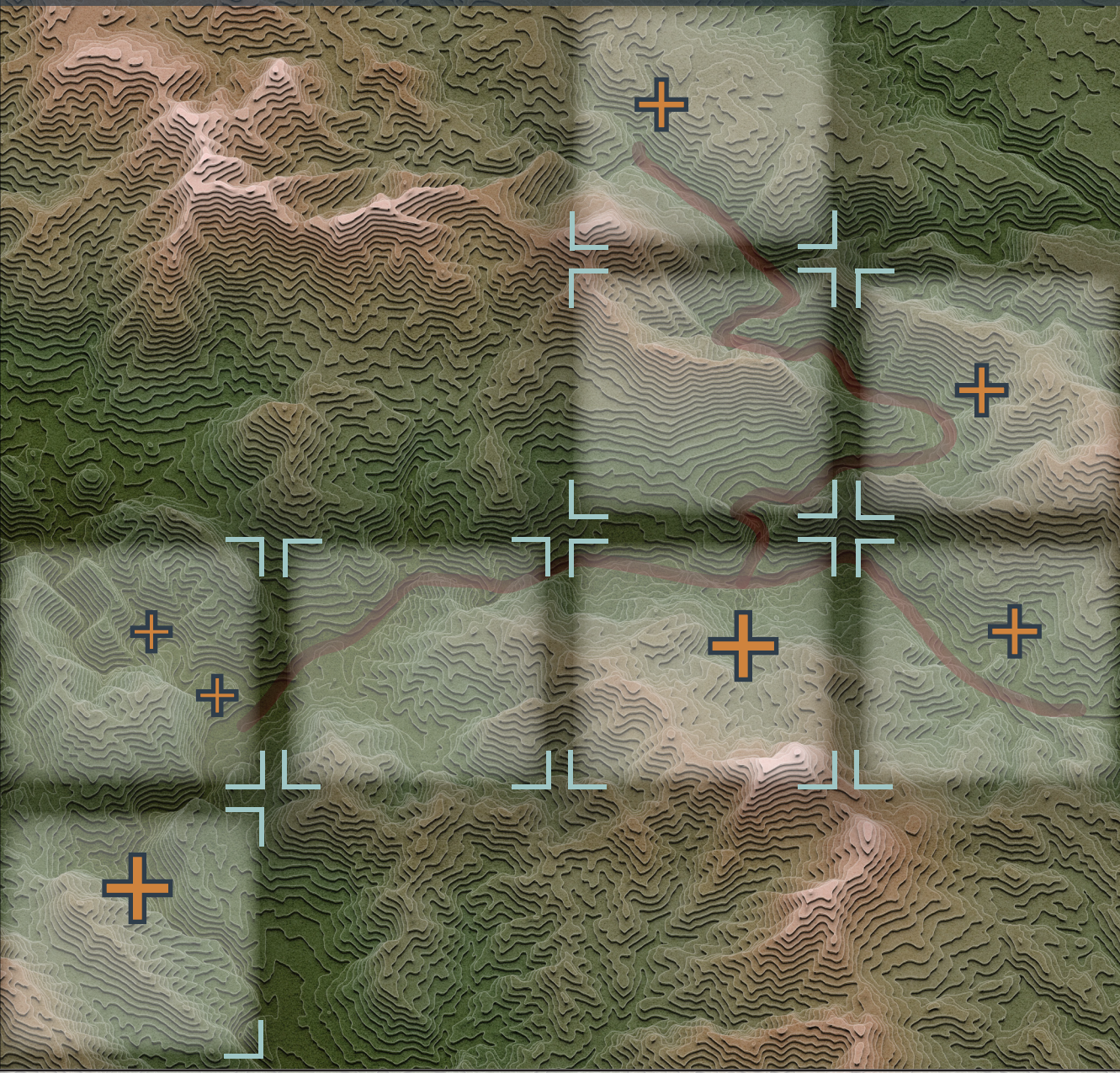
Dynamic Interplay in the Iranian Highlands

In Searching for Anthropogenic Landscapes



DFG Deutsche Forschungsgemeinschaft

Anthropogenic Landscapes

فلات ایران
The Iranian Highlands

RUHR UNIVERSITÄT BOCHUM RUB

Universität Marburg

DEUTSCHES BERGBAU-MUSEUM BOCHUM

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Welcome

"And how shall green life grow from crimson soil?"

—Bahram Beyzaie, Arash

Understanding the cultural trajectories of highland societies requires more than isolated case studies. It calls for an integrated framework that treats the landscape as an archive of human-induced transformation, where settlement patterns, soils, water systems, and archaeological record preserve the imprint of past decision making. This discussion begins with the dynamic interplay between human societies and their environments, an interplay that unfolds not as a linear cause-and-effect, but through multi-layered feedback. The interpretive framework we propose is Landscape Archaeology, an approach that moves beyond the boundaries of individual sites to read networks, interstitial spaces, and the long-term trajectories of human–environment transformations.

From this perspective, anthropogenic landscapes are not a mere label, but a spectrum of archaeological signatures. These signatures reveal both the mechanisms of everyday adaptation and the transformative forces that have rendered landscapes "human-made" over centuries. These intentional and unintended transformations jointly configured the highland landscapes we encounter today.

The Iranian Highlands, with their varied terrain, fragile ecologies, and shifting political boundaries, offer a rich setting to explore how communities navigated environmental uncertainty, resource fluctuations, and social change. We invite contributions to an online conference that places landscape, human–environment interaction, and spatial organization at the center of discussion, with a special welcome to early-career researchers and colleagues based in Iran.

