BP. Interestingly, tools percentage ratio to debitage is fairly high in this phase which may indicate short term visits of EUP hunter-gatherers to the Yafteh cave rather than a long seasonal occupation in the beginning of the sequence.

As the sequence of Yafteh shows us, we can trace the evolution of this industry throughout its core management toward a more volumetric shape and more complex and diverse reduction sequences (Fig. 3). The single phase based on the Bayesian model presented in Otte et al. 2011 is around 37,000 cal. BP which may belong to the middle phase of Baradostian which represents its highest point of complexity (Shidrang 2015).

In this phase, blades become more important and there seems to be a new line of blade production as end scraper’s blanks or being retouched laterally into notches or regular retouched blades(Fig.4). Diversity of bladelet cores increases in the middle phase which displays some degree of specialization for production of different bladelet type (Fig.5).

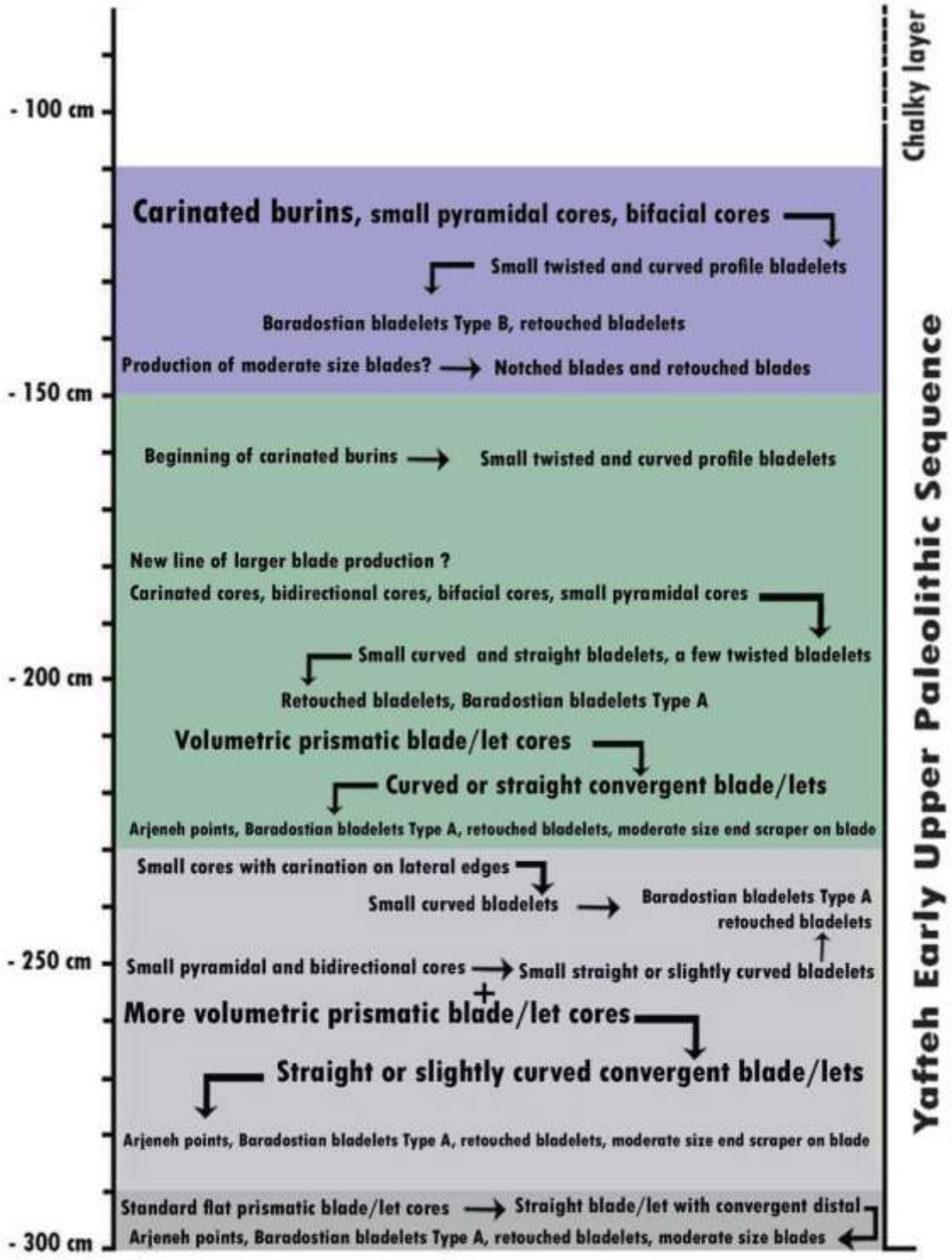

Fig.3. The main lines of lithic reduction sequence in Yafteh cave EUP layers (Shidrang 2015)

There is also evidence of frequent intentional use of ocher and a fire place. All the evidence, particularly the considerable number of domestic tools, suggest a strong probability of an intense occupation specialized in hide working and piercing the hides and ornaments.

While keeping its Proto-Aurignacian characteristics, the middle phase of the Baradostian transformed into a more complicated industry with more diverse and specialized tools. This may remind us of the Early Aurignacian, however, with major differences. In the middle phase of the Baradostian, blade production is not as important as in the Early Aurignacian and carinated scrapers which usually are found in a blade dominant context do not play a typological key role in the Baradostian.

However, specialization and individualization of the reduction sequence, emphasis on domestic tools made on blades, higher frequency of ornaments, bone tools and frequent use of ocher and other minerals are the general similarities of the two entities. We are not sure when exactly this phase ends but it may have continued until around 35,000 cal. BP and the last phase of Baradostian may be placed roughly some date between 29,000 cal. BP to roughly 35,000 cal. BP.

The first impression of the later phase of Yafteh cave is significant reduction in components size. A significant number of small twisted bladelets were left unretouched but some have been retouched into Dufour bladelets of “Roc de Combe” subtype, while the production of Arjeneh points decreases dramatically and become almost extinct (Shidrang 2015). The small standardized and lateralized carination technology with a significant frequency of carinated burins (and in lesser number nosed scrapers and small pyramidal cores) and their twisted bladelets began sporadically in middle phase of the sequence and become dominant characteristics of the assemblage in the late phase of Baradostian. End scrapers are usually made on flakes or smaller blades and display a clear reduction in size as we approach the end of Baradostian.

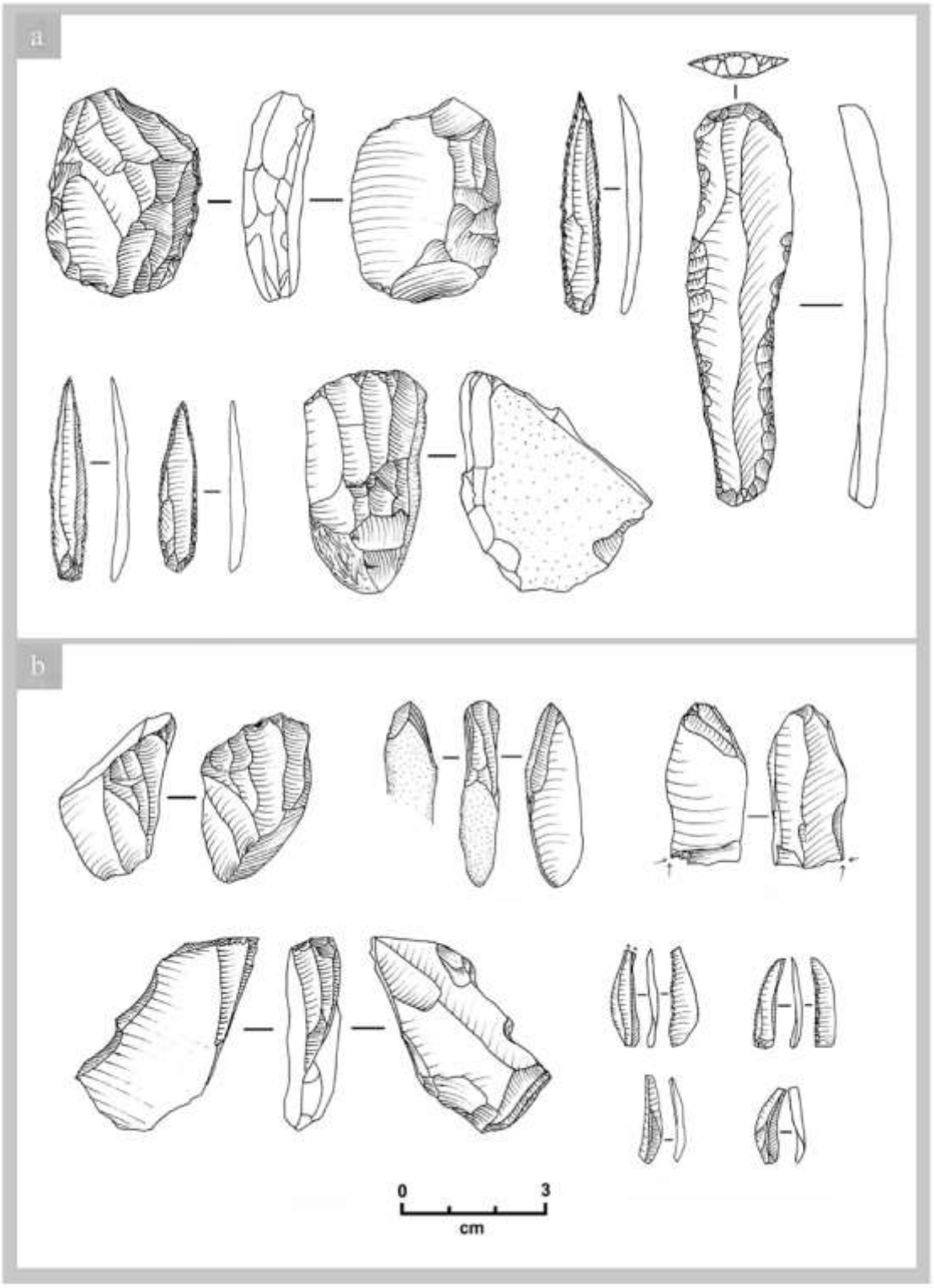

Fig.4. Example of lithic artifacts from middle phase of the Baradostian (a) and example of lithic artifacts from late phase of Baradostian (b) at Yafteh cave (Shidrang 2015)

