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THE KASHKADARYA OASIS AS AN INTEGRATED URBAN-HYDRAULIC LANDSCAPE: THE EVOLUTION OF ARCHITECTURE AND URBAN CULTURE FROM ANTIQUITY TO THE TIMURID PERIOD

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Abstract

The Kashkadarya Oasis represents one of the major historical and cultural regions of Central Asia, where urban, architectural, agricultural, defensive, and hydraulic systems developed and interacted over a period of more than two millennia. Despite the considerable body of archaeological research undertaken in the region, individual sites such as Uzunkyr, Sangirtepa, Podayaktepa, Yerkurgan, Nakhshab, Qarshi, and Shakhriyabz have generally been examined within relatively localized historical and archaeological frameworks. This article proposes an alternative approach by interpreting these sites as components of an integrated historical, urban, and hydraulic landscape.

The principal objective of the study is to identify the relationship between the development of urban architecture, defensive structures, sacred complexes, and water-management systems in the Kashkadarya Oasis. Particular attention is devoted to the early Uzunkyr – Sangirtepa – Podayaktepa complex in the Kesh Oasis, which provides important evidence for reconstructing processes of early urbanization in southern Sogdiana. Archaeological evidence suggests the existence of a functionally differentiated spatial system incorporating fortified

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areas, a citadel, and specialized cultic spaces. At the same time, the religious attribution of Sangirtepa requires a cautious approach and further interdisciplinary investigation.

Another major issue concerns the role of irrigation and hydraulic engineering. Under the arid environmental conditions of Central Asia, the long-term existence of urban settlements in the Kashkadarya Oasis was directly dependent upon the management and redistribution of water resources. Canals, water-intake and distribution structures, water-lifting devices, drainage systems, and related hydraulic infrastructure supported the agricultural hinterland of cities and simultaneously influenced their spatial organization and economic development. A particularly important stage in the architectural history of the region was the transformation of Kesh into Shakhriyabz during the reign of Amir Timur. The Ak-Saray palace, Dorut-Tilovat, and Dorus-Saodat are interpreted as interconnected elements of a monumental political and memorial programme intended to establish Shakhriyabz as a major dynastic and symbolic centre. The Historic Centre of Shakhriyabz was inscribed on the UNESCO World Heritage List in 2000 under criteria (iii) and (iv). However, it remains on the List of World Heritage in Danger, highlighting the necessity of integrated approaches to the conservation of monuments and their historical urban environment.

The study combines archaeological, architectural-historical, historical-topographical, environmental, and hydraulic perspectives. This approach makes it possible to interpret the Kashkadarya Oasis not as a collection of isolated monuments, but as a dynamic civilization landscape in which water, agriculture, settlements, cities, roads, defensive structures, and sacred architecture formed an interconnected system.

Keywords: Kashkadarya Oasis; Southern Sogdiana; Kesh; Uzunkyr; Sangirtepa; Podayaktepa; Yerkurgan; Nakhshab; Qarshi; Shakhriyabz; urban archaeology; architecture; irrigation; hydraulic engineering; historical landscape; cultural heritage.

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Introduction

The architectural history of Central Asia has traditionally been examined through the major political and cultural centres of the region, particularly Samarkand, Bukhara, Khiva, Balkh, and Merv. This approach is understandable, since these cities have preserved substantial monumental remains and have played prominent roles in the political and cultural history of Central Asia. Nevertheless, an exclusive focus on the major urban centres may obscure important regional processes in the formation and transformation of urban culture. One of the regions where such processes can be particularly fruitfully investigated is the Kashkadarya Oasis in southern Uzbekistan.

The Kashkadarya region occupied a strategically important position between the mountainous areas of Central Asia, the Zeravshan Valley, Bactria, and the western territories of Transoxiana. Its geographical position was complemented by considerable environmental diversity, ranging from mountainous and piedmont areas to fertile lowland agricultural zones. This combination created favourable conditions for the long-term development of sedentary agriculture, craft production, settlement networks, and urban culture.