Suggested topics

- *Landscape Archaeology and Spatial Analysis: How human activities inscribed meaning and memory into physical space.*
- *Land Use and Environmental Interaction: Agricultural, pastoral, and mobility practices that produced lasting ecological change.*
- *Hydraulic Landscapes and Water Management: Irrigation systems, qanats, and other infrastructures that reshaped land and settlement.*
- *Extraction and Resource Driven Change: Mining, quarrying, and related labor regimes and terrain modification.*
- *Subsistence Strategies and Daily Life: Archaeobotanical, zooarchaeological, and socio economic evidence of human responses to stress and opportunity.*
- *Urban Development and Settlement Hierarchies: The rise and decline of centers, towns, and cities in relation to environmental and socio-economic dynamics.*

We particularly welcome innovative methods such as spatial modelling, remote sensing (UAVs, LiDAR, Photogrammetry), GIS-based network analysis, archaeogeography and open-data approaches, as well as proxy data (isotopes, archaeobotany, zooarchaeology, proteomics) for reconstructing ancient lifeways.

Chronological scope: any period of Iranian archaeological history.

Geographical scope: the broad SPP 2176 definition of the "Iranian Highlands," including present-day Iran and adjacent regions such as Iraqi Kurdistan, the Kopet Dag and South Caucasus.

We look forward to your proposals and to an engaging exchange on how human action, deliberate and unintended, has fashioned the landscapes of the Iranian Highlands.

Assef Noroozi (Ruhr-Universität Bochum)
Zohreh Zehbari (Philipps-Universität Marburg)

Conference website:

https://ecal-workshop.iranhighlands.com

Email:

ecal.workshop@iranhighlands.com

Part of DFG Priority Programme 2176: The Iranian Highlands: Resilience and Integration in Pre-Modern Societies

December 16th — Panel A: Landscape Archaeology and Spatial Analysis

10:00–12:00 & 13:00–15:00 CET (12:30–14:30 & 15:30–17:30 Tehran)8

Panel A – Part 1 (Chair: Friederike Jürcke)

CET	Tehran	Program
10:00–10:15	12:30–12:45	Sign-in
10:15–10:30	12:45–13:00	Brief Welcome & Introduction (Z. Zehbari and A. Noroozi)
10:30–10:50	13:00–13:20	Amir Ahmadpour and Nader Alidadi Soleimani: *Settlement Ecology on the Guask-e Chughan Alluvial Fan (Boluk Plain, Southeastern Iran): Sector-Specific Niches and Long-Term Settlement Dynamics*
10:50–11:00	13:20–13:30	Q&A
11:00–11:20	13:30–13:50	Hosein Ramzanpour, Elham Ghasidian, Saman H. Guran: *The Palaeolithic Survey in Mehrabanroud Valley, Eastern Alborz Mountains, Iran*
11:20–11:30	13:50–14:00	Q&A
11:30–11:50	14:00–14:20	Ramin Yashmi: *Beyond What Survives: Bias-Aware Neolithic Settlement Patterns in the Western Karkheh Region*
11:50–12:00	14:20–14:30	Q&A
12:00–13:00	14:30–15:30	Break

Panel A – Part 2 (Chair: Zahra Hashemi)

13:00–13:20	15:30–15:50	Salah Salimi, Florian Janoscha Kreppner: *The Ancient Iron Production Landscape in Northwestern Iran*
13:20–13:30	15:50–16:00	Q&A
13:30–13:50	16:00–16:20	Assef Noroozi: *Between Algorithm and Landscape: Rethinking Computational Archaeology through Field-Based Reality in Central-Western Iran*
13:50–14:00	16:20–16:30	Q&A
14:00–14:20	16:30–16:50	Zeinab Hadi-Dastjerdi: *Architectural Fortifications of the Bavanat Valley during the Sassanian and Early Islamic Periods*
14:20–14:30	16:50–17:00	Q&A
14:30–14:50	17:00–17:20	Nemat Hariri, Nima Nezafati, Judith Thomalsky, Faezeh Barzegar, Mohsen Ranjbaran, and Saman H. Guran: *Lithic Raw Material Procurement and Economic Strategies among the Palaeolithic Occupations in the Kermanshah Plain, West-Central Zagros Mountains of Iran*
14:50–15:00	17:20–17:30	Q&A

Day 1 Wrap-Up

December 17th — Panel B: Human, Environment, and Daily Life

10:00–11:50 & 12:50–14:50 CET (12:30–14:20 & 15:20–17:20 Tehran)

Panel B – Part 1 (Chair: Sepideh Maziar)

CET	Tehran	Program
10:00–10:15	12:30–12:45	Sign-in
10:15–10:20	12:45–12:50	Introduction to the Panel (Z. Zehbari and A. Noroozi)
10:20–10:40	12:50–13:10	Angela Noseda, Camille Daujeard, Fabrice Bray, Xavier Gallet, Antoine Zazzo, Fereidoun Biglari, Marjan Mashkour: *Prey–predator interactions in the Zagros Mountains: taphonomic study of the large mammal assemblage from the Wezmeh Cave (Late Pleistocene–Holocene)*
10:40–10:50	13:10–13:20	Q&A
10:50–11:10	13:20–13:40	Soheil Salamat: *Dalma in Detail: A Techno-Social Characterization of Dalma Tradition in NW Iran*
11:10–11:20	13:40–13:50	Q&A
11:20–11:40	13:50–14:10	Parisa Naseri: *Shell Vessel from Susa: Evidence of Ritual and Exchange in the Bronze Age*
11:40–11:50	14:10–14:20	Q&A
11:50–12:50	14:20–15:20	Break