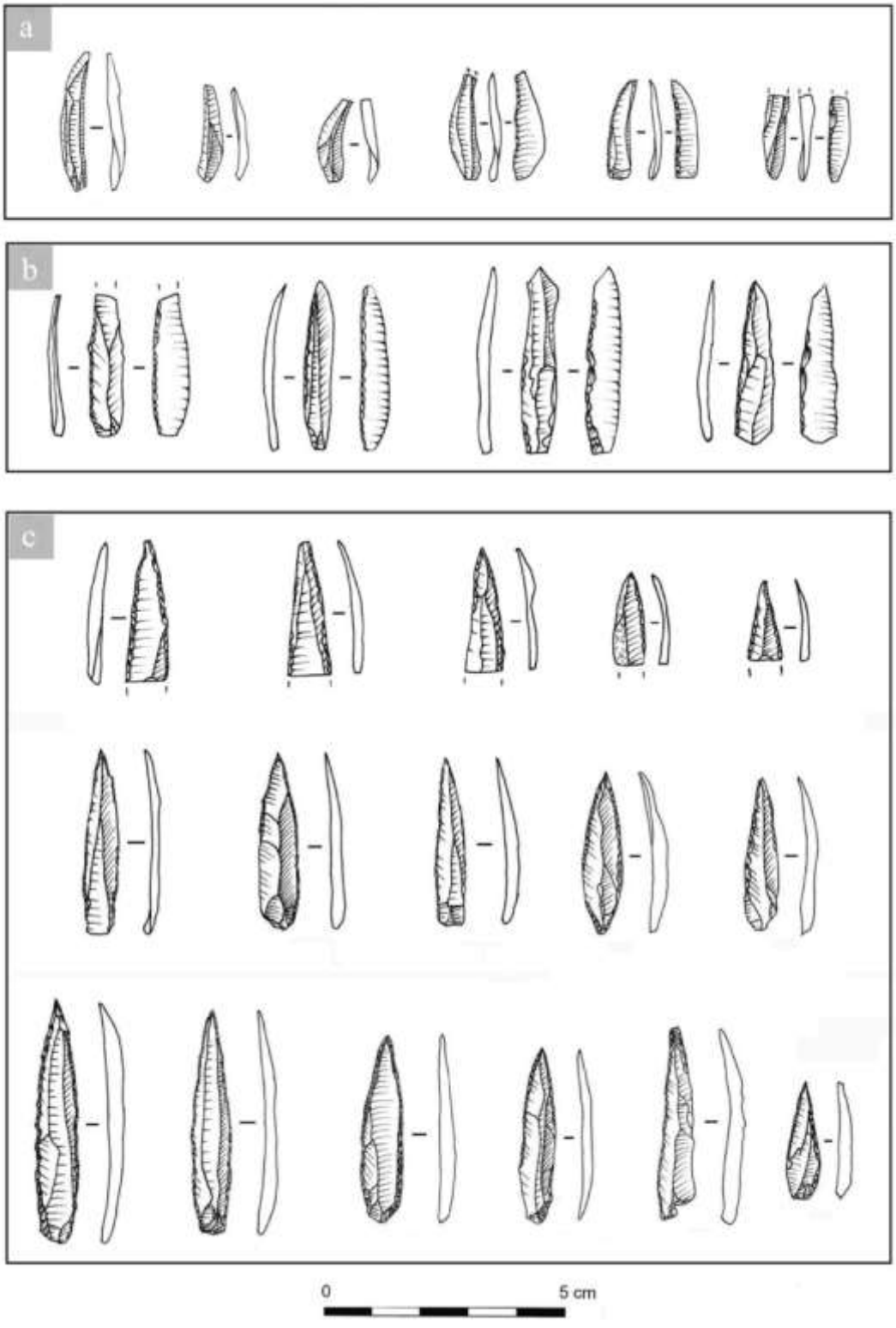

Fig.5. (a) Baradostian bladelets (Type B); (b) Baradostian bladelets (Type A); (c) Arjeneh points (Shidrang 2018)

2.4 Arabian Peninsula

The Arabian Peninsula is a geographical bridge between Africa and Eurasia, and its Pleistocene archaeological evidence is of significant interest in tracking the southern route of population expansion from Africa. Compared to Levant and Zagros, the study of Modern Human origins began relatively late in Arabian Peninsula. Given the scarcity of stratified sites and absolute dating, it is not yet possible to create a comprehensive idea of Middle to Upper Paleolithic Transition in Arabian Peninsula. However, recent research has found some archaeological affinities with North Africa and Southwest Asia, mainly based on Middle Paleolithic discoveries in coastal areas (Marks 2009; Rose et al. 2011; Delagnes et al. 2012).

The timing and dynamics of *Homo sapiens* dispersal out of Africa are central to reconstructing global population history, with prevailing models positing an initial, limited expansion ~130–90 ka and a later, widespread migration ~60–50 ka. From paleoanthropological point of view, new findings such as the Al Wusta-1 phalanx from Saudi Arabia, directly dated to >85 ka, represents the oldest *H. sapiens* fossil discovered beyond Africa and the Levant (Groucutt et al. 2018).

But the Upper Paleolithic of Arabia is less known and the current state of data has documented a long sequence of laminar technologies that date back to around MIS 4 through early MIS 1 (75–8 ka). Several sites, like Al-Hatab Rockshelter and Shi'bat Dihya1 inYemen, provide evidence for human occupation in southern Arabia during MIS 4 and MIS 2 (Delagnes et al. 2012). The site of Jebel Faya 1 with remains dated to MIS 5 and MIS 3 (Marks 2009) and Upper Paleolithic sites recorded in the Wadi Hadramaut are examples of Arabian Upper Paleolithic sites that were all found in marginal environments. Jebel Faya rockshelter in Sharjah Emirate is one of the a few stratified excavated Paleolithic sites that have yielded radiometric dates for Arabian Peninsula Paleolithic cultures (Marks 2009). The lithic materials are associated with three distinct archaeological layers of Jebel Faya spanning a major part of the Late Pleistocene.

The preliminary results of radiometric dates indicate an age of at least 85 ka for its Middle Paleolithic assemblage (C), while later assemblages (A and B) fall in MIS 3 (Marks 2009). Typo-technologically, the lowest assemblage is characterized by small handaxes, bifacial foliates, hard hammer blades and centripetal cores, and the next upper assemblage (B) is characterized by the production of flakes from 90 cores and flat cores. There are a number of multiple platform cores as well as a few truncated faceted pieces and blade production in addition to some volumetric cores. Tools comprise sidescrapers, endscrapers, denticulates and simple retouched pieces. Later assemblage (A) is characterized by the production of small rectangular flakes from multiple platform cores. The purposeful blade production is very rare, although a few short, wide blades exist. Tools categories include burins, retouched pieces, and small number of endscrapers, sidescrapers and denticulates (Marks 2009). Apparently,

the Jebel Faya 1 assemblages A and B show no obvious technological relations to any transitional industry in the Levant or Africa. Apart from the site Faw Well, which based on its similarities to late Ahmarian of the Levant probably date back to late MIS 3, other contemporaneous sites throughout Arabia show no close affinities to either the Levant or East Africa. The Faw Well, located east of the Asir Mountains in southern Saudi Arabia, seems to be the only convincing evidence for a Levantine Upper Paleolithic presence in Arabia (Marks 2009).

The small collections from Faw Well typo-technologically resemble the later Ahmarian of the southern Levant, which date to about c. 24 and 20 ka. At most of the sites, the blade technology is relatively different from contemporaneous Levantine sites and the absence of el Wad points and finely retouched blades and bladelets, makes it difficult to hypothesis any direct connections. While additional sites and absolute dates are vital to interpret these industries, currently the most accepted view is that they are parts of a long term, local developmental sequence of Arabian lithic industries. However, during early MIS 3, a period of increase in precipitation occurred in Arabia, which increased the possibility of demographic exchanges between Arabia and adjacent regions. For instance, southern Arabian populations may have spread to the north during this time and disperse a Nubian-derived Levallois technique used in production of elongated points from bidirectional Levallois cores, one of the technological characteristics of the Middle-Upper Paleolithic transition industries in the Levant (Rose et al. 2011).

Thus, the Paleolithic assemblages in the Arabian Peninsula are predominantly characterized by cores and flakes. This often results in an emphasis on the strategies used to produce blanks. Conversely, tools and well-defined tool types are rare, likely due to the harsh and unpredictable environments that necessitated flexibility among Paleolithic stone toolmakers.

A phenomenon seldom observed in the Paleolithic records of Arabia is the presence of blades and bladelets associated with the preparation of steep backs. These technological features are found in adjacent regions, such as the Levant and Africa, dating back approximately 40,000 years ago. Notably, in addition to the assemblage reported by Rose et al. (2019) from Dhofar, Edens (2001) documented surface collections with significant numbers of blades and bladelets from Faw Well in Southwest Saudi Arabia. Edens (2001) argues for a late Upper Paleolithic age of the surface-collected assemblage, based on the occurrence of double-backed bladelets and evidence of an Upper Paleolithic type of blade/bladelet production using crested blades.

The scarcity of Upper Paleolithic sites in Arabia highlights a substantial gap in our understanding. Hominin behavioral flexibility and socio-economic networks may have played an important role for coping with climatic change during the Pleistocene. One exception

might be the early Upper Paleolithic period, where blade and bladelet technologies as well as backing as an indicator for composite tools, occur. The scarcity of evidence for Upper Paleolithic occupations in Arabia, however, hinders an in-depth evaluation of the question why sophisticated lithic technology did occur late and not with the supposed dispersal of modern humans during MIS 5e. This situation also makes it very difficult to compare the scarce evidence of Upper Paleolithic from Arabia to well-studied Upper Paleolithic blade/bladelet industries of Zagros and Levant.

Justification

The nominated cave sites of Khorramabad Valley have revealed important evidence related to the culture of Upper Paleolithic hunter-gatherers, particularly in terms of their behavioral patterns and lithic technologies. These discoveries position these caves and rock-shelter as a key sites for understanding the Upper Paleolithic period in both Iran and Southwest Asia. What distinguishes the Upper Paleolithic Baradostian communities of nominated Khorramabad sites from other sites in the Zagros Mountains and throughout Iran is their use of a variety of symbolic artifacts that are not found elsewhere in the region. Among these unique items are pendants made from deer canines and shells from the Persian Gulf, located approximately 500 kilometers from Khorramabad Valley (e.g.Otte et al., 2007; Shidrang 2007;2018). The combination of diverse symbolic artifacts and an evolving lithic industry documented throughout the sequences of the nominated Khorramabad sites of the Baradostian culture—supported by extensive radiocarbon dating—has established a distinct cultural identity for the Baradostian in this region.

Furthermore, these archaeological cave and rock-shelter sites within the Khorramabad area represent the most compelling evidence of Paleolithic occupation in Iran with best monitoring and conservation of the properties, with no comparable sites in the country demonstrating greater eligibility for recognition as possessing outstanding Universal Value. Given the density of Upper Paleolithic sites and the rich, distinctive evidence of Baradostian cultural practices, the nominated sites of Khorramabad Valley stand out as unparalleled locations for examining the behavioral patterns of Upper Paleolithic societies—especially those linked to the Baradostian culture—on a global scale. This exceptional collection of archaeological findings emphasizes the valley's significance in the broader story of human cultural and technological evolution during the Upper Paleolithic era at least.

The nominated archaeological sites of Khorramabad Valley hold Outstanding Universal Value as a testament to humanity’s shared heritage, uniquely preserving the innovations and symbolic expressions of the Baradostian culture during the Upper Paleolithic. These caves and rock-shelter reveal extraordinary insights through rare artifacts—such as intricately crafted shell pendants sourced from the distant Persian Gulf and ornaments fashioned from deer

canines—alongside sophisticated stone tool technologies that surpass contemporaneous developments in Iran and the Zagros Mountains. Their exceptional state of conservation, reinforced by precise radiocarbon dating, not only underscores their authenticity but also highlights their role in decoding early human creativity, social complexity, and far-reaching trade networks.

