

Revisiting Kundi Bhandara: Understanding the Ancient Water Management Systems from the Mughal Period - Case of Burhanpur City, Madhya Pradesh

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Abstract

Since ancient times, managing water has been significant in human civilization. Sophistic water management systems were built in India's Mughal era, which is remembered for its architectural wonders. The Mughal period in India saw substantial developments in water management systems such as wells, canals, and baths. The Kundi Bhandara subterranean water management system in Burhanpur, Madhya Pradesh, is a lesser-known but significant example of their engineering. This research focuses on understanding the historic Mughal water management system and its unique application of the qanat system. The research highlights the sustainable characteristics of this ancient water delivery practice. This study focuses on the case of Burhanpur City in Madhya Pradesh in order to present a thorough understanding of the ancient water management systems from the Mughal era.

This paper investigates the methods and approaches used by the Mughals to manage water resources in Burhanpur by looking at historical documents, and archaeological discoveries, and analyzing the current water structures. The information sheds light on the historical significance of water management in the area and advances our understanding of the city's sustainable water practices.

Keywords: Sustainable water practices, Qanat system, Kundi Bhandara, Cultural Heritage

1. Introduction

The Mughal era brought significant advances in water management due to the need to efficiently utilize scarce water resources in arid and semi-arid regions. The qanat system, which originated in Persia, played a crucial role in the use of groundwater. This article focuses on the ancient water management system of Kundi Bhandara in Burhanpur, Madhya Pradesh, to decipher the sustainable groundwater practices of the Mughal period. The Mughal Empire in India (1526-1857) was characterized by the construction of magnificent monuments and cities. Alongside these architectural marvels, the Mughals developed sophisticated water management systems to address the challenges of water scarcity, storage, and distribution.

Burhanpur, located in present-day Madhya Pradesh, emerged as a prominent center during the Mughal period, known for its rich cultural heritage and advanced water management infrastructure. This research paper aims to explore the ancient water management systems of Burhanpur, providing insights into their engineering techniques, sustainability practices, and historical significance. Various water

management systems were developed during the Mughal period, such as wells, canals and baths. However, one exceptional system, Kundi Bhandara, stands out for its sophisticated and ingenious construction technique. This seventeenth-century underground water supply system is a testament to the engineering skills of the Mughals and a glorious relic of their rule in Burhanpur, Madhya Pradesh.

2. Methodology

The study adopts a multidimensional approach to understand the ancient water management system in Burhanpur. Primary data collection includes a site visit, including exploration of the underground tunnel, interviews with local people, and observations. Secondary data will be collected through literature study, analysis of articles, and examination of relevant historical texts. The integration of these approaches allows for a comprehensive understanding of the water management systems in Burhanpur. The collected data will be analyzed and presented through narrative descriptions, photographs, and drawings.

3. Historic Background of Burhanpur

Burhanpur was an important city under the Rastrakuta Dynasty from 753-982 CE. Burhanpur town, was then discovered in 1388 AD by the Faruki ruler, Nasir Khan on the northern banks of the Tapti river, and renamed it after the well-known sufi saint, Burhan-ud-Din. Burhanpur enjoyed two hundred years of grandeur and glory as the capital of Faruqi sultans. After the Faruqis, some of the Mughal emperors chose to stay there for some time. If it witnessed the marriage procession of Prince Shah Jahan, it also witnessed the funeral procession of Begum Mumtaz Mahal, Prince Daniyal and Prince Khusrau. This is the city where Abdur Rahim Khan-i-Khanan composed some of his most outstanding poems as Rahim. During the Mughal period, many countries of Europe were ruled by the cotton, silk and zari cloth of Burhanpur, attracting many foreign travellers to visit Burhanpur. With the decay of the Mughal Empire Burhanpur gradually lost its glitter.

Although Burhanpur is designated as one of the heritage cities of the UNESCO—Indian Heritage Cities Network (since 2006) with the endorsement of the Ministry of Urban Development, Government of India, the importance of qanat as a sustainable water management system is greatly underrated. The role of the "Qanat" water management system and its importance in the sustainable restoration of the Burhanpur landscape is underlined in certain research articles.

4. Understanding Qanat System

Qanat is said to have originated in Iran. With an average annual rainfall of 250 mm, it is divided among broad expanses in the east and centre with less than 100 mm yearly rainfall and tiny sections in the west and north, with annual rainfall of up to 1,400 mm (Motiee et al. 2006). In such cases, making optimal use of underground water supplies became critical. In this respect, about 800 BC, Persians developed groundwater extraction technology in the form of man-made underground water conduits known as Kanehat (today called Kariz or Qanat) (Goblot 1979; Behnia 1988). This technique was then expanded to other Middle Eastern nations, as well as China, India, Japan, North Africa, Spain, and Latin America (Abdin 2006; ICQHS 2015).

