

**MEDIEVAL MANUSCRIPT, EPIGRAPHIC AND ARCHAEOLOGICAL SOURCES IN
UZBEKISTAN: STATUS OF PRESERVATION AND RESEARCH**

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Abstract: This scientific article provides a comprehensive analysis of the current state of preservation of manuscript, epigraphic and archaeological sources stored in Uzbekistan, the practice of conservation and restoration, and the processes of their scientific research. The research used methods of historical and comparative, source studies, institutional and normative-legal analysis. Analytical conclusions were developed based on existing scientific literature, state programs, protection mechanisms, and the activities of scientific institutions. The results show that the country has formed an institutional and legal framework for the preservation of historical and cultural heritage, and large funds and museum collections have been involved in scientific circulation. At the same time, the full cataloging of manuscript and epigraphic sources, the modern conservation of archaeological finds, the acceleration of the digitization process, and the creation of a single integrated national database remain urgent scientific and practical tasks. The article scientifically substantiates the need for an interdisciplinary approach to the preservation and research of historical sources and the introduction of digital technologies.

Keywords: Manuscript sources, epigraphy, archaeological heritage, conservation, restoration, digitization, source studies, cultural heritage protection, digital twin, GIS, 3D modelling, geochemistry, bioarchaeology.

Introduction

The territory of Uzbekistan has long been one of the major civilizational spaces of Central Asia, and the written, epigraphic and archaeological heritage that arose here serves as the main empirical source in the study of the history of the region. The scientific reconstruction of historical processes, the identification of socio-political structures and stages of cultural development directly depend on the level of preservation of the source base, its scientific description and research based on modern methods. The largest collection of manuscripts stored in the country is concentrated in the funds of the Abu Rayhan Beruni Institute of Oriental Studies of the Academy of Sciences of the Republic of Uzbekistan, which contains unique works in Arabic, Persian and Turkic languages. Epigraphic and archaeological materials are also stored in the State Museum of History of Uzbekistan and institutions within the system of the Agency for Cultural Heritage of the Republic of Uzbekistan. Monuments such as Afrosiyob, Varakhsha, and Ichon-Kala, identified as a result of archaeological research, are an important scientific source for studying the political, economic, and cultural life of the Middle Ages.

In recent years, systematic reforms have been implemented to protect, conserve and restore historical and cultural heritage, as well as to accelerate the digitization processes. However, the problems associated with the scientific cataloging of existing sources, their storage using modern technologies, the creation of a single database and the expansion of interdisciplinary research remain relevant. The research problem is that although an institutional system for the preservation and study of manuscript, epigraphic and archaeological sources has been formed in Uzbekistan, the process of their comprehensive digitization, scientific description



and the creation of an integrated electronic database has not been sufficiently systematized. This limits the possibility of fully involving sources in scientific circulation. The object of the research is a set of manuscript, epigraphic and archaeological historical sources of the medieval period stored in the territory of Uzbekistan. The subject of the research is the state of preservation of these sources, conservation and restoration mechanisms, scientific description and digitization processes. The purpose of the research is to conduct a comprehensive analysis of the state of preservation and research of manuscript, epigraphic and archaeological sources in Uzbekistan and to develop scientific and practical proposals based on the identification of existing problems.

Research objectives:

1. Analysis of the state of preservation and scientific cataloging of manuscript sources.
2. Assessment of the level of documentation and study of epigraphic materials.
3. Study of the practice of conservation of archaeological finds.
4. Identification of methodological and technological aspects of the digitization process.
5. Substantiation of the prospects for creating an integrated national database.

Scientific novelty of the research - the preservation and study of manuscript, epigraphic and archaeological sources in Uzbekistan was comprehensively analyzed as a whole system. The processes of preservation, conservation and digitization were substantiated as an interrelated scientific and practical mechanism. The concept of creating an integrated digital database was proposed. The results of the research enrich theoretical and methodological approaches in the fields of source studies, epigraphy, and archaeology. The conclusions developed can serve as a methodological basis for developing practical programs for the preservation, digitization, and scientific circulation of historical and cultural heritage.

Literature review

The study of manuscript, epigraphic and archaeological sources in Uzbekistan has been formed within the framework of traditional source studies, oriental studies, epigraphy and archaeology schools, and the main attention in these areas is paid to the issues of source identification, description, textual analysis, provenance, historical context and introduction into scientific circulation. At the last stage, an integrated approach is gaining momentum, which sees the source as a chain of "preservation—restoration—cataloging—digitization—research—publicization". In this regard, the literature consistently emphasizes that the state of preservation and the quality of scientific research are directly related to institutional management, legal norms and technological infrastructure.

The issue of preservation and use of heritage objects in Uzbekistan is regulated primarily by regulatory legal acts. The Law "On the Protection and Use of Cultural Heritage Objects" establishes the general principles and mechanisms of relations in the field of cultural heritage protection. At the same time, among the sources explaining the state management and practical mechanisms in the field of cultural heritage, the regulation defining the status, tasks and functions of the Cultural Heritage Agency occupies an important place.