Archaeological investigations in the Kashkadarya Oasis have a history extending over more than a century. A number of prominent scholars contributed to the exploration of the region, while later archaeological projects considerably expanded the evidence concerning ancient and medieval settlement systems. Particularly important were investigations of the Kesh Oasis, which made it possible to identify and document numerous archaeological sites and reconstruct aspects of the historical topography of the region.

The accumulated evidence makes it possible to formulate a broader research question: how did individual settlements, urban centres, defensive structures, sacred complexes, transportation routes, agricultural territories, and hydraulic systems interact with one another and produce a coherent historical landscape? This question forms the central conceptual framework of the present study.

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One of the most promising areas for the investigation of early urbanization is the Kesh Oasis. Of particular importance is the archaeological complex associated with Uzunkyr, Sangirtepa, and Podayaktepa. Contemporary archaeological research in the Shakhrysyabz area connects the formation of an early urban centre with this complex and with the broader territory of ancient Kesh.

Uzunkyr represents a major fortified archaeological site. Its defensive system indicates a substantial degree of organization in construction and suggests the existence of social structures capable of mobilizing considerable labour resources. The importance of the site lies not only in the physical remains of its fortifications but also in its spatial relationship with other components of the Kesh complex.

Podayaktepa represents another important component of the early urban landscape and has been associated with the fortified and settlement areas of ancient Kesh. Taken together, the evidence from these sites suggests that early urbanization in the Kesh Oasis did not necessarily involve the creation of a compact and homogeneous city. Rather, it may have involved a spatially differentiated system in which administrative, residential, defensive, economic, and ritual functions were distributed among interconnected areas.

Sangirtepa is of particular significance in this context. Archaeological evidence from the site has been associated with ritual activity in the early Kesh Oasis, while the lower cultural layers have been dated to the eighth–seventh centuries BCE. Some scholars have interpreted the complex as an early Zoroastrian or fire-related cultic structure.

For an international academic publication, however, it is preferable to employ a more cautious formulation and refer to Sangirtepa as a cultic complex with possible evidence of fire-related ritual practice, rather than definitively identifying it as a Zoroastrian fire temple. Such an interpretation requires further comparison of architectural, stratigraphic, archaeobotanical, zooarchaeological, and comparative historical evidence.

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This methodological caution does not diminish the importance of Sangirtepa. On the contrary, the site becomes particularly valuable when considered together with Uzunkyr and Podayaktepa. Their spatial relationship may indicate the existence of an early urban system in which defensive, administrative, residential, and ritual functions were differentiated but interconnected.

The Kesh Oasis therefore provides significant evidence for understanding the emergence of urbanism in southern Sogdiana. The city appears not simply as a single architectural entity, but as a spatial network of functionally related places. A comparable process can be observed in another part of the Kashkadarya Oasis, in the area of ancient Nakhshab. Yerkurgan is among the most important archaeological sites of the region and provides evidence for the development of an urban centre over an extended chronological period. Archaeological investigations have identified defensive structures, palace and administrative complexes, cultic buildings, craft areas, and residential quarters.

Yerkurgan is especially significant for understanding the relationship between the city and its agricultural hinterland. An urban centre could not function independently of the territory that supplied food, raw materials, and labour. Its development therefore depended upon communication networks as well as upon irrigation and agricultural infrastructure.

This brings us to one of the central arguments of the present study: water was not merely a natural resource in the Kashkadarya Oasis; it was a fundamental factor in the organization of urban space and social life.

An irrigation canal was simultaneously an engineering structure, an economic infrastructure, and an instrument of social organization. Its construction required labour mobilization; its maintenance required continuous collective activity; and the distribution of water required systems of regulation and control.

The development of irrigation could therefore contribute to the emergence of more complex administrative structures, while the growth of cities could, in turn, create the institutional conditions necessary for coordinating water management.

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The relationship may be conceptualized as a historical sequence:

water resource → water intake → main canal → distribution network → agricultural territory → settlements → urban centre.

