

# Ancient Water Management Planning, Tradition and Techniques of India: An Overview

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## Abstract

India has an ancient tradition of water management system from more than 5000 years and over centuries. The testament to the collection of monsoon rainwater through reservoirs and wells can be seen in the Indus Valley civilization (3000-1500 BC). Mohenjodaro, the largest city belonging to Harappa culture had over open wells. The people of India possessed remarkable skills in the construction of dams, lakes, and tanks since old age. Their knowledge and expertise in water conservation systems enabling them to conceive and implement more improved structures to effectively captured, held, and stored the precious monsoon rainwater. These systems were carefully designed to ensure a sustainable water supply during the dry seasons that followed. As the long sustainability, simplicity to built and use, more eco friendly and less explosiveness, some ancient structure of water management are functioning even today. Since last 70 years, construction of deep tube wells or bore wells, water abstraction devices and pumping methods have made large scale exploitation of ground water to fulfil the water demand. The major source of water supply, ground water is depleting and cause water scarcity. This study aims to explore the ancient water management planning, tradition and techniques to review, conserve, revive and expand this old wisdom for the benefit of all.

**Keywords:** Water management, Water Scarcity, Water conservation, Natural Resource, Population Growth.

## INTRODUCTION

Water is one of the most valuable natural resource in the world for life. However, the growing demands of various sectors, driven by population growth, have placed significant strain on water availability. Currently, groundwater serves as a primary source of water supply. Due to large scale exploitation, ground water is depleting fast in many area. The rapid lowering of groundwater levels has opened doors for the intrusion of seawater into aquifers, rendering water from wells and hand pumps unsuitable for human consumption. Rapid urbanisation, Industrialisations and increased used of fertilizers and pesticides in agriculture affected the ground water quality. The untreated effluents being discharged into water body the ground water quality is declining alarmingly. The chance of water shortage is now more than ever it is in many areas.

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Received Date: April 01, 2024

Accepted Date: May 28, 2024

Published Date: June 06, 2024

**Citation:** Prakash Chandra Tamrakar. Ancient Water Management Planning, Tradition and Techniques of India: An Overview. International Journal of Architectural Heritage. 2024; 7(1): 59–63p.

Water management systems have been utilized for thousands of years, with continuous development and emergence of new techniques over time. Water management can be taken on three respects as Rain Water Harvesting (RWH), Waste Water Recycling (WWR) and harvesting of non conventional water resource. RWH stands out as one of a highly efficient approach to water management and conservation. It is a simple and cost effective process of collecting or storing rainwater by using scientific techniques. Rainwater collected directly can be stored for immediate utilization or recharge into groundwater reserves (Dagwal et al.,2016) [4].

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## ANCIENT WATER MANAGEMENT TRADITION AND TECHNIQUES

The practices of RWH systems can be traced throughout the history of various civilizations in India. Water has been harvested since pre-historic times using traditional methods. The designs of traditional RWH structures exhibited variations across states and regions in India, influenced by the specific monsoon pattern of each area. (Ummani and Mansi, 2013) [7]. India has an age old tradition of water management system from more than 5000 years and over centuries.

### Reservoirs & Wells (3000-1500 BC)

The Indus Valley civilization, known for its advanced water management system, developed an efficient water supply and drainage network despite the region's hot and arid climate with low rainfall. This system, considered one of the most well-developed in the world, contributed to the civilization's water sufficiency for its residents. The Indus Valley civilization is recognized as an urban settlement due to these remarkable advancements (Murthy et al, 2022) [5].

Evidence dating back to 3000 B.C. reveals the presence of reservoirs to collect monsoon runoff, with approximately every third house having a well (Bansod, 2005) [2]. Notably, sites such as Dholavira, Mohenjo-daro, and Harappa featured reservoirs for rainwater collection. Additionally, in regions like Lothal (Gujarat), Inamgaon (Maharashtra), and other parts of northern and western India, local communities constructed small bunds to store rainwater for drinking and irrigation purposes (Bansod, 2005; [2] Murthy et al., 2022; [5] Virtual Academy of Ancient Knowledge systems).

Mohenjodaro, the largest city belonging to Harappa culture had over 700 open wells (Chandel and Sharma, 2014) [3]. Rainwater was collected directly in open wells (Ummani and Mansi, 2013) [7].

### Dam Lakes (392-297 BC)

According to archaeological and historical records, during the reign of Shetty ST, Dhumale S, Shetty A, Tola SY (2024) [8] Indians demonstrated remarkable expertise in the construction of dams, lakes, and irrigation systems (Ummani and Mansi, 2013) [7].

The Buddhist site of Sanchi in Madhya Pradesh, dating back to the 3<sup>rd</sup> century BC, features three ancient tanks specially designed to collect rainwater from the surrounding hill slopes.

### Dam (200AD)

In south Asia, the first dam being constructed by King Karikala Chola, as early as 2<sup>nd</sup> century A.D. and it is functioning even today.

### Tanks (Tataka) (700 AD)

During the same period, the renowned Cauvery anicut was constructed, while in Tamil Nadu, extensive construction of tanks (known as Tataka) was undertaken to harness rainwater.

### Artificial Lake (1100AD)

During the 11th century A.D., King Bhoja of Bhopal oversaw the construction of India's largest artificial lake, which spanned an expansive area of over 65,000 hectares. This remarkable feat was achieved by channelling the waters from 365 streams and springs to feed the colossal lake (Ummani and Mansi, 2013) [7].

Eri, the traditional RWH system of south India were designed and developed 1000-1500 year ago. *Eris* have played several important role in maintaining ecological harmony as food control as food control system, preventing soil erosion and wastage of runoff during period of heavy runoff and

recharging ground water in the surrounding areas (Bhalge and Bhavsar, 2007) [1]. The Veeranam tank with 16 km. length of bund was built in 1011 A.D. (Bansod, 2005) [2].