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3. Academic potential and future research

The archaeological deposits within the nominated prehistoric caves and rock shelter are indeed of significant interest, both for their cultural heritage value and their potential to contribute to our understanding of prehistoric human activities in the region and broader context. Several investigations have been conducted to assess the academic and scientific potential of these deposits since 2023. During 2023-2024 a scientific appraisal of the archaeological mound beneath the Falak-ol-Aflak castle carried out. This recent excavation in 2023 has been conducted along a 25-meter-long and 2-meter-wide longitudinal trench on the southern flank of the mound beneath the castle, aligned parallel to Tower No. 3 and oriented in a north-south direction on a relatively steep slope. These investigations have yielded previously unrecognized archaeological artifacts, suggesting the presence of even older stratigraphic remains (Ghobadi-zadeh 2024; Please see pages 73-82 of the Additional information 1 sent to ICOMOS on 3 November 2024). This excavation was a part of “Short Term Plans of PCFEKV” (page 374).

Another scientific appraisal of deposits was initiated in late 2024 and early 2025, involving a multidisciplinary team of archaeologists, geologists, paleontologists, and other specialists. This appraisal focused on Ghamari Cave excavation focusing on stratigraphic analysis examining the layers of deposits to understand the chronological sequence of human occupation and environmental changes, sampling organic materials and sediments to establish a timeline for the deposits.

The team is studying soil composition and micro-stratigraphy to identify patterns of human activity, tool production, fire use, and habitation. And analyzing bone fragments, pollen, and plant remains to reconstruct the paleoenvironment and subsistence strategies of prehistoric communities. The preliminary findings suggest that the deposits hold substantial potential for advancing our knowledge of prehistoric technological, cultural, and environmental developments.

The presence of well-preserved flint tools, faunal remains, and evidence of fire use indicates that the sites were significant centers of human activity during the Middle Paleolithic period. The flint tools found at the sites exhibit a high degree of craftsmanship, suggesting advanced knapping techniques and tool specialization. The faunal and floral remains offer a window into how prehistoric communities of Khorramabad valley adapted to changing climatic conditions.

As noted in the management plan approved in 2023, one of the key short-term actions is the continuation of multidisciplinary research and archaeological excavations in the prehistoric caves and rock shelter. Since the approval of the management plan, the following activities have been undertaken:

3.1 Surveys of the caves and rock shelter have been conducted to identify areas of high archaeological potential. Also during an intensive survey of the mound beneath the Falak-ol-Aflak castle, several lithic artifacts exhibiting typo-technological characteristics of the Paleolithic artifacts were recovered in late 2024. The report of these finds is as follow:

Possible Paleolithic finds from Falak-ol-Aflak rocky hill

Falak-ol-Aflak rocky hill is situated in the narrowest segment of the Khorramabad Valley, which measures approximately 1 km in width, and overlooks the Khorramabad River. The eastern and northeastern slopes of the hill are characterized by prominent karst rock outcrops, from which several karst springs emerge at their base. The processes of karstification and dissolution have facilitated the formation of multiple rock shelters in this area. Historical evidence, including an old photograph from the Qajar period, indicates that these shelters were located at the eastern end of the rock formation, adjacent to a spring. The presence of these springs, combined with the availability of rock shelters, undoubtedly provided favorable conditions for the occupation of Paleolithic hunter-gatherer groups.

To evaluate the Paleolithic potential of this site, which later hosted settlements spanning the Chalcolithic, Bronze, Iron, and subsequent periods, an intensive survey was conducted on the rocky and sedimentary slopes beneath the castle. The objective was to identify potential remnants of Paleolithic activity. During this survey, 32 lithic artifacts were recovered, some of which are associated with late prehistoric settlements dating from the Late Neolithic to the Bronze Age. However, a subset of these artifacts, based on their technological characteristics, weathering patterns, and surface patina, are likely attributable to the Paleolithic period. Among these, two artifacts are of particular significance. The first is a core made from a river-worn pebble, sourced from the gravel deposits along the banks of the Khorramabad River, located approximately 200 meters east of Falak-ol-Aflak. On one surface of this core, a platform was created by the removal of five flakes, which was subsequently used to extract two additional flakes from the opposite face. Prepared platform cores of this type first appear in the Late Lower Paleolithic and become increasingly common during the Middle Paleolithic, particularly within the context of the Levallois technique. Similar cores have been documented at Middle Paleolithic sites within the Khorramabad Valley, with the closest being Ghamari Cave, situated 1,150 meters to the northwest.

Fig.6 Top: Historical photograph depicting the location of a rock shelter prior to modern construction during the Pahlavi period. Bottom: Current photograph showing the same location, where the rock shelter is now largely buried beneath modern infrastructure.

Fig.7 Rocky slope of the hill where numerous lithic artifacts were recovered during an intensive archaeological survey.

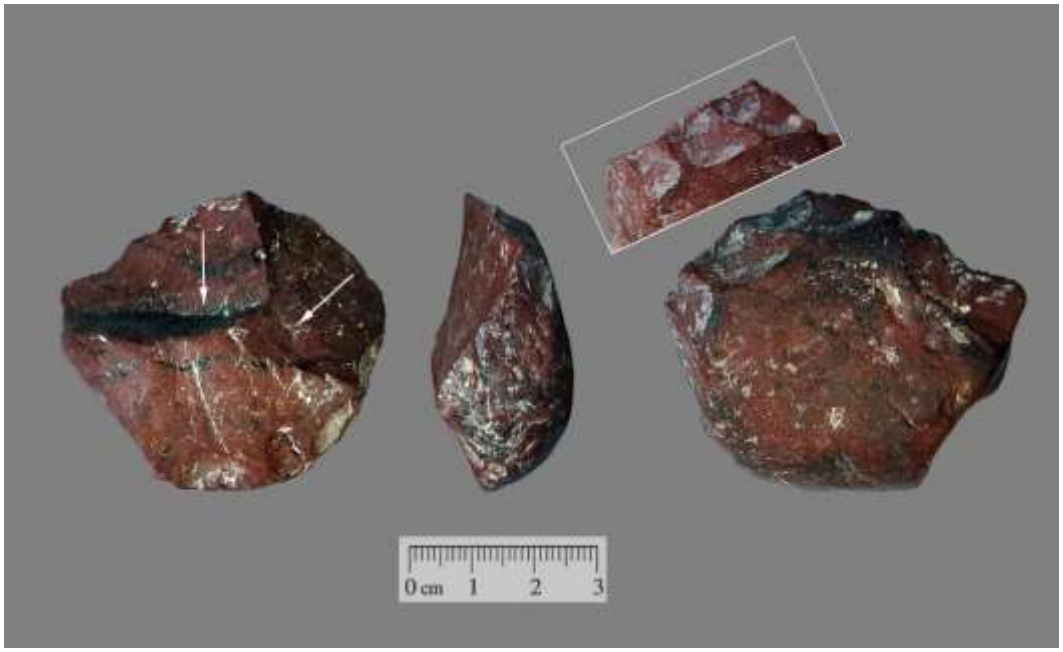


Fig.8 Partial centripetal core with prepared platform, Falak-ol-Aflak rocky hill.

The second artifact is a flake core made on a tabular chert, whose raw material probably originates from primary outcrops on the western slopes of Siah Kuh and Makhmal Kuh, located at least 3 kilometers from the site. This core features a dihedral platform, partially shaped by the removal of several small flakes, which was used to detach a triangular flake from the opposing face.

Both cores, based on their technological attributes, can be tentatively assigned to the Late Lower Paleolithic and Middle Paleolithic cultural periods.

The strategic location of Falak-ol-Aflak Rock and Hill in the narrowest part of the Khorramabad Valley, combined with its proximity to karst springs and rock shelters, would have made it an attractive location for Middle Paleolithic and potentially earlier hunter-gatherer groups. The elevated position of the site would have provided an advantageous vantage point for monitoring the movement of game herds and potentially ambushing them along their migratory routes. Additionally, the availability of rock shelters would have offered suitable habitation spaces with easy access to freshwater sources and lithic raw materials from the nearby river.

3.2 In our Prehistoric archaeological projects of the Khorramabad Valley, an excavation is in progress in Ghamari Cave in selected areas to assess the depth and richness of the deposits and carrying out multidisciplinary research which the first season of the excavation will be complete by the end of March 2025 and analyzing of materials such as typo-technological lithic studies, fauna studies, micro-morphological and datings would be finish by the end of September 2025. Here we provide you with a preliminary report of our ongoing excavation.

Excavation in the Ghamari Cave

In line with the recommendation by ICOMOS, which emphasized the significance of continued multidisciplinary research and archaeological excavations of prehistoric caves as outlined in the 2023 management plan, we are currently undertaking excavations at Ghamari Cave, one of the nominated sites. This initiative reflects ICOMOS's interest in receiving updates on progress. It seeks to advance our understanding of the technological developments evidenced by the flint tools recovered from these caves and rock shelters. The excavation at Ghamari Cave is a key component of our efforts to implement the short-term actions specified in the management plan. Below, we provide further details on the progress and findings of the ongoing excavations at this significant site.

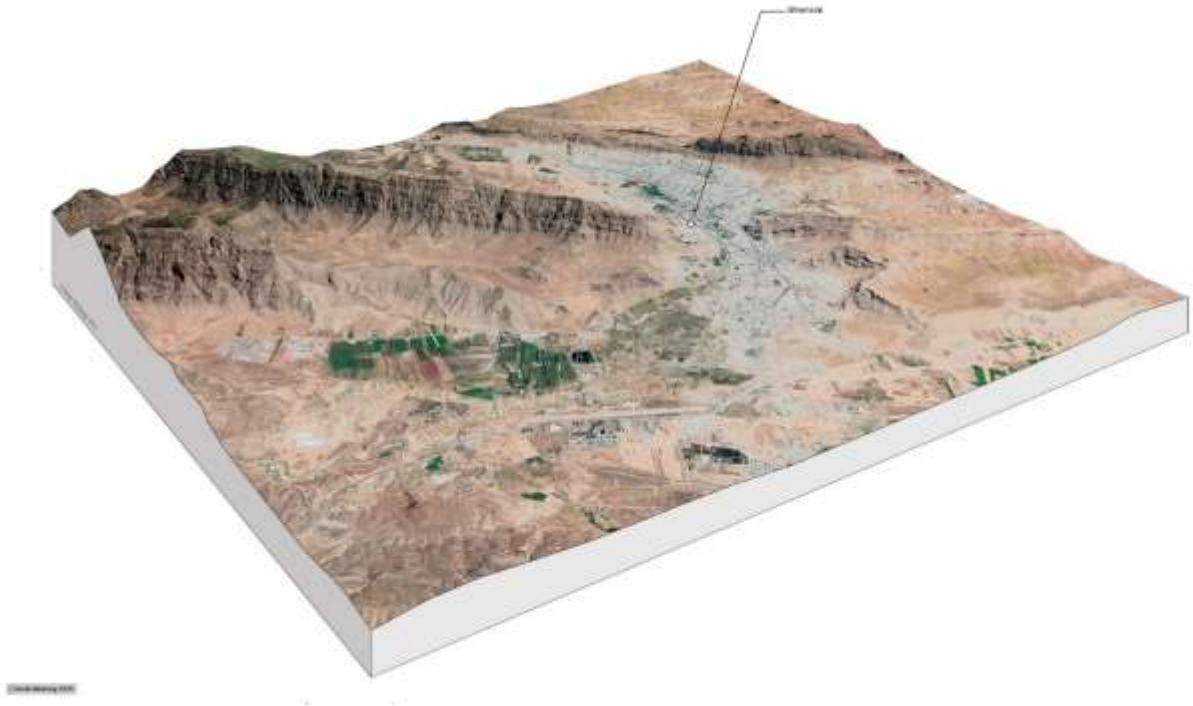


Fig.9 Location of Ghamari Cave at the southern terminus of Kuh-e Sefid Mountain, situated on the western periphery of Khorramabad city.