The process also operated in the opposite direction:

urban centre → administration → labour organization → maintenance of irrigation → agricultural production.

Hydraulic infrastructure should therefore be regarded not as a secondary element of architectural history, but as one of the fundamental mechanisms underlying the formation and sustainability of urban civilization.

The hydraulic landscape of the Kashkadarya Oasis included canals, water-distribution structures, reservoirs, drainage installations, and water-lifting technologies. Traditional water-lifting devices such as the chigir enabled communities to raise water to agricultural fields where natural topographic gradients were insufficient.

At the same time, it is essential to distinguish between archaeologically documented ancient hydraulic systems and later traditional technologies. The existence of a particular hydraulic technique in Central Asia does not by itself demonstrate the antiquity of every individual installation in the Kashkadarya region. The chronology of specific canals, underground water systems, and hydraulic structures requires archaeological, geomorphological, and hydrogeological investigation.

This methodological distinction is particularly important because hydraulic installations were repeatedly repaired, modified, expanded, and reused over centuries. A canal visible today may therefore incorporate elements belonging to several different historical periods.

The architectural culture of the ancient and early medieval Kashkadarya Oasis developed within the wider cultural environment of southern Sogdiana. Mud brick and fired brick remained fundamental construction materials, while

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architectural techniques gradually became more sophisticated through the development of vaulted, domed, and other load-bearing structures.

Defensive architecture occupied a particularly important position. Fortification walls did more than protect settlements from external threats: they also structured urban space. Together with citadels, gates, internal defensive lines, and natural barriers, they created multilayered systems of security.

With the spread of Islam, the architectural landscape of the oasis underwent substantial transformation. Mosques, madrasas, mausoleums, memorial complexes, and other religious structures became increasingly prominent. Nevertheless, Islamization did not represent a complete break with earlier architectural traditions. Brick construction, vaulted structures, domes, courtyards, and principles of spatial organization continued to evolve within new religious and social contexts.

Medieval Kesh and Nakhshab were integrated into the broader urban and commercial system of Transoxiana. Their location enabled them to participate in trade and cultural communication across Central Asia.

Caravanserais and rabats were important components of this network. They provided accommodation for travellers, protection for merchants, storage facilities, and services for animals. Their distribution was determined by distance, topography, road systems, and, above all, access to water.

Thus, the commercial and hydraulic landscapes of the Kashkadarya Oasis were closely interconnected.

The Mongol conquest constituted one of the most profound disruptions in the history of the region's cities and agricultural systems. The destruction of urban infrastructure and the interruption of agricultural production caused major economic and demographic consequences. Yet the subsequent recovery demonstrates the resilience of oasis civilization.

Urban reconstruction could not occur without the restoration of agriculture, while agricultural recovery was impossible without the rehabilitation of irrigation

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systems. Political reconstruction, therefore, should be considered together with the restoration of hydraulic infrastructure.

A qualitatively new stage in the architectural history of Kashkadarya emerged under Amir Temur.

For Temur, Kesh possessed exceptional dynastic and symbolic importance. The large-scale transformation of the city sought to create a monumental political centre corresponding to the ambitions and status of the Timurid ruler.

The most spectacular expression of this programme was the Ak-Saray palace. UNESCO recognizes the Timurid monuments of Shakhrisyabz as possessing outstanding significance for the architectural history of Central Asia. The Historic Centre of Shakhrisyabz was inscribed on the World Heritage List in 2000 under criteria (iii) and (iv).

The Ak-Saray should not be interpreted as an isolated palace structure. Together with Dorut-Tilovat and Dorus-Saodat, it formed part of a wider monumental programme in which political, dynastic, religious, and memorial functions were integrated into the urban fabric.

Architecture in Timurid Shakhrisyabz consequently served as an instrument of political representation. Monumental scale, ceramic decoration, epigraphy, domes, portals, and carefully organized public spaces created a visual language of dynastic power.