Panel B – Part 2 (Chair: Judith Thomalsky)

12:50–13:10	15:20–15:40	Faezeh Dadfar: *Anshan at the Crossroads: Transmission of Artistic Ideas across the Iranian Highlands*
13:10–13:20	15:40–15:50	Q&A
13:20–13:40	15:50–16:10	Saeed Baghizadeh, Rouhollah Yousefi Zoshk: *Power, Identity, and Human Landscapes of Highland–Lowland Interactions in the Proto-Elamite Period*
13:40–13:50	16:10–16:20	Q&A
13:50–14:10	16:20–16:40	Ali Khayani: *Local Political Strategies and the Development of Administrative and Political Institutions in the Central Zagros (ca. 3300–2500 BCE)*
14:10–14:20	16:40–16:50	Q&A
14:20–14:40	16:50–17:10	Rasha Elendari: *Rethinking Colonial Narratives at Godin Tepe: New Evidence for an Indigenous Highland Hub in the Late Fourth Millennium BC*
14:40–14:50	17:10–17:20	Q&A

Day 2 Wrap-Up

December 18th — Panel C: Anthropogenic Landscapes

10:00–13:00 CET (12:30–15:30 Tehran)

Panel C – Part (Chair: Kristen Hopper)

CET	Tehran	Program
10:00–10:15	12:30–12:45	Sign-in
10:15–10:20	12:45–12:50	Introduction to the Panel (Z. Zehbari and A. Noroozi)
10:20–10:40	12:50–13:10	Samran Asiabani, Mohammad Masoumian, Janoscha Kreppner: *Mapping Qanat Networks from KH-9 HEXAGON Imagery: A Line-Aware Deep-Learning Workflow for Landscape Archaeology*
10:40–10:50	13:10–13:20	Q&A
10:50–11:10	13:20–13:40	Marziyeh Sharbaf: *From Aerial Photographs to Historical Texts: Reconstructing Hydraulic Landscape of the Jarrāhī River Basin and Shādegān Wetland in the Lower Khuzestan Plain*
11:10–11:20	13:40–13:50	Q&A
11:20–11:40	13:50–14:10	Giuseppe Labisi, Sarvenaz Parsa, Stefan R. Hauser: *Hydraulic Landscapes and Fire Temples/Chahartaq: the example of Konār Siyāh (Fars, Iran)*
11:40–11:50	14:10–14:20	Q&A
11:50–12:30	14:20–15:00	Keynote (Thomas Stöllner): *Shaping Each Other: Perspectives on the Interplay Between Humans and Lands in the Premodern Iranian Highlands*
12:30–13:00	15:00–15:30	Final discussion and conference closing (Z. Zehbari and A. Noroozi)

Settlement Ecology on the Guask-e Chughan Alluvial Fan (Boluk Plain, Southeastern Iran): Sector-Specific Niches and Long-Term Settlement Dynamics

Amir Ahmadpour[1] , Nader Alidadi Soleimani[2]

1- Department of Near Eastern Archaeology, University of Tübingen.
2- Ministry of Cultural Heritage, Tourism and Handicrafts of Iran.

Abstract

Using a settlement ecology lens, this study treats the Boluk Plain's alluvial fans as coupled human–water–sediment systems in which households and communities balanced production, mobility, and risk. Integrating geomorphic fan zonation, hydrometric records, remote sensing, and spatial data from the South of Jiroft Archaeological Survey (SOJAS), we test how proximal, medial, and distal sectors of alluvial fans structured decision-making from the Chalcolithic through the Historic periods. Beyond external drivers, we evaluate how each zone's specific advantages and hazards interacted with community dynamics to influence settlement persistence. Preliminary analysis indicates that distal sectors and plain margins, with gentler relief and finer deposits, supported irrigated cultivation and more permanent settlements; medial sectors, with accessible shallow groundwater and finer textures, sustained stable communities and oasis-like settlement forms. Proximal sectors, with steep gradients and coarse sediments, favoured transient and seasonal occupations. Taken together, the physical template of the alluvial fans delimited feasible niches, yet the realised settlement trajectories were contingent on community choices that tuned social organisation and land–water practices to sector-specific opportunities and hazards.

The Palaeolithic Survey in Mehrabanroud Valley, eastern Alborz Mountains, Iran

Hosein Ramzanpour[1,2*], Elham Ghasidian[2,3], Saman H. Guran[3,4]

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2- DiyarMehr Institute for Palaeolithic Research, Iran
3- Neanderthal Museum, Germany
4- Institute for Prehistoric Archaeology, University of Cologne, Germany

Abstract

The expansion of late Pleistocene hominins from Eurasia to the Far East is a major issue in palaeoanthropology and Palaeolithic archaeology. When, and through which routes, did these expansions and migrations occur? The Iranian Plateau is a key area for hominin movements toward the east and north. The northern parts of the Plateau are among the least known yet most significant areas during the Pleistocene, where limited information about hominin presence exists. Sparse research on the northern slopes of the Alborz Mountains has revealed their high potential during the Palaeolithic, from the Lower Palaeolithic to the Epipalaeolithic periods. These findings suggest that the southern Caspian Sea may have been part of this expansion route from the Middle Pleistocene to the Holocene. The limited Palaeolithic research conducted over the past decade in this region has uncovered several small natural passages in the Alborz, which late Pleistocene hominins could have used to cross from the interior of the Iranian Plateau to the Caspian Sea lowlands. One such passage is the Mehrabanroud River Valley, which acts as an intra-regional corridor. This is the first time this hypothesis has been proposed in relation to Iranian Palaeolithic archaeology in the region between the Caspian Sea and the Alborz (Southern Caspian Corridor).