5. Kundi Bhandara of Burhanpur

Kundi Bhandara is built on the concept of Qanat system developed in Persia. The Mughal pleasure in developing various water systems such as fountains, canals, baths is well known. But Burhanpur boasts

of what may be one of their most elaborate unique systems for transporting water, demonstrating an unparalleled constructional technique. Even today, these remain glorious relics of Mughal engineering, ingenuity and skill. Kundi Bhandara is one such type of a unique underground water management system developed by the Mughals in the seventeenth century in Burhanpur, Madhya Pradesh. My main aim for selecting this structure for narration is to understand this unique ancient water management system from Mughal period and how it can be useful in today’s context.

The Mughals developed Burhanpur extensively during their reign, as the basis for their expansion in South India. The region was endowed with ample water resources by nature. The city is located on the banks of the Tapti and Utavali rivers, and receives an average annual rainfall of about 880 mm. How to use the available resources efficiently to meet the needs of 2,00,000 Army members and 35,000 civilians have emerged, as a matter of grave concern for the Mughal subedar, Abdul Raheem Khankhana.

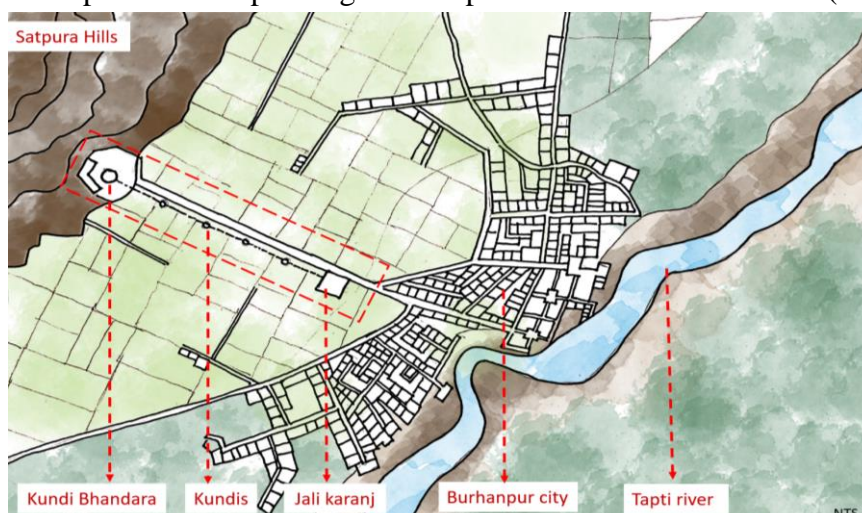
Khankhana came up with the concept of building an underground water system to prevent the enemy from poisoning the drinking water as a precautionary measure. The Persian geologist Tabkutul Arj brought his ideas to life. He built khundi bhandara in 1615, consisting of 103 kundis (Well like storage structures) built in a line and linked by an underground tunnel of 3.9 km long. According to various research studied, the quality of water matches that of mineral water.

6. Working of Kundi Bhandara

Kundi Bhandara an ancient water management system in Burhanpur showcases a brilliant thought process of the rulers from ancient history. The entire structure was designed in a way that could ensure flawless water supply through underground water channels to the city. Even today you can witness the underground tunnel, which is still collecting the flow of rainwater from the Satpura hills towards Tapti River and storing it at kundi Bhandara.

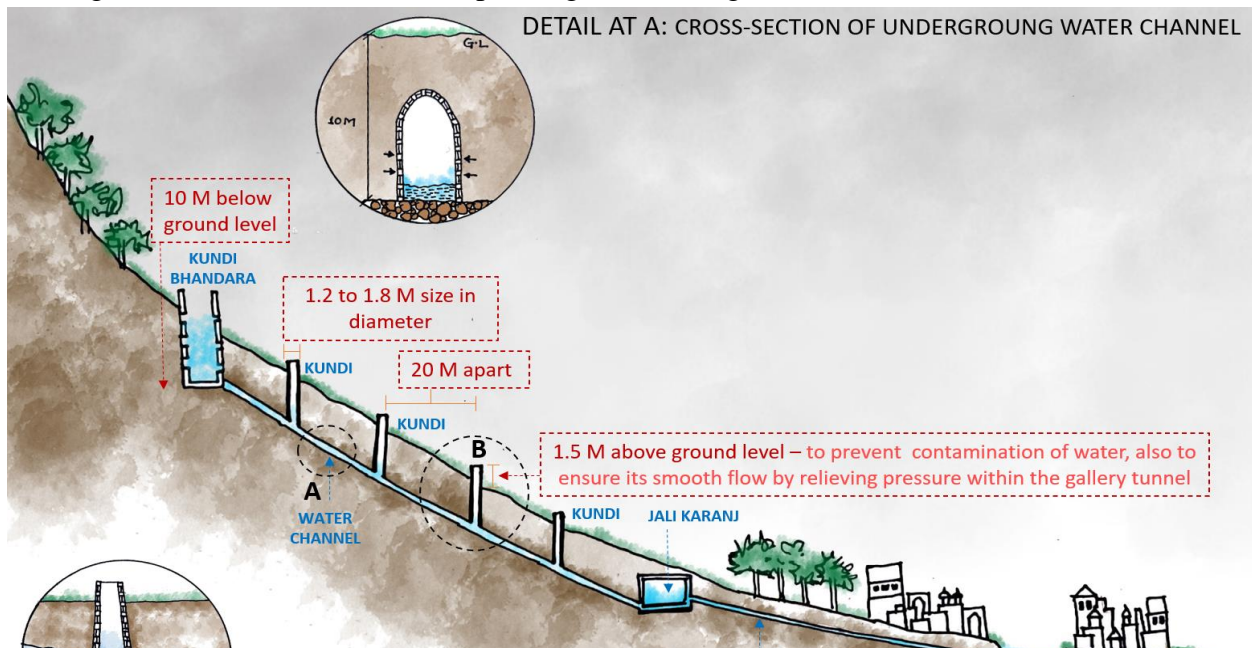
This unique water transportation system was also mentioned in some of the books written on Burhanpur, which was once called as the medieval gateway to the Deccan. The underground water channel of Kundi Bhandara is located 10 meters underground and is a dome-shaped circular structure. It consists of one-meter-wide brick walls to prevent landslides and uses natural percolation of rocks and holes in the walls for water supply. The system also includes kundies, circular air shafts/wells built at short intervals to provide ventilation and visibility of the water flowing below. Water from the Bhandara is piped through an underground channel to a collection chamber called Jali Karanj, which then supplies water to the city.