The nominated cave site of Ghamari is situated at the southern end of Kuh-e Sefid Mountain, on the western edge of the city of Khorramabad, at an elevation of 1,320 meters above sea level, approximately 130 meters above the valley floor. The cave overlooks a rocky slope that descends to the Gerdab-e Sangi karst spring at its base. Its southeast-facing entrance is 8.35 meters wide and 3.5 meters high. The cave consists of two large chambers, the front and largest of which is approximately 27 meters long and up to 13 meters wide at its center. The cave features a front gallery with a nearly flat and level floor that connects to a large rear gallery through a steeply sloping corridor. The front gallery contains significant archaeological deposits, providing valuable insights into past human activity. In contrast, the rear gallery is predominantly devoid of both archaeological and natural deposits, with bedrock exposed across much of its surface. This gallery experiences seasonal moisture, remaining damp during winter and spring, which has contributed to the formation of extensive flowstone and speleothem deposits that adorn its walls. This combination of cultural and natural heritage enhances the cave's value across multiple dimensions, including scientific research, educational outreach, and tourism.

Fig.10 To protect the Ghamari Cave and ensure its preservation, a full gate was installed at its entrance in 2024.

Fig.11 Examples of speleothem formations on the walls of the rear gallery.

Research background

Ghamari Cave was officially registered as a national monument in 2001 under registration number 4144. The site was first excavated in 1965 by Frank Hole, followed by a second excavation in 2012 led by Behrouz Bazgir. Their test excavations revealed that the front chamber contains at least 2.5 meters of cultural deposits, consisting of two main archaeological sequences. The upper sequence, approximately 80 cm thick, yielded materials from the Late Prehistoric period (Neolithic and Chalcolithic) to the Historic Period, while the lower sequence, about 160 cm thick, contained Middle Paleolithic artifacts. Notably, neither excavation reached bedrock. Given the substantial size and morphology of the anterior chamber, it is estimated that the deposits may extend to a depth of more than 10 meters, underscoring the site's significant potential for further archaeological exploration. Based on these previous test excavations, the Middle Paleolithic layers comprised reddish-brown sediments and lithic artifacts characteristic of the Mousterian industry. The lithic artifacts discovered included Levallois products, side scrapers, and limaces, some of which exhibited microscopic traces of use.

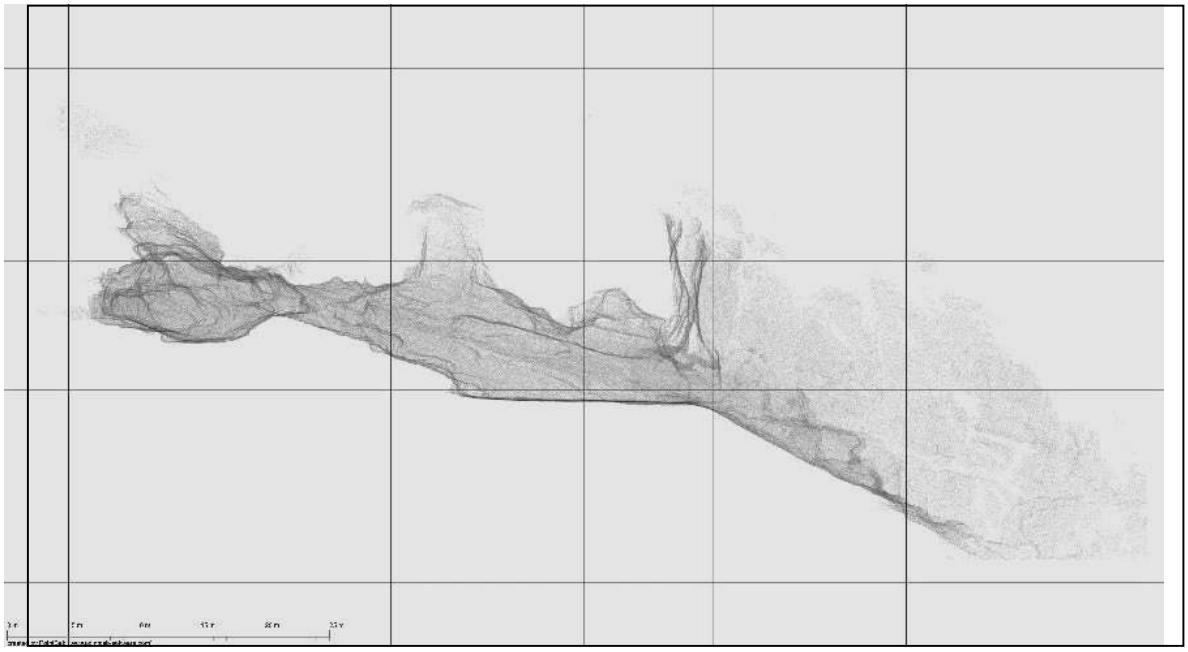


Fig.12 High-resolution 3D model of the cave generated using terrestrial laser scanning technology (2024).

To protect the cave and ensure its preservation, a full gate with vertical bars was installed at its entrance in 2024. This measure allows for controlled access to the site, enabling visitors to experience its cultural and historical significance while safeguarding its integrity. The gate also supports ongoing research and monitoring, ensuring Ghamari Cave remains a

protected and well-managed heritage site for future generations. In the same year, using a combination of terrestrial laser scanning (TLS), close-range photogrammetry, and GPS technology, a highly accurate 3D model of the Ghamari Cave was successfully created. The integration of terrestrial laser scanning, close-range photogrammetry, and GPS technology ensured that the model was both geometrically precise and visually realistic, providing a valuable resource for understanding and preserving the cave's unique features. The mapping enhances our understanding of the cave's structure and serves as a valuable tool for conservation planning, research, and virtual accessibility, ensuring the site's preservation and documentation for future study and public engagement.

2025 excavation

The new archaeological excavation project led by Fereidoun Biglari (National Museum of Iran) and Sonia Shidrang (Shahid Beheshti University) was started in Ghamari Cave in February 2025. For this purpose, an area of 2x2.5 meters was selected for excavation along the southern wall of the cave, near the entrance, where the potential for access to richer occupational remains was considered to be highest. By focusing on this area, the excavation aims to reveal detailed evidence of human activity, from Late Pleistocene hunter-gatherers to Holocene pastoralists and later historical occupations, helping to piece together the cave's long and complex history.

Since the beginning of this most recent excavation project, we have identified a dry-stone structure associated with pastoralists in several excavation units. Based on the pottery fragments recovered, most of which date to the Chalcolithic period, it is likely that this structure also belongs to this period. To accurately document this stone structure, a detailed 3D model was created using photogrammetry. This method provides an accurate and comprehensive digital record of the structure, capturing its shape and spatial relationships for further analysis and conservation.

Fig.13 New excavation in the Ghamari Cave, February 2025

Fig.14 3D model of the dry-stone structure created through photogrammetry.

Fig.15 Selected Chalcolithic potsherds from 2025 excavation in the Ghamari Cave

Beneath the Holocene layers, which vary in thickness from 5 to 15 centimeters across most excavation units, we have reached archaeological deposits dating to the Middle Paleolithic period. These deposits are primarily composed of brown and reddish-brown Pleistocene

sediments, marking a distinct stratigraphic transition to earlier occupation phases. These deposits have yielded a collection of lithic artifacts, faunal remains, charcoal fragments, and a hearth or ash pit.

The lithic artifacts include cores, flakes, retouched tools, and other byproducts. The lithic assemblage exhibits techno-typological characteristics consistent with the Zagros-Mousterian tradition. The raw materials used for these tools consist of chert pebbles and cobbles from the Khorramabad River gravels, about 900 m to the east, and outcrops on the western slopes of Siyah Kuh and Makhmal Kuh, about 3.5 km to the east of the cave.

Fig.16 Levallois core, Middle Paleolithic, Ghamari cave

The presence of cortical fragments suggests that toolmakers transported whole pebbles to the cave and worked them into flakes and other tools on site. The lithic raw materials are predominantly fine-grained, with colors ranging from reddish brown to green and gray. Although the limestone bedrock near Ghamari Cave contains nodules of gray chert, these are often fractured and unsuitable for flaking. Cores are few but show clear use of the Levallois technique. The tools consist mostly of side scrapers, points, and retouched pieces, some of which are made on Levallois blanks.

The faunal remains recovered so far belong to a variety of animal species. The patina, color and fossilization of the bones indicate their Middle Paleolithic age. Evidence of burn and butchery marks on the bones of small herbivores, such as wild goats, indicate their hunting and consumption. The assemblage includes both identifiable bones and fragmented, unrecognizable specimens. Of note is the distal end of the metacarpal of an immature wild goat (between 1.5 and 2 years old), which shows burn marks. Another significant specimen is

the distal end of a tibio-tarsal bone from a bird that, based on its size and morphology, likely belongs to the Anatidae family, although further comparative analysis is needed.

Fig.17 Metacarpal of an immature wild goat (Between 1.5 and 2 years old), Middle Paleolithic, Ghamari Cave

In addition, rodent remains, such as a femur from a small rodent (possibly from the Muridae family), provide insight into the paleoenvironment of the site. Rodents are sensitive to climatic conditions, and their presence helps reconstruct climatic fluctuations at the end of the Ice Age. Other faunal remains include the proximal end of an ulna, probably from a Mustelidae family or possibly an otter (Lutra lutra). Otters, which inhabit freshwater river environments, are common at archaeological sites, and their pelts may have been used for clothing. Another notable specimen is an occipital bone, where the spine joins the skull, from a medium-sized herbivore. This bone shows clear burn and butchering marks, suggesting that the animal's skull was brought into the cave after butchering, or possibly that the entire carcass was brought into the cave for processing.

A hyena coprolite was another significant find within the Holocene deposits. This discovery holds considerable potential for paleoenvironmental reconstruction, as the coprolite may contain preserved pollen and ancient DNA. Analyzing these elements can

provide valuable insights into the local vegetation, climate, and ecological conditions during the time of deposition, as well as information about the diet and biology of the hyenas themselves.

The identification of a possible ash pit or hearth is significant. Its presence indicates an occupational floor, and careful examination of this feature and its surroundings can provide critical insights into how Middle Paleolithic humans organized the space within the cave. In addition, if heated deposits beneath the hearth can be identified, it will be possible to date these remains using the thermoluminescence dating method, thus providing a chronological framework for the occupation and activities within the cave.