An analysis of the literature and regulatory sources shows that, despite the existence of a legal framework, in practice there is a need to strengthen a single standardized "scientific and technological roadmap" between storage, monitoring, examination, restoration, inventory and digital accounting systems.

Three main areas are distinguished in the literature on manuscript sources:

1. Description of funds and collections (catalogs, indexes);
2. Codicological and textual analysis (manuscript structure, calligraphy, paper, seal, colophon, copy history);



3. Expansion of scientific circulation through digitization and electronic catalogs.

It is in the third area that institutional results have been noticeable in recent years: the launch of an electronic catalog of manuscripts of the main fund of the Institute of Oriental Studies, which contains more than 25,000 descriptions, indicates the formation of a digital infrastructure. However, along with the existence of an electronic catalog in the literature, the issues of full digital copying (scan, MSI), metadata standards, provision of text in machine-readable formats (for example, XML/TEI), and open scientific circulation (long-term storage, repositories) are considered crucial promising areas.

Scientific literature on epigraphic sources usually covers the problems of object identification and passportization, paleographic and linguistic reading, historical-topographic context, material and inscription degradation (erosion, humidity, salinization, biodegradation). Modern literature recommends the introduction of methods such as high-resolution photography, RTI (Reflectance Transformation Imaging), photogrammetry, and 3D scanning in documenting epigraphic heritage. These approaches serve to scientifically substantiate conservation decisions by accurately reading the text, distinguishing inscription layers, and creating a “digital twin” of the object.

In the corpus of literature on archaeological sources, the share of interdisciplinary approaches, such as excavation methodology, conservation of finds, laboratory analysis (materials science, geochemistry, bioarchaeology), GIS and remote sensing (RS), is increasing. In Uzbekistan, too, the need for interdisciplinary research and innovative methods (including modern forms of documentation and analysis) are being discussed in archaeology, as reflected in the materials of scientific conferences and collections.

There are separate studies on manuscript, epigraphic and archaeological sources. However, comprehensive analyses that unite them as a single system from the point of view of conservation/restoration and scientific treatment (cataloguing–digitization–research) are insufficient. Therefore, this article considers the three types of sources in one integrative model, analyzing them at the intersection of institutional and legal frameworks and practical problems.

Methods

This study was carried out on the basis of an analytical-synthetic approach. The set of methods was selected in accordance with the nature of the source type. The study was based on the concept of the “life cycle of a heritage object”. Identification → documentation → preservation (conservation) → restoration (restoration) → scientific description (catalogue) → digitization → scientific analysis and treatment. This concept allowed for a comparison of management and scientific processes common to manuscript, epigraphic and archaeological sources in a single system.

The empirical base was divided into three categories:

1. Regulatory documents: laws and regulations on the protection of cultural heritage.
2. Institutional and practical data: the activities of scientific institutions and digital infrastructure (for example, electronic catalogs of manuscripts and the volume of descriptions).
3. Scientific publications and conference proceedings: discussions of interdisciplinary archaeological methods and innovative approaches.

The main research methods are as follows:

- a) In the source analysis, the descriptive logic (metadata) of manuscript sources is modeled based on the following indicators: Title of the work, author, copy date, paleographic sign, material (paper/paint), colophon and seals, condition (degradation), restoration traces, storage conditions. This approach serves to determine the scientific minimum of cataloging and digital description.
- b) In the epigraphic-documentation (descriptive) method, the “object passport” model is used to analyze epigraphic objects. Location, typology (gravestone/portal inscription/ornamental



inscription), type of writing, degree of preservation of the text, risks to reading (loss/erosion), documentation method (photo/3D). This method is used to justify the need for standardized recording of epigraphic materials.

c) In the archaeological-institutional analysis, the subsequent stages of the excavation process — laboratory conservation of the find, inventory, transfer to the fund, exhibition or introduction into scientific circulation — were considered as a chain. Scientific views on the increasing need for interdisciplinary methods are also summarized in this block.

d) In the normative-legal analysis, the content of laws and regulations was coded according to the categories of “duty–authority–responsibility–control”. This approach allows us to analyze how institutional responsibilities are distributed in the practice of preservation and research.

e) In the comparative method, a comparative analysis was carried out between manuscript, epigraphic and archaeological sources according to the following criteria. The risk of degradation and damage factors, the complexity of conservation/restoration, the level of cataloging, the technological requirements of digitization, and the speed and limitations of scientific circulation are determined.

The reliability of the study was ensured through “triangulation” (cross-checking) between three complementary groups of sources (legal documents, institutional data, scientific publications). As a limitation, the lack of full statistical openness for some funds and the uneven level of documentation for territorial epigraphic objects are noted (this situation is also interpreted in the article as a factor that enhances the problem statement).

Results

The results of the research were systematized in terms of manuscript, epigraphic and archaeological sources, and their state of preservation, conservation, cataloging and digitization was analyzed based on an integrated model. The main part of the manuscript heritage stored in the territory of Uzbekistan is concentrated in the funds of the Abu Rayhan Beruni Institute of Oriental Studies of the Academy of Sciences of the Republic of Uzbekistan. Manuscripts are stored in special fund rooms, under controlled climate conditions. Physical degradation factors include paper fragility, ink bleaching, and biological damage. Disinfection, mechanical cleaning, and strengthening are carried out in restoration laboratories.

