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Research Article

Identification and introduction of the underground water transfer system (Qanat) from the Shapur River to Genaveh Port in the Northern Bushehr Province

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Extended Abstract

Introduction

The qanat system is a significant engineering marvel for water transportation and management, particularly in arid regions. Historically, it facilitated the transfer of water from distant sources to agricultural lands and settlements. In ancient times, the construction of qanats was crucial for sustaining life in dry areas, especially in Iran, where most large qanats were developed in desert regions. However, little is known about the qanat construction methods and water transfer systems in coastal areas, particularly in Bushehr Province. This study aims to fill this knowledge gap by analyzing linear features through satellite imagery, aerial photographs, and field surveys to identify and introduce the Boukeh-Tol Borj qanat, which stretches approximately 63 kilometers. This qanat is believed to have transported water from the Shapur River near Ab Pakhsh to the northern and eastern regions of Bandar Genaveh. The average distance between well shafts is about 60-65 meters, and the direction of the qanat runs from southeast to northwest. The existence of such a large and costly qanat indicates advanced engineering capabilities and the importance of water supply for distant settlements and extensive agricultural activities in the Persian Gulf region.

Materials and Method

The study area encompasses the ancient water transfer system, the Boukeh-Tol Borj qanat, located in the coastal plains of Busahehr Province. The qanat extends from southeast to northwest, originating near the Shapur River in Dastan County. Satellite imagery from Google Earth was utilized to conduct a geological and hydrological analysis over an area of approximately 1521 square kilometers. The identification of human-made linear structures was achieved by analyzing the classic qanat architecture and comparing it with satellite imagery. Field surveys were conducted to validate the identified structures using GPS, and hydrogeological maps were generated based on hydrological and geological data to assess the position of rivers, groundwater conditions, and the quality of water sources.

Results and Discussion

The results of the study indicate that the Boukeh-Tol Borj qanat is an extensive and ancient water management system. The geomorphological features of the region, characterized by sedimentary deposits and a relatively flat terrain, facilitated the construction of this qanat. Groundwater quality varied

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significantly along the qanat's route, with high salinity levels observed in central areas, indicating that the water source must have been of high quality, likely derived from the Shapur River. The identification of well shafts, evidenced by distinct vegetation patterns and soil moisture retention, supports the existence of this qanat. The structure of the qanat, featuring a unique four-well system, distinguishes it from other qanats in Iran, suggesting advanced construction techniques adapted to the local environmental conditions.

Conclusion

The Boukeh-Tol Borj qanat represents a significant achievement in ancient water engineering, showcasing the ability of past civilizations to manage water resources effectively in challenging environments. The study highlights the importance of this qanat in facilitating agricultural activities and sustaining settlements in the region. The findings contribute to a better understanding of ancient water management systems in Iran, particularly in coastal areas where such structures have been less documented. Future archaeological excavations and studies may further uncover the complexities of this qanat and its role in the historical context of the Persian Gulf region. The identification of this qanat not only emphasizes the ingenuity of ancient engineering practices but also underscores the necessity of preserving such heritage for future generations.

Keywords: Qanat, River, Satellite images, Genaveh port, Bushehr province