Fig.18 Middle Paleolithic occupational floor identified across three sub-units, showing the distribution of lithic artifacts, small charcoal fragments, limestone clasts, and an ash pit or possible fire pit.

Fig.19 Middle Paleolithic flake tool discovered in proximity to two additional flakes on the occupational floor, adjacent to an ash deposit or potential fire pit.

To engage the public and raise awareness about the archaeological excavations and their findings, several guided tours of the recent excavations at Ghamari Cave have been organized. So far, two tours have been conducted for school students and their teachers, offering them a firsthand look at the site's significance. Given the Ghamari Cave's importance for understanding Middle Paleolithic and Early Holocene archaeology, excavations at the site will continue over the next four years. As part of efforts to transform a section of the cave into a site museum, a prehistoric dry-stone structure uncovered during recent excavations will be preserved. This structure serves as tangible evidence of the presence of early pastoralist communities in the Zagros region, highlighting the cave's role in their cultural and subsistence practices.

3.3 In addition to the archaeological excavation, we have commenced a systematic analysis of the lithic artifacts (with the focus on technological development), symbolic objects, and faunal remains from all previous excavations at Yafteh Cave. This effort aims to integrate these findings into a new database and catalog that we are preparing for the prehistory caves and rock shelters of Khorramabad, with the project scheduled for completion by the end of 2025. To support this initiative, we have established several partnerships with researchers from academic institutions, including the National Museum of Iran, ICAR,

Shahid Beheshti University, CNRS, and other research organizations. These collaborations will facilitate multidisciplinary studies encompassing lithic analysis, zooarchaeology, and paleoenvironmental reconstruction.

3.4 We have also completed the establishment of a digital document center and museum of archaeology related to the PCFEKV at Falak-ol-Aflak Castel

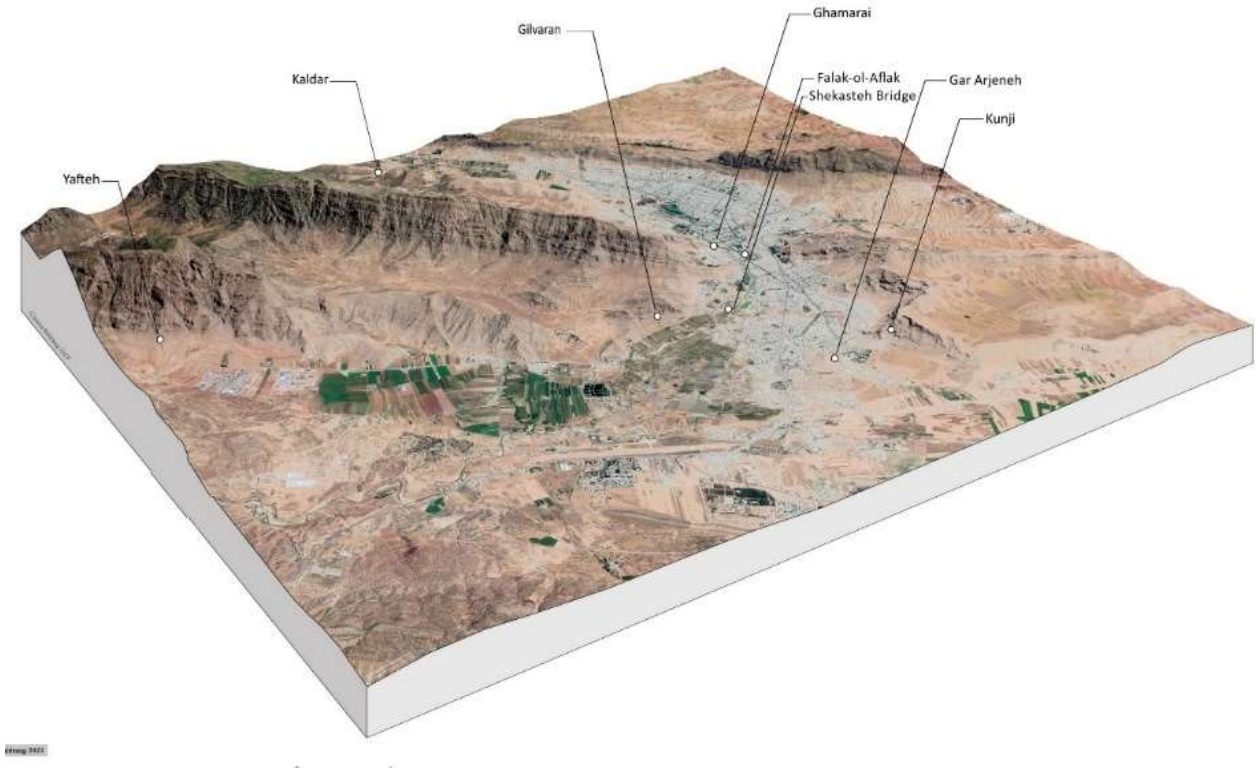
4 Tourism management

A Study of the Tourism Capacity of the Prehistoric Caves Ensemble in Khorramabad Valley

The Ensemble of prehistoric caves in the Khorramabad Valley is located on the slopes of the Sefid Mountains, Yafteh, and Modbeh, which are protected by a set of protective regulations in the form of an integrated buffer zone.

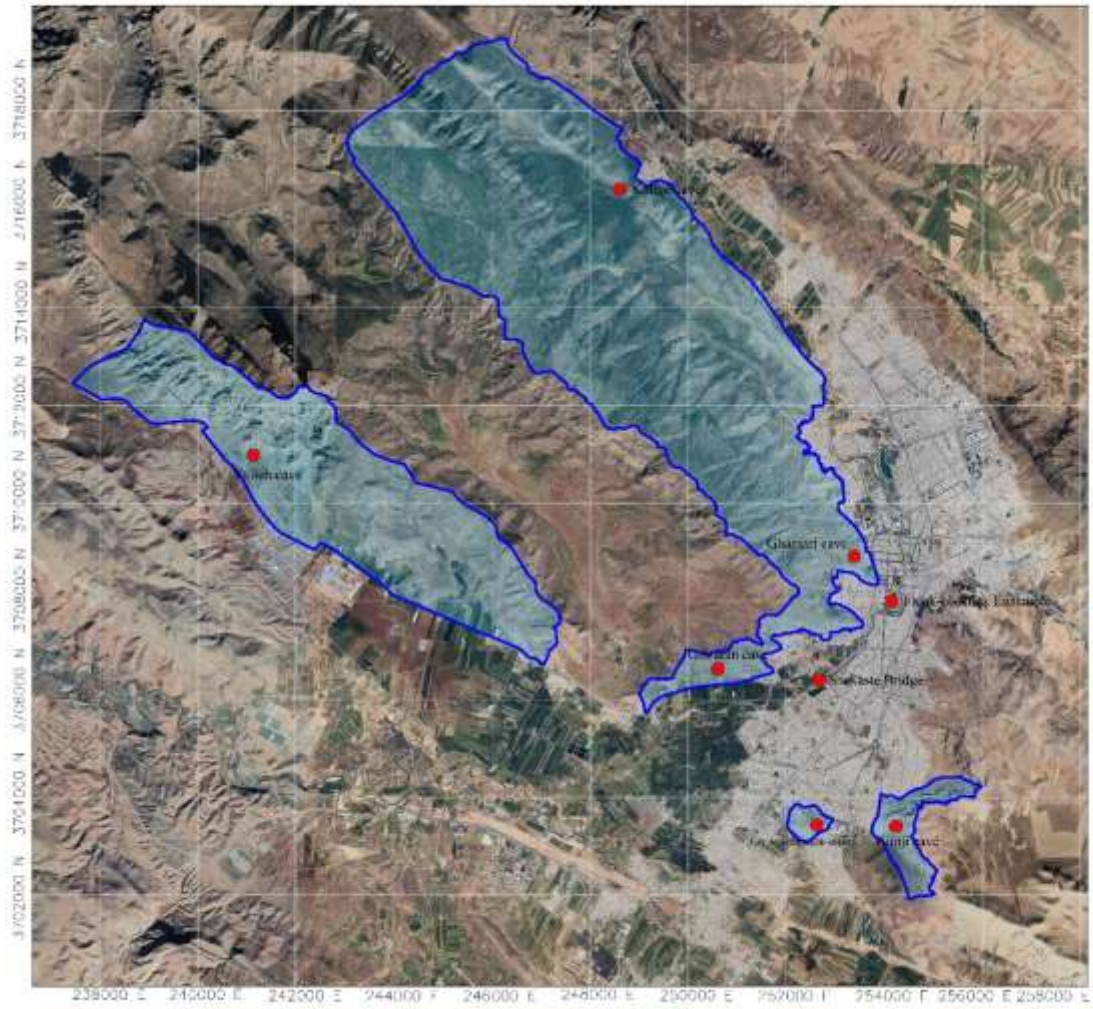
The defined tourism routes for the nominated sites are such that, in addition to introducing the values of the site, both inside and outside the cave, they help to effectively protect these sites. Therefore, tourism management in these sites is pursued with sensitivity; Firstly, the caves are a natural complex that, in addition to containing archaeological data, are also home to native animals. Secondly, these caves have very limited spaces that do not allow for the presence of many tourists. Thirdly, the values of prehistoric habitation are not limited to the inside of the cave, but are related to the surrounding environment. For this reason, the Core zone of the caves is considered the main place for tourism management and is not limited to the inside of the caves.

Considering the above, for tourism management, before any action, the true tourism capacity of this area was calculated through a technical process. In the following, based on the technical method presented at the beginning of the discussion, the cave area has been examined separately.


Ghamarai
Gilvaran
Kaldar
Falak-ol-Aflak
Shekasteh Bridge
Gar Arjeneh
Kunji
Yafteh

Prehistoric Caves and Falak-ol-Aflak Ensemble of Khorramabad Valley

Boundaries of Caves and Rock-shelter Buffer Zone



Reference : UTM WGS84, Zone 39

Key Plan:

Nominated Component

Caves and Rock-shelter Buffer Zone

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Research Background

Today, the tourism industry plays a pivotal role as a key player in the global economy. In many countries, it serves as the foremost source of income, job creation, and a catalyst for infrastructure development. According to the World Tourism Organization (WTO) report, global tourism experienced a 4.3 % increase in the year (Kiani Sadr et al., 1399: 132). The WTO's projections indicate this growth continuing through 2030, with tourist numbers expected to reach 1.8 billion (Aslani et al., 2020: 25). Alongside tourism's significant contribution to economic development, its negative impacts on the environment and social fabric cannot be overlooked. Excessive utilization of popular tourist areas and the strain placed on associated lands lead to the degradation of environmental, cultural, and social resources. This resource depletion negatively affects tourism development, potentially reduces tourist destinations, and ultimately hinders the region's economic growth (Maggi et al., 2010: 1). Therefore, under such conditions, stabilizing, maintaining the dynamism, and protecting these areas, thereby ensuring sustainable tourism development and delivering an acceptable level of tourism quality, is essential (Meshkini et al., 1392: 76). However, one approach to achieving sustainability in tourism is to consider the carrying capacity of tourist areas. This concept encompasses all aspects of sustainable development aimed at safeguarding the physical, social, cultural, and environmental dimensions (Kiani Sadr et al., 1399: 133).