Preliminary studies using a geographical information system (GIS) have identified the Mehrabanroud River Valley as one of the most accessible biogeographical passages on the northern slopes of the Alborz Mountains. Based on this, systematic surveys were conducted in this valley to understand the demographic patterns of the southern Caspian Sea Corridor during the Pleistocene, covering areas from the lowlands of the Caspian Sea to the highlands of the Alborz Mountains. As a result, over seventy open-air sites, rockshelters and caves were identified in both lowland and highland areas. For the first time, the Mehrabanroud Valley has been recognised as a vital intra-regional natural corridor for migration and a reservoir for Pleistocene hominin species between the Alborz and the Caspian Sea.

Beyond What Survives: Bias-Aware Neolithic Settlement Patterns in the Western Karkheh Region

Ramin Yashmi

PhD in Prehistoric Archaeology, Art University of Isfahan, Iran

Abstract

Archaeological surveys on the Susiana plain and its surrounding regions have documented a comparatively high number of Late Neolithic sites, whereas recent work west of the Karkheh River has found only a few locales: two marked by sparse but diagnostic Archaic Susiana close-line ware sherds, plus two other loci offering a conservative lithic terminus ante quem. This contrast need not mean true settlement scarcity. Rather, it reflects a paired reasoning error: survivorship bias, where only the most durable or newly exposed sites enter the sample, and the Texas sharpshooter fallacy, where post hoc patterns in those survivors are projected to the whole Neolithic landscape. In such a highly dynamic floodplain with channel shifts, aggradation, avulsion and westward river migration, much of the Late Neolithic record was likely buried under younger cultural layers or natural alluvium, truncated by river trenching, or removed. Thus, surface distributions alone are a weak proxy for past settlement structure.

To address this logical and taphonomic problem, the study outlines a workflow treating survey observations as an incomplete, detection-weighted sample. It will (1) partially reconstruct the region's palaeolandscape in GIS, (2) build a predictive suitability model for early sedentary niches calibrated against better documented neighbours in Central Susiana and Deh Luran, and (3) incorporate preservation and visibility modules (e.g. erosion risk, surface visibility) to estimate missingness and produce bias-adjusted settlement density surfaces with uncertainty. It also recommends targeted intensive surface surveys, sounding and coring at high-probability yet currently empty spots to ground-truth the model.

Methodologically, the study integrates discovery, preservation and interpretation, reducing overconfident narratives based on surface "survivors" alone. Regionally, it reframes the western Karkheh plains as connective zones between two Neolithic cores rather than an anomalous void. More broadly, it offers a replicable, bias-aware template for reconstructing early settlement in southwestern Iran and comparable dynamic basins.

The Ancient Iron Production Landscape in Northwestern Iran

Salah Salimi[1], Florian Janoscha Kreppner[2]

1- University of Tehran
2- Institut für Altorientalistik und Vorderasiatische Archäologie, Universität Münster, Germany

Abstract

This study investigates the development of early iron smelting in the mountainous region south of Lake Urmia in north-western Iran, an area long recognized for its Iron Age metalwork yet lacking systematic archaeological research. While neighboring regions such as Anatolia, the Levant, and the Caucasus possess well-documented iron-smelting traditions, the northern Zagros has remained comparatively understudied. The South Lake Urmia Archaeological Project seeks to address this gap by identifying ancient smelting sites, examining local ore sources, and reconstructing iron production from the Iron Age through the early Islamic period.

Archaeological surveys conducted in the Barikaya (Sardasht) and Kani Rash (Mahabad) areas south of Lake Urmia identified eighteen iron-smelting sites, along with associated settlements, fortresses, slag heaps, tuyères, and furnace remains, revealing an extensive industrial landscape focused on iron production. Investigating access to iron resources—including the documentation of iron mines in the southern Lake Urmia region—constituted another major objective of the project, and in several cases evidence for ancient iron mining was identified. Geological studies confirmed the presence of hematite and magnetite deposits, while excavations at a smelting site exposed substantial slag accumulations and furnace materials, providing direct evidence for smelting activities.

The project further explores spatial variation in iron-smelting remains by comparing production debris recovered near ore sources with material from settlement contexts, in order to assess whether iron production was centralized or locally organized. A second analytical focus concerns the -reconstruction of the complete iron-production chaîne opératoire, evaluating factors such as fuel availability, proximity to ore, access to water resources, and communication routes to determine whether a distinct operational model emerged in this region. Laboratory analyses of slag—including petrography, XRF, and TL dating—offer critical technological insights into furnace conditions, reduction processes, and the evolution of iron-production techniques from the Iron Age through the Islamic period.

Overall, the project provides the first comprehensive framework for early iron metallurgy in the southern Lake Urmia region and contributes new evidence for technological practices, chronological development, and socio-economic organization in the northern Zagros Mountains.

Between Algorithm and Landscape: Rethinking Computational Archaeology through Field-Based Reality in the Central-Western Iran

Assef Noroozi

Ruhr Universität Bochum

Abstract

In recent years, computational and GIS-based methods have become indispensable tools in landscape archaeology, offering quantitative precision and visual clarity. Yet this apparent precision often conceals a deeper fragility: models can be mathematically consistent while empirically wrong. When digital analyses become detached from field-based understanding, they risk producing landscapes that exist in data rather than in reality.

