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**HISTORY AND ARCHITECTURAL FEATURES
OF THE DEVELOPMENT OF HYDROTECHNICAL
INSTITUTIONS IN UZBEKISTAN**

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Abstract. *This article comprehensively analyzes the stages of historical formation of hydraulic structures in Uzbekistan and their architectural features. The results of the study are of great importance in scientifically substantiating the issues of studying hydraulic architectural objects of the cistern type, their preservation and effective use in modern conditions. The limited availability of water resources in the arid and semi-arid climate of the region has historically had a significant impact on population settlement, economic activity and urbanization processes. Therefore, improving water management systems, developing irrigation infrastructure and constructing hydraulic structures is considered an urgent scientific and practical issue.*

Keywords: *Hydraulic structures, cistern, irrigation system, water resources, architecture, water management.*

Abstract. *This article analyzes the historical stages of development of hydraulic engineering structures in Uzbekistan and their architectural features. The research findings are important for the scientific substantiation of the study, preservation, and modern utilization of hydraulic architectural objects such as sardobas. The arid and semi-arid climate of the region and the scarcity of water resources have historically influenced settlement patterns, economic activities, and urbanization processes. Therefore, the development of water management systems, irrigation infrastructure, and hydraulic structures remains a crucial scientific and practical issue.*

Keywords: *hydraulic structures, sardoba, irrigation systems, water resources, architecture, water management.*

Introduction. The issue of rational use of water resources in the Central Asian region has long been considered one of the important factors of socio-economic development. In this region, where arid climatic conditions prevail, water has been a crucial resource not only for agriculture, but also for the development of urban planning, trade routes and social infrastructure. Therefore, complex irrigation systems,

reservoirs and hydraulic structures have been formed in the historical process.

Cisterns in particular are distinguished by their engineering and architectural solutions. They are of historical importance as multifunctional structures that serve to store water for a long time, reduce evaporation and protect it from the effects of the external environment. Their constructive solutions reflect physical laws, in particular heat

Main part. The territory of Uzbekistan is one of the regions with a high demand for water resources in terms of natural and climatic conditions. Therefore, the formation of irrigation systems and hydraulic structures dates back to ancient times. According to the results of archaeological research, the first irrigation systems appeared in the III-II millennia BC, which were mainly implemented through the use of natural water sources, the digging of artificial canals and the construction of water collection structures. In later periods, in particular, in antiquity and the early Middle Ages, irrigation systems were further improved, and complex hydraulic complexes were formed. Large canals, ditches and water distribution systems played an important role in the development of cities. This process indicates a systematic approach to water resource management. In the Middle Ages, the functional and constructive capabilities of hydraulic structures expanded significantly. Structures such as cisterns, culvert systems, and reservoirs played an important role in storing, transporting and distributing water. In particular, cisterns stabilized the internal microclimate through their domed covered structures and reduced water

evaporation. This indicates that they were built on the basis of high-level engineering solutions.

Koriz systems, on the other hand, allowed groundwater to be transported over long distances based on natural slopes. This system served to minimize water loss and ensure a stable water supply. By the 17th–19th centuries, irrigation systems had risen to the level of state management, and the system of water resource use had become more centralized. During this period, cisterns functioned not only as an economic, but also as an integral part of trade and transport infrastructure.

In general, the development of hydraulic structures on the territory of Uzbekistan reflects an evolutionary process from simple irrigation systems to complex engineering complexes. This process directly influenced the formation of engineering thought and the architectural school in the region.

Conclusion. The results of the study show that the formation and development of hydraulic structures in the territory of Uzbekistan was inextricably linked with natural and climatic conditions. The limited availability of water resources gave impetus to the development of irrigation systems and engineering structures. Hydraulic structures created in ancient and medieval times are not only of practical importance, but are also recognized as an important historical and cultural heritage. Today, a deep study of this experience serves as an important scientific basis for improving modern water management systems, ensuring environmental sustainability, and preserving historical heritage.

References

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