The concept of tourism carrying capacity in protected areas, heritage sites, and tourist attractions was first introduced in the United States in the 1930s. However, it emerged as a distinct concept in the field of tourism during the 1970s and 1980s, leading to the prioritization of sustainable tourism development in local policymaking (Makhadmeh et al., 2020: 160-161).

The World Tourism Organization defines tourism carrying capacity as the maximum number of people who can visit a location within a specific time frame without jeopardizing the environmental, physical, economic, social, and cultural attributes, and without diminishing visitor satisfaction (WTO, 1999). Tourism carrying capacity comprises physical carrying capacity, real carrying capacity, and effective tolerable capacity.

Research Methodology

This research employs a library-documentary approach using analytical methods. The necessary data was obtained from the Ministry of Cultural Heritage, Tourism, and Handicrafts, as well as the National Meteorological Organization. Additionally, to calculate the required spaces for determining tourism capacity, existing maps were utilized within AutoCAD software or geo-referenced satellite imagery. To gather other essential data for the research,

such as the duration of visits to each site, the space requirements per tourist, etc., interviews were conducted with tour guides and site managers at each location.

Furthermore, to assess tourism capacity, the following relationships were used:

- Physical Carrying Capacity (PCC)
    - Physical Carrying Capacity refers to the maximum number of visitors who can be physically present in a location at a given time.
    - PCC = A * V/a * Rf
        - A: Area of suitable land for tourism use.
        - V/a: The amount of space each visitor requires to move comfortably without interference with other physical elements or individuals.
        - Rf: The number of daily visits to a location, calculated as:
            - RF = (Average visit duration / Average available time of the location)

Real Carrying Capacity (RCC)

Real Carrying Capacity represents the maximum number of visitors a recreational site can accommodate, considering limiting factors arising from the site's unique conditions and their impact on Physical Carrying Capacity. These limiting factors are determined by analyzing biophysical, ecological, social, and managerial variables. Real Carrying Capacity is calculated using the following formula:

RCC = PCC - cf1 - cf2 - … cfx

Where cf represents a limiting factor expressed as a percentage.

Alternatively, this can be expressed as:

RCC = PCC * (100 - CF1/100) * (100 - CF2/100) ... * (100 - CFn/100)

It is crucial to note that limiting factors can be specific to each region. For instance, flooding might be a limiting factor in one area, while in another, the limiting factors may be entirely different. The specific limiting factors depend on the unique conditions and characteristics of each region.

Limiting factors are expressed as percentages and calculated using the following formula:

CF = M1/M+ * 100

Where CF is the limiting factor, M1 is the constraint of a variable, and M+ is the total value of a variable.

Effective Carrying Capacity (ECC)

Effective Carrying Capacity refers to the maximum number of visitors a site can accommodate while being sustainably managed by the existing management capabilities. Management Capabilities (MC) encompass the conditions required for a region's management to achieve its desired goals and performance. Numerous variables affect the quantitative assessment of these capabilities, including objectives and policies, laws and regulations, infrastructure and equipment, human resources, financial resources, and more. Deficiencies in these management capabilities are among the most critical issues in managing tourism regions in developing countries. Shortcomings in any of the mentioned areas reduce Effective Carrying Capacity. Even with 100% management capability, Effective Carrying Capacity will never exceed Real Carrying Capacity.

ECC is calculated using the following formula:

ECC = RCC * MC

Where MC is the existing management capacity relative to the optimal level of management capabilities, calculated as:

MC = (100 - Fm)/100

Where Fm is the management adjustment factor, calculated as:

Fm = (Imc - Amc)/Imc * 100

Where Imc (Ideal Management Capacity) represents the ideal number of facilities for sustainable tourism management, and Amc (Actual Management Capacity) represents the number of existing facilities.

Assessing Tourism Capacities in Prehistoric Caves of the Khorramabad Valley

Tourism activities at prehistoric cave sites within the Khorramabad Valley occur within the caves' Core zone areas. These Core zone areas encompass the caves themselves, zones associated with prehistoric habitation such as water sources, animal and plant food resources, and stone procurement areas for toolmaking. Accordingly, tourism is defined at two levels for these caves: outside the cave and inside the cave. The area outside the cave is primarily related to the surrounding natural environment and the core values of prehistoric settlement, while the area inside the cave encompasses the main habitation zone, archaeological data, and site museums.

Based on this, tourism capacity is defined at two levels for the prehistoric caves as a whole:

- **Level One:** Outside the cave (designated tourist routes within the core zone and surrounding area).
- **Level Two:** Inside the cave (main habitation area, site museums, and archaeological data locations).

Consequently, the tourism capacity of a cave is defined as the maximum capacity at either level. Naturally, if the tourism capacity is lower at one level, this capacity will be the benchmark for that level, and tourism management will be conducted accordingly. However, at the other level, tourism management can proceed with a higher capacity. For example, if Level One (core zone and surrounding area), which includes tourist routes at various levels and encompasses wider areas, has a higher tourism capacity than the inside of the cave, which is a limited space, tourism management outside the cave will be conducted according to this capacity. Meanwhile, the inside of the cave must be managed according to its own capacity.

Following this, a map of the designated tourism areas for the prehistoric caves in the Khorramabad Valley is provided, delineating the two levels mentioned.

-Kaldar Cave

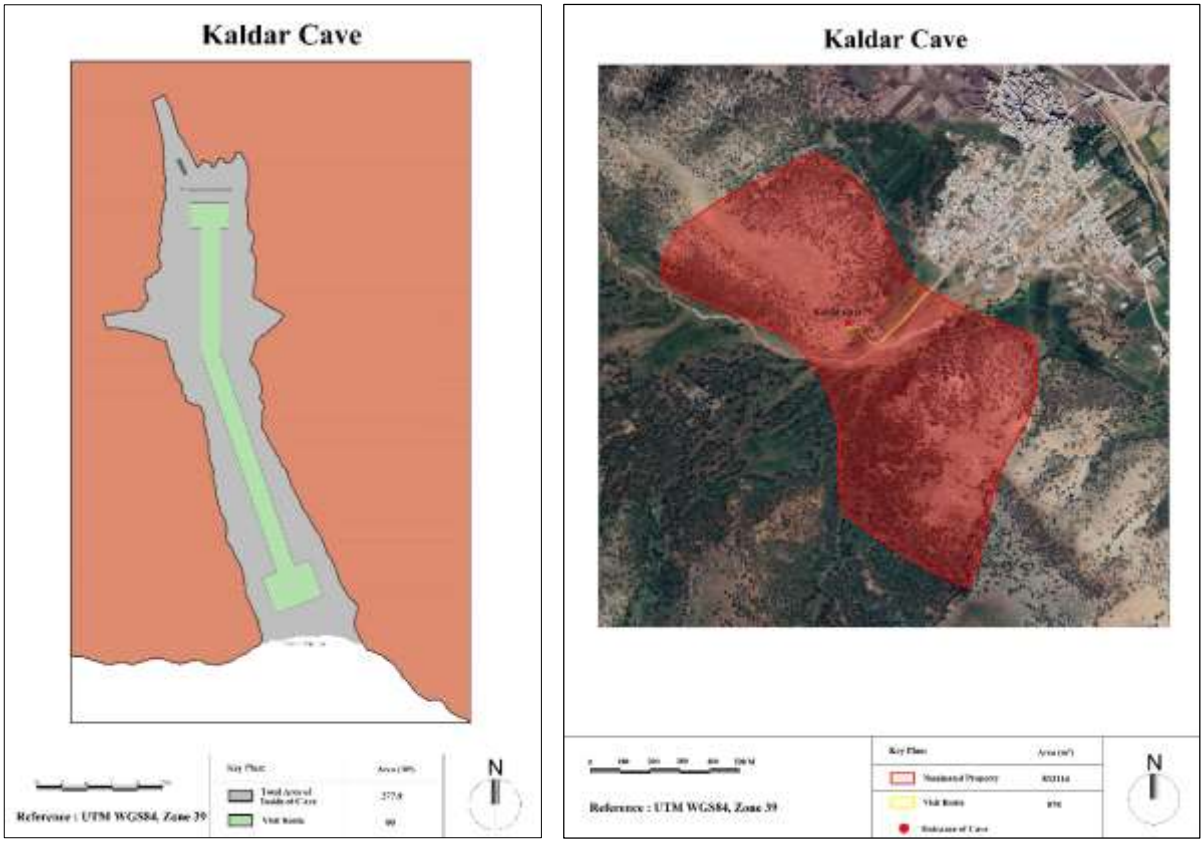

Fig.20: Defined Tourism Area of Yafteh Cave - Right: Level One, Outside Kaldar Cave and within the Site; Left: Level Two, Inside the Cave.

-Yafteh Cave

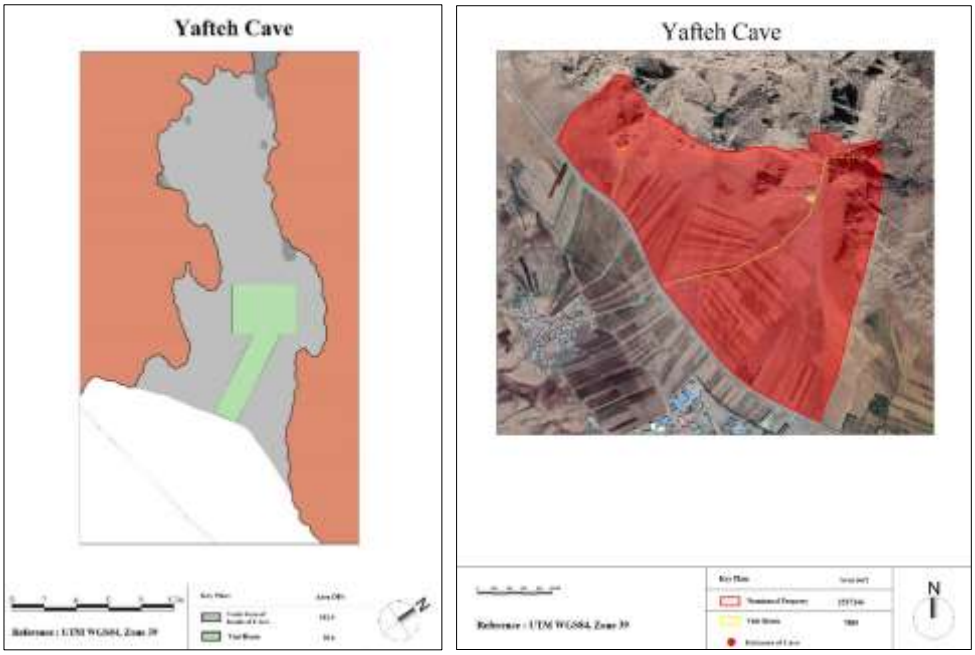

Fig.21: Defined Tourism Area of Yafteh Cave - Right: Level One, Outside Kaldar Cave and Within the Site; Left: Level Two, Inside the Cave.