At the same time, the architecture of Kashkadarya should not be understood as a completely autonomous “school” opposed to the traditions of Samarkand or Bukhara. A more accurate interpretation is to regard it as a regional architectural tradition embedded within the broader architectural culture of Transoxiana.

Kashkadarya participated in a wide exchange of construction technologies, artistic practices, craftsmen, and architectural ideas. The monuments of Timurid Shakhrisyabz demonstrate the interaction between local traditions and techniques developed in other parts of Central Asia. UNESCO documentation, for example,

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records the involvement of craftsmen from Khwarazm in the construction of the Ak-Saray.

Brickwork, glazed ceramics, mosaic techniques, carved and moulded terracotta, and monumental epigraphy became important components of the architectural vocabulary of the period. Their presence demonstrates not the isolation of Kashkadarya but its integration into a wider transregional architectural system.

During the subsequent centuries, Qarshi increasingly developed as an important political and economic centre of the region. Under the Shaybanids, Ashtarkhanids, and Manghits, religious, commercial, residential, and public architecture continued to develop.

The urban landscape included mosques, madrasas, markets, caravanserais, bathhouses, residential quarters, and defensive structures. The organization of these spaces was closely connected with transportation and water infrastructure. For this reason, the architectural history of Qarshi should be investigated not only through surviving buildings but also through historical topography and the reconstruction of former water-management systems.

Sacred sites constituted another important component of the cultural landscape. Mausoleums, mosques, memorial complexes, and pilgrimage centres served simultaneously as places of religious practice, collective memory, and social interaction.

Dorut-Tilovat in Shakhrisyabz represents one of the clearest examples of this interaction. Its memorial, religious, and dynastic functions were combined within a carefully organized sacred landscape.

By the late medieval period, the Kashkadarya Oasis had therefore developed into a complex network of cities, rural settlements, roads, commercial stations, defensive structures, sacred centres, and hydraulic systems.

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Contemporary Research and Heritage Conservation

In the twenty-first century, the study of Kashkadarya's heritage should increasingly move from an object-centred approach toward a landscape-based methodology.

Traditional archaeological research seeks to determine what a particular monument was. A broader historical-landscape approach must also ask how that monument was connected to other places and systems.

This shift opens significant opportunities for the application of Geographic Information Systems, remote sensing, geophysical survey, digital archaeology, satellite imagery, photogrammetry, and three-dimensional reconstruction.

One particularly promising project would be the creation of an integrated GIS model of the historical Kashkadarya Oasis in which archaeological settlements, fortifications, ancient canals, water-management structures, agricultural zones, caravan routes, sacred sites, medieval cities, and modern heritage-protection areas could be mapped within a single analytical framework.

Such a database would make it possible to move from the description of individual monuments toward the reconstruction and modelling of the historical landscape as a whole.

This approach is especially relevant to Shakhrisyabz.

The Historic Centre of Shakhrisyabz was inscribed on the UNESCO World Heritage List in 2000. However, concerns regarding the transformation of the historic urban environment subsequently led to its inscription on the List of World Heritage in Danger. The World Heritage Committee has repeatedly requested stronger mechanisms for conservation, planning, and management.

The 2025 decision of the World Heritage Committee is particularly important for understanding the present situation. The Committee welcomed ongoing dialogue with UNESCO and ICOMOS concerning a possible significant boundary modification and noted the development of a new Master Plan and Heritage Code. It also allowed additional time for archaeological surveys, research, conservation

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planning, and the preparation of a possible revised nomination. At the same time, it decided to retain the Historic Centre of Shakhrysyabz on the List of World Heritage in Danger.

This situation has direct implications for the conceptual framework proposed in this article.

If architectural heritage is considered only as a collection of individual monuments, conservation becomes primarily a matter of restoring structures such as the Ak-Saray, Dorut-Tilovat, or Dorus-Saodat.

If, however, Shakhrysyabz is understood as a **historic urban landscape**, the object of conservation becomes considerably broader:

architecture + urban morphology + archaeological layers + traditional neighbourhoods + water systems + historical landscape.