Drawing on fieldwork and spatial analysis of the Kura–Araxes culture in central-western Iran, this paper reflects on how such distortions arise in two widely used approaches: DBSCAN clustering and terrain modelling (slope and aspect). In DBSCAN, for example, the determination of ε from k-distance curves varies dramatically depending on the chosen algorithm (derivative, chord, L-method, Kneedle, and others), sometimes by more than 30 km. Each result appears internally "optimal" yet implies a completely different spatial logic, demonstrating that algorithmic precision is not equivalent to archaeological validity. Likewise, in terrain analysis, automated slope and aspect extraction from DEMs can yield systematically misleading outputs. Rather than capturing the true inclination or orientation of the landscape, these values often reflect only a small patch of mound-surface variability.

These examples reveal a shared underlying problem: quantification without grounding leads to structured error. To address this, the paper proposes a reflexive, dual-anchored workflow in which computational outputs are continuously tested against geomorphological, archaeological, and experiential realities. For both analytical domains, this paper advances field-informed and archaeologically reasoned solutions, including the behavioural calibration of ε in DBSCAN based on realistic ranges of human and animal mobility, and the adaptive refinement of slope and aspect analyses according to geomorphic subzones. By exposing the hidden biases of supposedly objective analysis, the study calls for a more balanced and transparent form of computational landscape archaeology—one that measures not only distances and gradients but also understanding.

Architectural Fortifications of the Bavanat Valley during the Sassanian and Early Islamic Periods

Zeinab Hadi-Dastjerdi

PHD Student of Archaeology, University of Tehran, Iran

Abstract

The Bavanat Valley, located in the southwestern region of the Iranian plateau, in the northern part of Fars Province and within Bavanat County, is a mountainous plain stretching approximately 60 kilometers along a north-west to south-east axis between the Zagros mountain range. In the 3rd century AD, with the establishment of the Sassanian Empire, a centralized emerged in southern Iran with Fars province as its core, which held significant importance for the empire. The Sassanian administrative system divided Fars into five koras, each further divided into smaller regions called "Rostaqs." These Koras were: Estakhr, Shapur Khor, Ardashir Khor, Arjan, and Darabgerd, with the Bavanat Valley lying within the boundaries of the Estakhr Kora.

Evidence of human settlement in the Bavanat Valley during the 3rd to mid-7th centuries AD, corresponding to the Sassanian period, is significantly more prominent than in earlier periods. This presence is evident in the 55 identified and preserved archaeological sites from this era. Among these, five fortresses have been identified: three situated in the highlands and two in the plains.

The presence of these fortifications along the Bavanat Valley suggests that during the Sassanian period, the region was at constant risk of raids and incursions, making the establishment of defensive structures essential for the continuity of life in the valley. Analysis of pottery found at these fortifications indicates that these castles continued to be in use in later periods after the fall of the Sassanian Empire.

The number of Sassanian sites is notably higher than that of earlier periods, clearly indicating a population increase during this time. With the growth of the population, securing the valley for its inhabitants became a priority for the rulers of the era.

In addition to historical events, factors such as geomorphology, climate, weather, soil, and road networks play a significant role in determining the settlement pattern within the Bavanat Valley. Thus, to assess the biological viability of different areas of this region, ecological models specific to agricultural and pastoral soils in Iran can be employed. Furthermore, to better understand the interrelationship between roads and sites, the current road network can be studied, and using GIS software, the connectivity and routes between these sites can be analyzed and modeled.

Lithic Raw Material Procurement and Economic Strategies among the Palaeolithic Occupations in the Kermanshah Plain, West-Central Zagros Mountains of Iran

Nemat Hariri[1,2], Nima Nezafati[3], Judith Thomalsky[4], Faezeh Barzegar[5], Mohsen Ranjbaran[1], and Saman H. Guran[6,1]

1- School of Geology, College of Science, University of Tehran, Tehran, Iran
2- DiyarMehr Institute for Palaeolithic Research, Iran
3- German Mining Museum and Ruhr University Bochum, Germany
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5- Department of Archaeology, Faculty of Humanities, Tarbiat Modares University, Iran
6- Institute for Prehistoric Archaeology, Cologne University, Germany

Abstract

Various archaeological investigations, including surveys and excavations, reveal that during the Lower Palaeolithic to the Epipalaeolithic period, the Kermanshah Plain in the West-Central Zagros Mountains was one of the most intensively occupied regions within the entire Zagros and even across the Iranian Plateau. These occupations were recovered in different site types, including caves, rock shelters, and open-air sites.

Despite the available data, comprehensive and specialised studies on the lithic raw materials used during the Palaeolithic periods remain scarce, with only a limited number of investigations conducted to date.

Raw material sources for lithic assemblages in the Kermanshah area fall into two main categories: (1) primary sources (banded chert), notably the “Kermanshah Radiolarite Belt”, and (2) secondary sources, consisting of nodular chert and various chert sources scattered across mountain slopes and riverbeds.

This study focuses on two chronologically significant archaeological sites in the Kermanshah region: Bawa Yawan Rockshelter (Middle Palaeolithic to Epipalaeolithic) and Gelimgoush Cave (Upper Palaeolithic), both situated in the Nawdarwan Valley, a tributary of the Kermanshah Plain. The research on systematic raw material sampling, macroscopic attribute recording, and pilot thin-section petrography suggest suggests that prehistoric populations extensively utilised radiolarian chert, which was procured from both in situ and secondary sources. Patterns of raw material use varied across occupational phases, mostly during the Middle and Upper Palaeolithic periods. This variation supports the hypothesis that different human populations, Neanderthals and anatomically modern humans, employed distinct raw-material use patterns. Neanderthals, in particular, show greater flexibility in using local stones and a more opportunistic provisioning strategy.