-Ghamari Cave

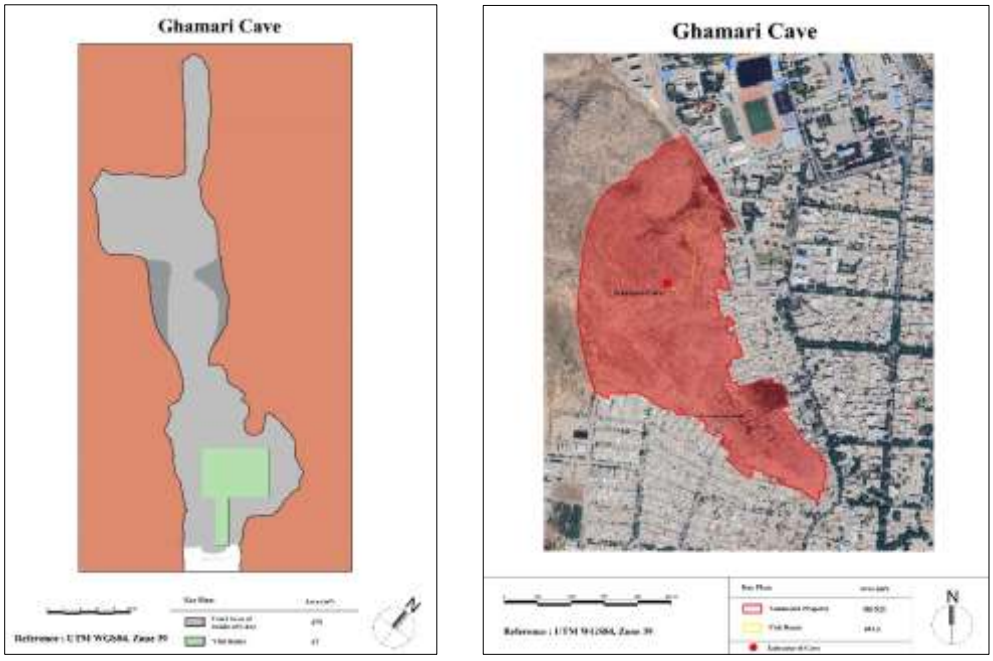

Fig. 22: Defined Tourism Area of Ghamari Cave - Right: Level One, Outside Kaldar Cave and Within the Site; Left: Level Two, Inside the Cave.

- Kunji Cave

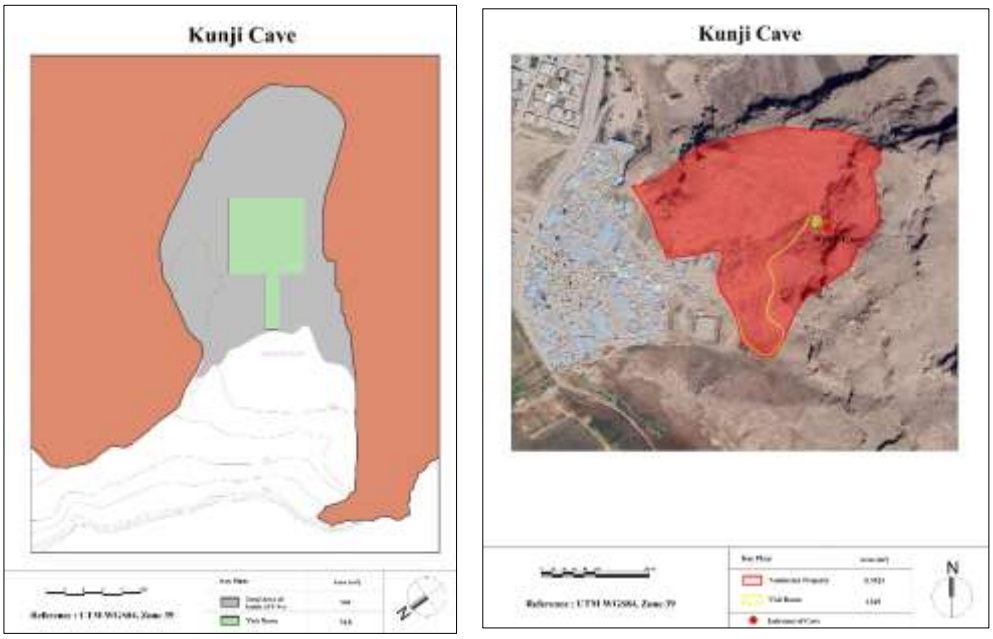

Fig. 23: Defined Tourism Area of Kunji Cave - Right: Level One, Outside Kaldar Cave and Within the Site; Left: Level Two, Inside the Cave.

- Gilvaran Cave

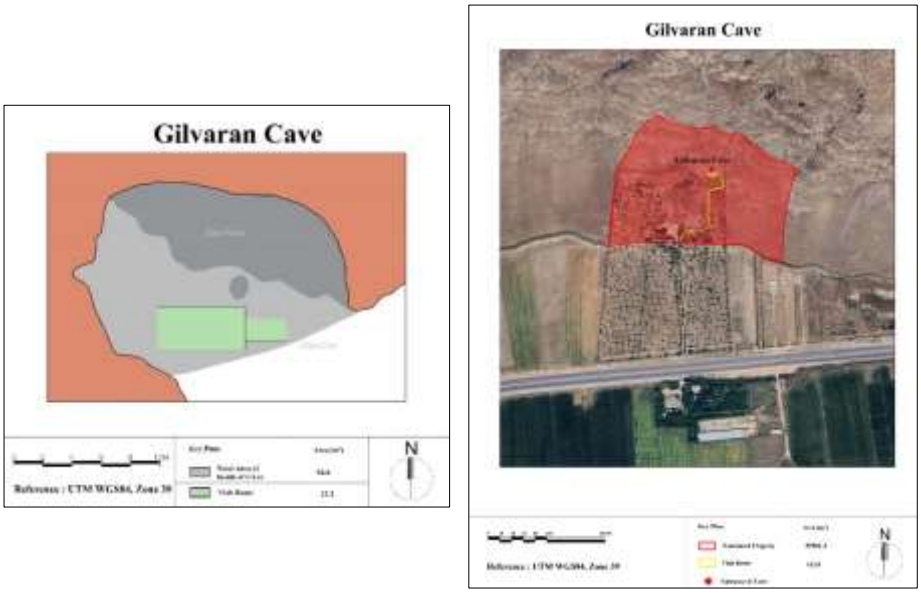

Fig. 24: Defined Tourism Area of Gilvaran Cave - Right: Level One, Outside Kaldar Cave and Within the Site; Left: Level Two, Inside the Cave.

-Gar Arjeneh Rock -Shelter

Due to its open-air nature and the absence of distinct interior and exterior spaces like caves, the Gar Arjeneh Rock- Shelter has only one defined level of tourism, which is Level One. The entire tourism space is defined as a unified level throughout the site.

Fig. 25: Defined Tourism Area of Gar arjeneh Rockshelter , Level One

Considering the defined levels at each of the prehistoric cave and rock shelter sites, the physical area of the defined zones and visitor routes, according to the technical method established for calculating tourism capacity, are presented in the table below.

Site name	Area of nominated property (m^2)	Area of Visit route Level 1 (m^2)	Total area of inside of cave (m^2)	Areae of Visit route level 2 (m^2)
Kaldar Cave	833114	878	277.9	60
Yafteh Cave	2527246	7885	152.5	20.6
Ghamari Cave	381521	491.5	475	57
Kunji Cave	113924	1245	344	74.8
Gilvaran Cave	55901.3	433.8	84.6	22.2
Gar Arjeneh Rockshelter	32318	350	-	-

Data Analysis

To assess the tourism capacity of a site, it is necessary to first calculate the Physical Carrying Capacity (PCC), followed by the Real Carrying Capacity (RCC), and finally the Effective Carrying

Capacity (ECC). Below, these capacities are calculated for the prehistoric cave complex in the Khorramabad Valley.

Physical Carrying Capacity (PCC)

Based on the established relationship for evaluating tourism capacity, the Physical Carrying Capacity of a location must first be determined. This capacity is calculated using the following formula:

PCC = A * V/a * Rf

Where:

- A: Area of suitable land for tourism use.
- V/a: The amount of space each visitor requires to move comfortably without interference with other physical elements or individuals.
- Rf: The number of daily visits to a location, calculated as:
    - RF = (Average visit duration / Average available time of the location)

Given that two levels of tourism have been defined for the prehistoric cave area, the above relationship must be calculated separately for each level.

The required information for each level regarding the area of suitable land for tourism use (A) is defined on the maps of each site (provided above) at the two defined levels, which are the visitor routes for the site. These routes have been previously defined by the Tourism Deputy of the General Directorate of Cultural Heritage of Lorestan based on the values of the site and visitation programs, and the necessary infrastructure has been provided.

Regarding the appropriate space for each visitor (V/a), this has been determined through interviews with tour guides and site managers at each location. This component varies for each level, and considering that Level One is in an open space and Level Two is inside the cave, the values for each level are defined in the table below for each site.

Site Name	• V/a: The amount of space each visitor requires to move comfortably without interference with other physical elements or individuals. (Person/space required for visit)	
	Level one (outside the cave, within the core zone) (square meters)	Level Two (inside the cave) (square meters)
Kaldar Cave	$\frac{1}{3}$	$\frac{1}{1.5}$
Yafteh Cave	$\frac{1}{3}$	$\frac{1}{1.5}$

Ghamari Cave	$\frac{1}{3}$	$\frac{1}{1.5}$
Kunji Cave	$\frac{1}{3}$	$\frac{1}{1.5}$
Gilvaran Cave	$\frac{1}{3}$	$\frac{1}{1.5}$
Gar arjeneh Rockshelter	$\frac{1}{3}$	-

The prehistoric cave sites in the Khorramabad Valley are active and open from 8:00 AM to 4:00 PM, according to the specific schedule provided by their Cultural Heritage Base. Therefore, the average available time for each site is 8 hours.
However, the visit duration for each site and at each defined level (Level One and Level Two) is quite different. This is due to the different visitor routes defined within the site of each prehistoric cave. Based on interviews with tour guides stationed at each site, the visit duration for each site at each level is presented in the table below:

Site Name	Average visit duration	
	Level One (Outside the Cave, Within the core zone) (Minutes)	Level Two (Inside the Cave) (Minutes)
Kaldar Cave	30	10
Yafteh Cave	30	10
Ghamari Cave	45	15
Kunji Cave	45	15
Gilvaran Cave	30	10
Gar arjeneh Rockshelter	30	-

Accordingly, the number of daily visits to a location (Rf), considering the available time of each site and the average visit duration at each level, is calculated for each site in the table below:

Site Name	Number of daily visits to a location (Rf) RF = (Average Visit Duration / Average Usability Time)	
	Level One (Outside the Cave, Within the core zone)	Level Two (Inside the Cave)
Kaldar Cave	16	48
Yafteh Cave	16	48
Ghamari Cave	11	32
Kunji Cave	11	32
Gilvaran Cave	16	48
Gar arjeneh Rockshelter	16	-

Based on the Physical Carrying Capacity (PCC) relationship, this capacity can be shown for each site at both levels in the table below (Level One is the outdoor space of the cave, and Level Two is the indoor space of the cave).