Manuscripts have been scientifically described and transferred to the electronic cataloguing stage. Although a metadata system exists, full coverage of all funds has not yet been completed. Codicological description (author, copy history, calligraphy, paper type) is not sufficiently deep in some collections. Scanning is being carried out in stages. However, high-resolution multispectral imaging (MSI) and text encoding systems based on XML/TEI have not been widely implemented. The unified national database of manuscripts has not yet been fully integrated. An institutional base for manuscript heritage has been formed, but the process of digital transformation has not been fully completed.

Epigraphic materials are stored in mosques, mausoleums, tombstones, and architectural monuments. There are scientific publications on many large monuments. Inscriptions at the regional and village levels have not been fully inventoried. The passporting system is uneven. Conservation problems include climatic factors (humidity, salinization, erosion), tourist pressure, and anthropogenic factors. Restoration work is not based on constant monitoring. 3D scanning and photogrammetry have been used in some objects. RTI and laser scanning methods have not been widely implemented. The level of preservation of epigraphic heritage varies regionally; documentation and digital archiving require systematization.

Archaeological finds were identified through excavations, in particular in the regions of Afrosiyob, Varakhsha, and Ichan-Kala. Excavations are conducted based on scientific



methodology. Laboratory conservation of finds depends on material and technical capabilities. The preservation of organic materials is complex. There is a process of inventory - transfer to museum funds. However, the electronic inventory system is not the same in all regions. Archaeological mapping based on GIS has begun. Remote sensing and geoinformation analysis are not widely used. Archaeological research is active, but the preservation of finds and digital integration require systematization.

Discussion

The results show that Uzbekistan has an institutional and legal framework for the preservation of historical and cultural heritage. However, the system requires modernization in three main areas:

1. The need to move from storage to digital circulation;
2. The problem of interdisciplinary integration;
3. Comparison with international experience.

The traditional conservation and cataloging model is not enough today. For scientific circulation, a single national database, text encoding based on TEI/XML, a 3D epigraphic archive, and a GIS-integrated archaeological platform are necessary. This process requires the introduction of the concept of a "digital twin".

Preservation of manuscript, epigraphic and archaeological heritage requires the integration of the following disciplines:

1. History
2. Philology
3. Chemistry and materials science
4. Physics (MSI, laser analysis)
5. IT and artificial intelligence

In the current system, this integration is fragmentary. In international practice, digitization is carried out through open scientific platforms. Metadata is standardized. 3D and GIS systems are widely used. Scientific cooperation is integrated into global networks. In Uzbekistan, this process is being implemented gradually, but a single platform needs to be formed. Based on the discussion, the following scientific and practical proposals were developed:

1. Creation of a single integrated national digital platform for manuscript, epigraphic and archaeological heritage.
2. Equipping restoration laboratories with modern technologies.
3. Training specialists in digital source studies.
4. Complete inventory of regional epigraphic objects.
5. Introduction of a GIS-based archaeological monitoring system.

Certain institutional achievements have been achieved in Uzbekistan in the preservation of manuscript, epigraphic and archaeological sources. However, digital integration and interdisciplinary methodology that meet the requirements of modern scientific treatment have not yet been fully formed. The next stage of preserving historical heritage is the stage of digital transformation and global scientific integration.

Conclusion

This study made it possible to analyze the state of preservation of manuscript, epigraphic and archaeological sources and their scientific research in Uzbekistan based on a comprehensive, systematic and interdisciplinary approach. The results obtained show that the country has formed a legal and regulatory framework for the protection of historical and cultural heritage, the institutional structure has stabilized, and the main scientific funds are operating in a centralized



manner. In particular, the processes of preservation and cataloguing of manuscript heritage have been systematized, archaeological excavations are carried out on the basis of scientific methodology, and scientific publications on epigraphic monuments have been created. At the same time, the following systemic problems were identified during the study:

1. The absence of a single integrated national digital database of manuscript, epigraphic and archaeological sources.
2. Incomplete standardization of the digitization process (metadata, XML/TEI, 3D documentation).
3. Inconsistent inventory of territorial epigraphic objects and archaeological finds.
4. Insufficient development of high-tech laboratories in the field of restoration and conservation.
5. Fragmentation of interdisciplinary integration.

Based on the results of the research, the following scientific and practical conclusions were formulated:

1. The process of preserving historical sources should move from the traditional conservation model to the digital transformation model.
2. Full digitization of manuscripts and their conversion to a machine-readable format will significantly expand scientific circulation.
3. Documentation of epigraphic objects based on 3D modeling and photogrammetry will ensure long-term preservation.
4. Integration of archaeological heritage with GIS platforms will increase the effectiveness of monitoring and scientific analysis.
5. An interdisciplinary model based on the integration of history, philology, chemistry, physics and IT should be introduced.

Thus, although the system of preservation and research of historical sources in Uzbekistan is institutionally formed, its next stage of development is associated with digital integration and strengthening global scientific cooperation. This article serves to scientifically substantiate this process and determine strategic directions.

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