#### **Talab with Paithu and Dabri (1400 AD)**

As far as the city of the Raipur (Chhattisgarh), in 14 th century (Kalchuri period) there were 300 water bodies (Ponds) locally called Talab developed. These water bodies were connected by storm water channels locally called Paithu and Dabri. Initially Raipur had 154 natural and manmade talabs. Therefore, despite a history of heavy rainfall of more than 1200 mm. during the monsoon period of 4-5 months per year, the city never had any problem with water logging and flooding ([www. amazon. In / Natural – Treatment – Systems - Sustainable- Context/ dp/ 1780407106](http://www.amazon.in/Natural-Treatment-Systems-Sustainable-Context/dp/1780407106)).

#### **Jhalara (1660 AD)**

Indians persisted in constructing structures to capture, retain, and store monsoon rainwater for the subsequent dry seasons. Talab, Jhalaras, Pynes, Khadin, Taank, Bawri, Baoli, Kund Zing, Zabo etc. are some Indian water conservation systems. Jhalaras were constructed with the purpose of ensuring a continuous and convenient water supply for religious rituals, royal ceremonies, and communal needs. In the city of Jodhpur, there are eight jhalaras, with the oldest among them being the Mahamandir Jhalara, which dates back to 1660 AD ([http://www.The better India.com](http://www.ThebetterIndia.com)). Due to its proximity to the Thar Desert, the city of Jodhpur historically implemented a system to acquire water through its lakes and stepwells. However, in 1897-98, this system was replaced by a public piped water supply distribution network throughout the city ([http://www.cseindia.org /userfiles/ Urban%20Rainwater %20harvesting %20 report. pdf](http://www.cseindia.org/userfiles/Urban%20Rainwater%20harvesting%20report.pdf)).

#### **Intricate System of RWH (1860 AD)**

Bangalore has always been heavily dependent on lakes and tanks as there are not any river source nearby. As early as the 1860s, Bangalore had established a sophisticated rainwater harvesting system. The then Commissioner of Bangalore, Sir Lewing Bentham Bowring, had in 1866 laid storm water drains to divert the rainwater to outlying tanks, and very little rainwater was allowed to go waste in this process (Ummani and Mansi, 2013) [7].

#### **Modern Water Supply System (1870)**

In India, the credit of getting the first modern water supply system goes to Calcutta (Kolkata) municipal authorities. The system was installed in 1870 (Angelakis AN, Asano T, Bahri A, 2018) [9]. In recent times, people have become reliant on the government's centralized water supply system to fulfil their various needs. This shift in water management and distribution in urban areas has resulted in a significant gap in community responsibility. Consequently, the traditional water harvesting systems that once thrived have gradually diminished, as the government-led approach has taken precedence (<https://infinitylearn.com/surge/study-materials/english/essay/rain-water-harvesting-essay/>)

Construction of deep tube wells or bore wells, water abstraction devices and pumping methods have made large scale exploitation of groundwater. The groundwater level is steadily declining due to the decreasing percolation of rainwater into the ground. It is affecting the ground water table harmfully. It can cause groundwater poisoning in some places.

### **FUNCTIONING ANCIENT WATER MANAGEMENT STRUCTURES**

In certain regions of India, traditional and ancient methods of rainwater harvesting continue to be practiced. These time-tested techniques, which have demonstrated success in the past, are still employed in both rural and urban areas of the country. Some significant traditional methods of rainwater harvesting, using still in India described ahead.

#### **Madakas**

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This traditional rainwater harvesting method is practiced in the tropical belt of the southern states of Karnataka and Kerala. (Weerahewa J, Timsina J, Wickramasinghe C 2023) These regions are characterized by abundant laterite soil, which naturally forms depressions with three high sides. These elevated sides serve as catchment areas, collecting rainwater into the depressions. To retain the runoff, a small dam is constructed at the lower end of the depression (<https://infinitylearn.com/surge/study-materials/english/essay/rain-water-harvesting-essay/>)

### **Taankas**

Taankas form an integral part of the traditional rainwater harvesting method prevalent in the western state of Gujarat. These underground reservoirs have the capacity to store thousands of liters of rainwater. In the capital city of Ahmedabad alone, approximately ten thousand households rely on taankas to fulfil their daily water needs. The water stored in a taanka is effectively shielded from sunlight, ensuring its freshness for extended periods (<https://infinitylearn.com/surge/study-materials/english/essay/rain-water-harvesting-essay/>)

### **REVIVAL OF ANCIENT STRUCTURE JAHAD**

Jahad are small earthen check dam to capture and conserve rain water. It also improved percolation and groundwater recharge. Over a span of sixteen years, beginning in 1984, the rejuvenation of approximately 3000 Johads (small earthen dams) in Alwar district, Rajasthan, had remarkable outcomes. These Johads were spread across more than 650 villages. The concerted efforts led to a significant rise of groundwater level by 6 meters, an impressive 33 percent increase in forest cover in the region, and the transformation of five rivers into perennial water sources. The rivers dry immediately following monsoon, before revival of the Jahad (<https://www.cseindia.org/traditional-water-harvesting-systems-683>) [8].

### **CONCLUSION**

In general the approach of managing water availability through different schemes comes with its own [providing it in better desired quality and quantity within easy reach of the people. Traditional water management planning are also more satisfying option in terms of sustainability as they last longer, simple to built and use, less exploitative. The wisdom of water management at all levels of society ensured sufficient availability of quality water for everyone, serving as the foundation for comprehensive development and prosperity. As per above study, it is considerable to use this old age tradition and technique for water management by review, conserve, revitalize, expand and improve by latest technology for the benefit of all.

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