Site Name	Area suitable for tourism use (A) (square meters)		Space required per visitor (V/a) Person/space) required for (visit		Number of daily visits to a location (Rf)		Physical Carrying Capacity (PCC) Pcc =A * V/a * Rf	
	Level One	Level Two	Level One	Level Two	Level One	Level Two	Level One	Level Two
Kaldar Cave	878	60	$\frac{1}{3}$	$\frac{1}{1.5}$	16	48	**4682**	**1920**
Yafteh Cave	7885	20.6	$\frac{1}{3}$	$\frac{1}{1.5}$	16	48	**42053**	**659**
Ghamari Cave	491.5	57	$\frac{1}{3}$	$\frac{1}{1.5}$	11	32	**1802**	**1216**
Kunji Cave	1245	74.8	$\frac{1}{3}$	$\frac{1}{1.5}$	11	32	**4565**	**1595**
Gilvaran Cave	433.8	22.2	$\frac{1}{3}$	$\frac{1}{1.5}$	16	48	**2313**	**710**
Gar arjeneh Rockshelter	350	-	$\frac{1}{3}$	-	16	-	**1866**	**-**

Real Carrying Capacity (RCC)

To calculate tourism capacities based on the provided formula, it is necessary to determine the Real Carrying Capacity based on the Physical Carrying Capacity. This capacity is obtained from the following relationship:

RCC = PCC - cf1 - cf2 - … cfx

Where cf is a limiting factor expressed as a percentage.

Alternatively, this can be expressed as:

RCC = PCC * (100 - CF1/100) * (100 - CF2/100) ... * (100 - CFn/100)

Therefore, it is necessary to first examine the limiting factors (cf).

Calculation of Limiting Factors

Field surveys of prehistoric caves indicate that the limiting factors for visits primarily include weather and climatic conditions. However, some factors, such as site closures during the year, are also limiting factors. Considering this, the limiting factors for tourism capacity are as follows and are calculated as follows:

a. Number of Hot Days in the Year

Based on meteorological data in Khorramabad, the number of very hot days has averaged 52 days over the past 5 years. Therefore, the limiting factor is calculated as follows:

Cf1 = (52/365) * 100 = 14.24%

b. Number of Frost Days

Based on meteorological data in Khorramabad, the number of frost days has averaged 41 days over the past 5 years. Therefore, the limiting factor is calculated as follows:

Cf2 = (41/365) * 100 = 11.23%

c. Site Closure Days

Based on the guidelines of the Ministry of Cultural Heritage, all cultural heritage sites are closed for 4 days a year. Therefore, the limiting factor is calculated as follows:

Cf3 = (4/365) * 100 = 1.09%

Given that the Physical Carrying Capacity has been calculated for two levels of the prehistoric cave sites in the Khorramabad Valley, it is necessary to calculate the Real Carrying Capacity at both levels. This capacity has been calculated for the prehistoric cave sites in the Khorramabad Valley in the table below.

Site Name	Physical Carrying Capacity (PCC) Pcc =A * V/a * Rf		Number of Hot Days in the Year (Cf1)	Number of Frost Days (Cf2)	Site Closure Days (Cf3)	Real Carrying Capacity (RCC) Rcc = Pcc * (100 - CF1/100) * (100 - CF1/100) ... * (100 - CFn/100)	
	Level One	Level Two	14.24	11.23	1.09	Level One	Level Two
Kaldar Cave	4682	1920				**3467**	**1421**
Yafteh Cave	42053	659				**31140**	**488**
Ghamari Cave	1802	1216				**1334**	**900**
Kunji Cave	4565	1595				**3380**	**1181**
Gilvaran Cave	2313	710				**1712**	**525**
Gar arjeneh Rockshelter	1866	-				**1381**	**-**

Effective Carrying Capacity (ECC)

Since the maximum number of tourists at a site is calculated based on the management capabilities of that site, and this is referred to as the Effective Carrying Capacity, it is necessary to calculate this capacity for management planning purposes for tourism in the prehistoric cave complex. This capacity is obtained from the following relationship:

ECC = RCC * MC

To calculate the Effective Carrying Capacity, it is necessary to calculate the Management Capabilities (MC). Currently, at each site in the prehistoric cave complex of the Khorramabad Valley, two people are employed to provide services to tourists (one tour guide and one guard). Ideally, at least five people should be present (site manager, two tour guides, guard, and service personnel). Therefore, the Management Capacity (MC) for the prehistoric cave sites in the Khorramabad Valley is calculated as follows:

Fm = (5 - 2) / 5 * 100 = 60

MC = (100 - 60) / 100 = 0.4

Considering that the Effective Carrying Capacity should be calculated at two levels for each site, this capacity for the prehistoric caves is shown in the table below:

Site Name	Real Carrying Capacity (RCC)		Management Capabilities (MC)	**Effective Carrying Capacity (ECC)** Ecc = Rcc * Mc	
	Level One	Level Two	0.4	Level One	Level Two
Kaldar Cave	**3467**	**1421**		**1386**	**568**
Yafteh Cave	**31140**	**488**		**12456**	**195**
Ghamari Cave	**1334**	**900**		**533**	**360**
Kunji Cave	**3380**	**1181**		**1352**	**472**
Gilvaran Cave	**1712**	**525**		**684**	**210**
Gar arjeneh Rockshelter	**1381**	**-**		**552**	**-**

Conclusion

As discussed, tourism in the prehistoric caves of the Khorramabad Valley is associated with unique conditions. These conditions are due to the type of site, the subject of tourism, and the manner in which the site's values are experienced. Therefore, examining the physical tourism capacity of the prehistoric caves in the Khorramabad Valley has been used as a

fundamental principle in the tourism programs of these caves. The comprehensive tourism program for the prehistoric caves of the Khorramabad Valley has been developed based on the physical tourism capacities of each cave. The assessment of the Effective Carrying Capacity in the prehistoric caves of the Khorramabad Valley shows that in each visit cycle per day (ten to fifteen-minute time slots inside the cave) at Level Two, between five to twelve people can simultaneously visit inside the cave (the number varies depending on the capacity of each cave). Accordingly, the cave visitation program has been designed to control tourism pressure as follows:

1- Use of trained tour leaders

2- Visiting is possible only as a tour and in groups of 5-10 people. Visitors must register at the tourist center located in the Falak -Ol-Aflak Ensemble.

3- Visiting time for each group in each cave is 10-15 minutes

4- Visiting from 10 am to 12 am and 2 pm to 5 pm (summer)

Visiting from 10 am to 12 am and 1 pm to 4 pm (winter)

5-Visitors must follow the environmental restrictions.

6- Using attraction presentation boards

This program clearly demonstrates that visits to the caves are aligned with the Effective Carrying Capacity; visit durations are between 10-15 minutes per cave, the maximum number of simultaneous visitors is between 5-10 people, accompanied by a guide, and during specific hours of the day.

Currently, with the established visitation program based on tourism capacity, the process of visiting the caves is well-controlled, and tourism-related impacts are minimized.

Furthermore, to reduce pressure and demand for visits inside the caves and to control visitation, tourism levels at each cave were divided into two levels: outside the cave, within the site (Level One), and inside the cave (Level Two). This allows for a reduction in pressure for inside cave visits by accommodating more people at Level One, which is an open space. In each 30-minute cycle at Level One, it is possible to accommodate three groups for ten-minute visits inside the cave, which is Level Two.

Fig. 26 Visits inside Kaldar Cave (Level Two), accompanied by a tour guide and the minimum number of tourists appropriate to the Effective Carrying Capacity (based on the Effective Carrying Capacity, 12 people can visit Kaldar Cave in each 10-minute visit cycle, while currently ten people visit inside the cave in each visit cycle

Fig. 27 Visits to Level One of Kaldar Cave, commensurate with the Effective Carrying Capacity of this cave at Level One (at Level One of Kaldar Cave, the Effective Carrying Capacity is 86 people per 30-minute visit cycle. However, to control tourism pressure for visiting each cave, a maximum of 30 people visit Level One in each visit cycle, allowing for three groups to visit the cave in ten-minute cycles).

In conclusion, it is imperative to note that visits to the prehistoric caves of the Khorramabad Valley are conducted with utmost sensitivity. This is due to the fact that these areas are not only considered unique heritage sites, but also protected environmental zones. Therefore, the subject of tourism is also subject to environmental regulations.

Consequently, the number of tourists present at these sites is highly controlled and kept to a minimum, in accordance with the physical capacities presented in this report. This is crucial to ensure that tourism is managed in line with infrastructure, human resources, environmental regulations, the physical capacity of the caves, and ultimately, to provide the best possible experience for visitors.

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Final Remarks:

The prehistoric caves, rock shelters, and Falak-ol-Aflak ensemble (particularly the Falak-ol-Aflak mound) in the Khorramabad Valley contain critical archaeological evidence tracing human occupation from the Middle, Upper and Epi-Paleolithic to the Bronze Age. These sites, particularly in the Upper Paleolithic, reveal advanced Zagros communities with sophisticated lithic industries and symbolic behavior, marking a fundamental shift in cultural complexity. Post-Paleolithic, the valley's karst landscape remained integral to settlement: Bronze Age fortifications at Falak-ol-Aflak and burial practices at Kunji Cave highlight its enduring significance. The region's karst geology, with its elevated outcrops and hydrological advantages, fostered habitation across eras, linking the nominated sites through their adaptive use of distinctive landforms.

Beside the nominated cave and rock-shelter sites, to assess the Falak-ol-Aflak mound Prehistoric potential and as a part of the short-term action in the management plan of the nomination dossier, a focused survey of slopes beneath the castle identified 32 lithic artifacts. While most align with Late Neolithic–Bronze Age activity, a subset—distinguished by technology, weathering, and patina—suggests Paleolithic origins. Two artifacts hold particular significance which technologically are assigned to Middle and probably Lower Paleolithic. These discoveries point out the interconnected values of all components of PCFEKV (The Prehistoric caves, rock-shelter, and the the Falak-ol-Aflak mound and outcrop) as an outstanding ensemble. Falak-ol-Aflak outcrop and mound, strategically positioned in the narrowest part of Khorramabad Valley, provided Middle Paleolithic and other Prehistoric hunter-gatherers with an elevated vantage point to monitor game herds and access to karst springs and rock shelters. These shelters offered habitation spaces, freshwater, and nearby lithic resources, making the site a critical hub for early human settlement.

While ICOMOS has tentatively emphasized the significance of Prehistoric caves and rock-shelter sites in its evaluations, the State Party advocates for a broader recognition that integrates both these caves and the Falak-ol-Aflak mound into a cohesive narrative. Recent findings confirm that the mound under the Falak-ol-Aflak dates to the Middle Paleolithic period, underscoring its profound Prehistorical relevance as well. The State Party would appreciate profoundly if ICOMOS acknowledge the interconnected heritage value of the Prehistoric Caves and Falak-ol-Aflak Ensemble in the Karst Valley (PCFEKV), emphasizing their synergistic relationship shaped by millennia of human adaptation to the unique karst landscape.

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