Prey-Predator Interactions in the Zagros Mountains : Taphonomic Study of the Large Mammal Assemblage from the Wezmeh Cave (Late Pleistocene-Holocene)

Angela Noseda[1], Camille Daujeard[2], Fabrice Bray[3], Xavier Gallet[2], Antoine Zazzo[4], Fereidoun Biglari[5], Marjan Mashkour[4]

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5- Paleolithic Department, National Museum of Iran, Iran.

Abstract

The Zagros Mountains have yielded numerous archaeological sites testifying to human presence and subsistence strategies during Paleolithic times. However, in this rich fossil record, carnivores are only scarcely represented. Therefore, carnivore behaviour and possible interactions with prehistoric human groups are not well documented. The Wezmeh Cave (Zagros Mountains, Iran) has yielded a large faunal assemblage dated from the Late Pleistocene and Holocene. The remains of over ten carnivore species were found, the most important ones being the red fox, spotted hyena, brown bear and wolf, followed by small and large cats, weasels and mongooses. This site counts among the few that document the biodiversity of Pleistocene carnivores in the region.

A large collection of herbivore remains was also discovered, consisting mainly of wild and domestic goats and sheep, pig/boars, and to a lesser extent deer (red and fallow deer), cattle, gazelles and a rhinoceros. In addition, a Neanderthal premolar tooth was also recovered. Prior to its discovery, the cave suffered from looting activities that disturbed its stratigraphy, making it difficult to interpret the origin of the accumulations. The zooarchaeological and taphonomical study of 9,300 faunal remains allows us to question the origin(s) of the faunal accumulations and discuss the possible interactions between the different taxa involved. Our work shows carnivores played a secondary role in the accumulation of the remains, alongside humans, who also contributed to a minor extent. Rather, we put forward natural processes as the main accumulative processes. Indeed, caverniculous behaviours are well known for modern-day caprines, who visit cavities and sometimes die there after getting trapped or from natural causes. We argue it can play a major role in the formation of caprine-rich faunal assemblages, such as Wezmeh, complementing and complexifying our knowledge on past human–animal interactions.

Dalma in Detail: A Techno-Social Characterization of Dalma Tradition in NW Iran

Soheil Salamat

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Abstract

Located in the southern basin of Lake Urmia, Dalma Tepe is widely considered the origin of a prehistoric tradition in northwestern Iran, dating back to the 5th millennium BC. The site and its archaeological materials were briefly investigated in the 1960s and, more recently, during an excavation season in 2021. So far, only a few sites attributed to the Dalma tradition have been identified. Consequently, a comprehensive regional chronology for northwestern Iran has not yet been fully established. The most distinctive feature of the Dalma tradition is the wide chronological and geographical distribution of its pottery, extending into the Central Zagros region, northern Mesopotamia, and the South Caucasus. However, no systematic internal classification, whether temporal or regional, has yet explained this distribution pattern.

This research aims to revisit Dalma Tepe and re-examine its archaeological data using modern methods developed over the past five decades. Based on newly acquired archaeological data from recent excavations at Dalma Tepe, this study aims to establish a reliable typo-chronological pottery sequence and provide new insights into the Dalma tradition. It examines its origin, social organisation, and distribution patterns in northwestern Iran and beyond, while also exploring how the spatial patterns of Dalma pottery reflect mobility and exchange networks across the Urmia Basin, the Caucasus, and the Zagros corridor. In doing so, the study sheds new light on the socio-cultural dynamics of northwestern Iran during the 5th millennium BC.

Shell Vessel from Susa: Evidence of Ritual and Exchange in the Bronze Age

Parisa Naseri

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Abstract

The shell vessel from Susa is among the most significant examples of worked organic materials from the Bronze Age, notable for its technological refinement, cultural meaning, and archaeological context. The artifact was carved from large marine shells, most likely Turbinella pyrum, Fasciolaria trapezium, and Lambis truncata. The natural sources of these shells lie in the southern waters of Iran, including the Persian Gulf, the Oman Sea, and the Gulf of Gwadar. Transporting such marine materials over a distance of more than 600 km to the inland city of Susa reveals the existence of extensive trade networks along the Indian Ocean and direct connections with the Indus Valley during the third millennium BCE.

These shell vessels have been predominantly recovered from male burials, suggesting a ritual or symbolic function. In the Bronze Age belief systems—particularly within the Elamite cultural sphere—marine shells were associated with purity, water, and regeneration. Comparable shell vessels have been found in other Iranian Bronze Age cemeteries, including Bani Surmeh, Kalleh Nisar, Bard-e Zardeh, and Shahdad, indicating a widespread funerary tradition involving the use of marine shell containers.

Although excavations at Susa were conducted prior to the application of modern archaeological methods, and no direct remains of shell-working workshops have been identified, the coexistence of raw and worked shells strongly implies the presence of local production. Similar examples from Bronze Age Mesopotamian sites further attest to artistic and cultural parallels between Susa and its contemporaneous centres. The shell vessel from Susa thus serves as material evidence of ritual practice, interregional exchange, and cultural interaction across southwestern Iran during the Bronze Age.

Anshan at the Crossroads: Transmission of Artistic Ideas across the Iranian Highlands

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Abstract

Anshan, the highland capital of Elam and a precursor to the political formations that would later shape the Persian Empire, remained absent from broader archaeological discourse until its identification at Tall-e Malyan by William M. Sumner in the 1970s. Five subsequent excavation seasons briefly revealed the contours of this important urban centre, yet the Kaftari-period levels (ca. late third to early second millennium BCE) have remained understudied. This neglect is due both to the late rediscovery of the site and the suspension of fieldwork after 1978, leaving significant portions of its material record unpublished.