Such an approach corresponds more closely to contemporary international principles of historic urban conservation.

The relationship between architecture and hydrology is particularly significant. UNESCO documentation has drawn attention to water infiltration affecting monuments and to the need to address the problem at the urban scale. It has also emphasized the importance of investigating groundwater conditions and drainage, including the possibility of restoring some of the benefits historically provided by traditional water-management channels that have largely disappeared.

This demonstrates that hydraulic infrastructure is not merely part of the ancient economic history of the oasis; it remains relevant to the contemporary conservation of its architectural heritage.

The preservation of Kashkadarya's heritage therefore requires a comprehensive interdisciplinary strategy. Archaeological research should be combined with architectural documentation, hydrological and hydrogeological studies, historical geography, GIS mapping, environmental analysis, and heritage-management planning.

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Such a strategy would also make it possible to connect conservation with sustainable cultural tourism. The archaeological and architectural landscape of Kashkadarya possesses considerable potential for international cultural tourism, but this potential can only be realized if tourism development is based on the protection of authenticity, historical context, archaeological integrity, and local communities.

Conclusion

The historical development of the Kashkadarya Oasis provides an important opportunity to reconsider the formation of urban civilization in Central Asia.

The central argument of this study is that the architecture and urban history of Kashkadarya cannot be adequately understood without considering their relationship with the natural environment and hydraulic infrastructure.

Uzunkyr, Sangirtepa, and Podayaktepa provide valuable evidence for reconstructing an early urban configuration in the Kesh Oasis in which defensive, administrative, residential, and ritual functions were interconnected.

Yerkurgan demonstrates a later stage in the development of urban organization and illustrates the close relationship between the urban centre of Nakhshab and its agricultural hinterland.

The history of Nakhshab and Qarshi demonstrates the resilience of urban culture and its dependence upon communication networks, agricultural production, and water-management systems.

Shakhrisyabz, particularly during the reign of Amir Temur, represents a major stage in the monumental development of this regional tradition. The Ak-Saray, Dorut-Tilovat, and Dorus-Saodat constituted an architectural environment in which political authority, dynastic memory, religious practice, and urban identity were closely interconnected.

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Architectural development, however, never occurred in isolation. It was linked to irrigation, agriculture, trade, transportation, defence, demographic processes, and the organization of public space.

The Kashkadarya Oasis should therefore be interpreted as an integrated historical, urban, and hydraulic landscape.

Such an interpretation makes it possible to bring archaeological settlements, architectural monuments, ancient canals, hydraulic installations, agricultural territories, roads, and sacred sites into a single analytical framework.

Three priorities are particularly important for future research.

First, an integrated GIS-based model of the historical Kashkadarya Oasis should be developed. Such a model would allow researchers to reconstruct the spatial relationships between urban centres, settlements, water systems, agricultural territories, roads, and defensive structures.

Second, ancient hydraulic systems require systematic archaeological and hydrogeological investigation. Their chronology, technical characteristics, environmental impact, and relationship with settlement development remain insufficiently understood.

Third, cultural-heritage management should move beyond the isolated restoration of individual monuments and increasingly adopt a landscape-based approach. The conservation of Shakhriyabz in particular demonstrates the necessity of integrating architectural preservation with urban planning, archaeological research, environmental management, and protection of the historical setting. The continuing UNESCO process confirms the international importance of this challenge.

The interdisciplinary integration of archaeology, architectural history, hydraulic engineering, historical geography, geomorphology, digital mapping, and heritage studies offers the most promising framework for understanding the full historical significance of the Kashkadarya Oasis.

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From this perspective, Kashkadarya should not be regarded as a peripheral territory in relation to the better-known centres of Samarkand and Bukhara. Rather, it should be understood as an important regional centre that both developed its own architectural and engineering traditions and participated actively in the wider cultural and technological networks of Central Asia.

The concept of the urban-hydraulic landscape proposed here provides a framework through which this complex historical development can be studied as an interconnected process rather than as a series of isolated monuments.

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