Figure 1: Conceptual Plan explaining the components of Kundi Bhandara (Source: Self)



The aforementioned image illustrates the distinct and pivotal components employed in the functioning of the kundi bhandara. It predominantly encompasses a diverse array of kundis, an underground water channel, jali karanj (for water storage), bamba (terracotta pipes), and hauz (small water storage tanks) strategically distributed throughout different regions of the city.

Figure 2: Sectional Elevation explaining the working of Kundi Bhandara (Source: Self)



The operational mechanism of the kundi bhandara can be delineated as follows:

UNDERGROUND WATER CHANNEL:

The aforementioned image illustrates the distinct and pivotal components employed in the functioning of the kundi bhandara. It predominantly encompasses a diverse array of kundis, an underground water channel, jali karanj (for water storage), bamba (terracotta pipes), and hauz (small water storage tanks) strategically distributed throughout different regions of the city.

An underground, domed circular channel situated approximately 10 meters below ground level serves as the primary conduit for water flow. The tunnels that accommodate the water measure around 80 centimeters in width and offer sufficient height for an average person to traverse comfortably. To mitigate the risk of natural rock landslides, a one-meter-wide brick wall constructed with lime and mud acts as a protective barrier. The Bhandara receives its water supply from both the water percolating through the rocks and the apertures intentionally created in the aforementioned one-meter-wide wall.

Figure 3, 4 & 5: Underground water channel of Kundi Bhandara, Burhanpur, Madhya Pradesh



KUNDI:

To facilitate proper ventilation for the water coursing through the underground tunnels, open wells called Kundi are constructed at regular intervals. These air shafts or wells, standing approximately 1.5 meters above the ground, afford a view of the flowing water when observed from their tops. These Kundis, typically circular in shape with a radius ranging from 1.2 to 1.8 meters, are spaced every 20 meters. Furthermore, the Kundis are positioned 1.5 meters above ground level to prevent water contamination and ensure smooth water flow by alleviating pressure within the gallery tunnel. Kundis, located in suburbs, are use as wells to draw potable water from the subterranean stream, that still maintain water depth of 70 cm even in summer.

Figure 6, 7 and 8: Series of Air Shafts - Kundis, visible above ground level, Burhanpur, Madhya Pradesh



Figure 9 & 10 : Internal view of Air Shafts- Kundis, from underground water channel



JALI KARANJA:

The water sourced from the Bhandara is conveyed through a subterranean channel, linking interconnected wells, towards a central collection chamber known as Jali Karanj. From there, the water is further distributed to the town. During the Mughal era, the water from Jali Karanj was transported to the town of Burhanpur via terracotta pipes.

7. Conclusion

Today, most historic water systems are not functioning as originally intended. While the need for clean potable water became pre-eminent, the truth is that as a heritage structure, Kundi Bhandara had the capacity to attract Professionals, Researchers, Students and Tourist.

This heritage water management systems with ancient planning and design concept, which are vital for the creation of historic Burhanpur, is slowly degenerating.

These water management systems today are not only no longer acknowledged and appreciated but also facing the absence of proper management and the presence of vandalism, encroachment and over-intensive use. There is an urge for restoring these architectural marvels for reviving sustainability. The Mughal water management systems in Burhanpur were not only functional but also showcased sustainable practices. The study concludes that understanding and reviving ancient water management systems like Kundi Bhandara offer immense potential for modern sustainable water management practices. By reviving the ingenuity of the Mughal era, we can protect this great human heritage and use it as a sustainable solution to address water problems in today's drylands.

8. References

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