This paper reconsiders Anshan in the Kaftari period through a body of previously unpublished artefacts. Examining ceramics, figurines, ornaments, and other portable objects, it demonstrates how these materials provide evidence not only of local traditions but also of practices and ideas that travelled across wider cultural landscapes. The assemblages attest to a dynamic exchange of artistic forms and technological knowledge, situating Anshan as more than an isolated highland settlement. Located on crucial highland routes, Anshan functioned as a central node that connected Susiana and Mesopotamia with the northeastern regions of the Bactria-Margiana Archaeological Complex. The material record thus highlights the city's role in facilitating the movement of goods, styles, and symbolic vocabularies across vast distances, reframing Anshan as a pivotal crossroads in the networks of the Middle Bronze Age Iranian highlands.

Power, Identity, and Human Landscapes of Highland–Lowland Interactions in the Proto-Elamite Period

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Abstract

This study explores socio-economic and cultural interactions between lowland plains and highlands in the Iranian Central Plateau during the Proto-Elamite period (c. 3200–2800 BCE). It argues that surplus production and circulation were central in shaping relations between highland agro-pastoral groups and lowland farming communities, embedding these dynamics within broader trajectories of resilience and convergence on the Iranian Plateau. Rather than peripheral zones of Uruk expansion, Proto-Elamite interaction areas are understood as multi-centred arenas of negotiation and shifting institutional alliances.

Administrative texts from the Proto-Elamite period reveal decentralised exchange practices embedded in daily life. Variations in tablet headers and seal imagery reflect multiple familial and group identities, while pointing to flexible and distributed accounting. Instead of a centralised bureaucracy, evidence indicates multi-nodal systems of control in which grain, livestock, and craft goods circulated through direct negotiation among diverse groups. Archaeological and ethnographic parallels highlight Susa as a nodal hub linking highland pastoralists and lowland farmers in surplus exchange.

Godin Tepe and early Proto-Elamite tablets from Susa emphasise highland contributions to administrative innovations later consolidated in Susa. Regional diversity, as seen at Tepe Sefalin, Tell Malyan, and Tepe Yahya, illustrates the importance of nomadic–sedentary synergies in shaping early state economies. Beyond economic dependency, these highland–lowland interactions generated shifting configurations of power: fertile lowlands and highland control of routes fostered recurring cycles of negotiation, rivalry, and cooperation. By placing Proto-Elamite administrative practices within the long-term framework of highland–lowland relations, this study interprets texts and material assemblages not only as accounting devices but also as active monuments of human strategies for adaptation and integration. The emergence of the "Proto-Elamite Union" reflects not a centralised state but a fluid coalition of agricultural and pastoral communities bound by the social and economic mobilisation of surplus—a practice fundamental to cohesion, resilience, and early state formation in ancient Iran.

Local Political Strategies and the Development of Administrative and Political Institutions in the Central Zagros (ca. 3300–2500 BCE)

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Abstract

Although several Central Zagros polities appear in Mesopotamian texts of the late third millennium BCE, the formation and sociopolitical organisation of these polities remain poorly understood. Previous studies often explain the development of administrative and political institutions in the Central Zagros region through core–periphery models, emphasising asymmetrical relations with Mesopotamian urban centres. While framing highland polities as cases of "secondary state formation," such perspectives tend to overlook the internal political strategies that shaped the sociopolitical organisation of these communities.

This paper applies Dual-Processual Theory to archaeological evidence—particularly administrative artefacts—from Godin Tepe (period VI:1), Tepe Tyalineh, and Chogha Maran. The analysis highlights the role of both exclusionary and corporate strategies in the emergence of administrative institutions between 3300 and 2500 BCE. The results demonstrate that sociopolitical change in the Central Zagros was not simply a byproduct of Mesopotamian influence but was deeply rooted in local strategies. The collapse of centralised administration at Godin VI:1 in LC 5, followed by the rise of more communal institutions at Tyalineh and Chogha Maran during the Early Bronze Age I–II, suggests that late third-millennium highland polities were shaped primarily by corporate political strategies.

Rethinking Colonial Narratives at Godin Tepe: New Evidence for an Indigenous Highland Hub in the Late Fourth Millennium BC

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Abstract

The late fourth-millennium BC occupation at Godin Tepe has long been framed as a southern Mesopotamian colonial outpost, centered on the so-called 'Oval Compound' - a complex containing Uruk/Susa-style pottery and administrative tools and believed to have been enclosed by a defensive wall. My architectural reassessment shows that this 'Oval Wall' never existed; it is a mistaken amalgamation of wall segments from multiple phases. The new reconstruction reveals not an enclosed or restricted enclave, but a more extensive and internally coherent complex extending beyond the presumed oval and aligns closely with Iranian Highland building traditions. This reinterpretation points to a community that shared a unified architectural and cultural landscape across the site, one that cannot be simply defined through artificial divisions such as the 'Oval Wall'. Consequently, southern-centric colonial models that relied on this wall to argue for a defensible Uruk/Susa enclave require fundamental reconsideration. Rather than a foreign colony, the evidence positions Godin as a highland hub along long-established overland routes connecting communities across the Iranian Highlands and Mesopotamia.

The material culture of Godin VI:1 reinforces this view. The inhabitants participated in a distinct late fourth-millennium traditions, blending southern Mesopotamian elements with long-standing Iranian Highlands practices. This cultural continuity, which spans from Late Uruk/Susa II to Proto-Elamite/Susa III traditions, challenges rigid cultural and historical periodization and reveals overlaps between periods once considered distinct within Godin's VI:1 occupation.

This research is based on a comprehensive re-examination of the Godin Project archive at the Royal Ontario Museum. It integrates reassessment of stratigraphic and architectural data, analyses of floor assemblages, renewed evaluation of key artifacts (like pottery, numerical tablets, and seal impressions), and recalibrated radiocarbon dates. A reevaluation of the Kangavar Valley Survey further situates Godin's substantial expansion during this period within the broader emergence of contemporary settlements across the surrounding region.

Mapping Qanat Networks from KH-9 HEXAGON Imagery: A Line-Aware Deep-Learning Workflow for Landscape Archaeology

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Abstract

Qanats (karez), as central premodern irrigation and water-management systems, provided the hydraulic backbone for settlement and cultivation. A qanat is an underground water-supply system composed of gently sloping horizontal tunnels intercepted by regularly spaced vertical shafts; it taps an aquifer and conveys water underground to zones of use, sometimes over tens of kilometres from the source. Although the origins and pathways of diffusion are debated, by the early second millennium CE, variants of this technology sustained rural and urban communities across wide arid and semi-arid belts of Africa and Asia, making rigorous documentation of qanat landscapes a priority for archaeological research and heritage management. Yet existing maps are uneven and often limited to isolated ventilation shafts rather than complete alignments. Systematic identification of qanat systems is essential for reconstructing irrigation landscapes, analysing settlement patterns, and assessing agricultural investment, with particular relevance for studies of the first-millennium BCE and later periods.

This study introduces a compact, reproducible workflow that converts declassified KH-9 HEXAGON imagery into GIS-ready maps of qanat lines, leveraging the synoptic, metre-scale record of 1970s historical satellite photographs, captured prior to extensive modern land transformation. The pipeline firstly prioritises low-sun acquisitions of KH-9 imagery that enhance shadow relief around the shafts and improve their visibility, detects small circular shafts on panchromatic frames, and finally applies a line-aware post-processor that links detections into polylines by enforcing collinearity, near-regular spacing, low curvature, and gentle downslope continuity derived from a digital elevation model. The workflow is demonstrated in two targeted areas in Iran and the Kurdistan Region of Iraq. Performance is assessed at the shaft level (precision/recall) and at the line level (continuity), the latter directly tied to archaeological utility. By advancing from point detections to coherent reconstructions of qanat alignments, the results enable spatial analyses of irrigation infrastructure in relation to settlement organisation and land use, offering a transferable method for integrating hydraulic features into comparative studies.

From Aerial Photographs to Historical Texts: Reconstructing Hydraulic Landscape of the Jarrāhī River Basin and Shādegān Wetland in the Lower Khuzestan Plain

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Abstract

Archaeological knowledge of the historical and prehistoric landscapes in the southern part of the Lower Khuzestan plain—particularly around the Jarrāhī River and the Shādegān Wetland—remains limited compared with the better-studied Upper Khuzestan plain. This scarcity of data has long conveyed the impression that these southern areas were marginal zones, scarcely inhabited or utilised by past communities. Yet, the presence of key environmental features—including the perennial freshwater of the Jarrāhī River, extensive alluvial fans and floodplains, the extensive and ecologically rich Shādegān Wetland, and access to the sea—suggests that the region held considerable potential for settlement, agriculture, and long-term human occupation.

This research argues that the apparent lack of evidence is a consequence of insufficient systematic surveys, the absence of critical reassessment of existing data, and the limited application of new methodologies in landscape archaeology. To address this gap, a preliminary study was undertaken that integrates aerial photography, satellite imagery, and historical texts, and was tested in the field through ground-truthing. Particular emphasis was placed on the identification of water-management elements—such as irrigation canals and dams—that structured the cultural landscape. The study also highlights the gradual disappearance of material evidence caused by natural and anthropogenic forces over time. These destructions not only result in the loss of cultural layers and settlement evidence, but also lead to a disruption in our understanding of past land use. Consequently, misinterpretation of landscape patterns and historical functions of these sites is likely, and in some cases inevitable, akin to a silent archaeological catastrophe.

This integrative approach underscores the need for renewed archaeological attention to the southern part of the Lower Khuzestan plain and demonstrates the value of combining remote sensing, textual sources, and landscape-based perspectives to recover the hidden dimensions of a region that has so far remained understudied.

Hydraulic Landscapes and Fire Temples/Chahartaq: the example of Konār Siyāh (Fars, Iran)

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Abstract

The site of Konar Siyah, situated on the main communication route between Gur/Firuzabad and the Persian Gulf, is known for its well-preserved chahartaq. A combination of remote sensing, archaeological and hydrological analysis demonstrates that its vicinity is characterised by a network of water management systems, suggesting an integrated management of land and resources. The proximity of a palatial complex a few hundred meters west of the chahartaq complex/fire temple (if contemporary to the latter, as suggested by the construction techniques and general layout) may indicate the existence of an aristocratic endowment (waqf-like institution) responsible for the site's maintenance and operations. Rather than reflecting peripheral adaptation, the hydraulic landscape of Konar Siyah illustrates the organised and enduring strategies of resource control that supported Sasanian religious and administrative infrastructure in one of the empire's most dynamic regions.

Dynamic Interplay in the Iranian Highlands

In Searching for Anthropogenic Landscapes

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