

Heritage management of Stepwells in Maharashtra

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Abstract

Stepwells, known for their intricate architectural designs, were an essential part of India's ancient water management system. These structures not only served as water reservoirs but also held cultural and religious significance, often built near temples for ritual purification. Designed with stepped access, they ensured water availability even during droughts. Despite their historical and functional value, many stepwells in Maharashtra have deteriorated due to neglect, urbanization, encroachment, and pollution, with some being reduced to dumping grounds.

This study explores the Heritage management plan for conservation of stepwells as a sustainable approach to water management and heritage preservation. By restoring these structures, Maharashtra can address water scarcity while also boosting heritage tourism, as seen in successful restoration projects like Rani ki Vav in Gujarat and stepwells in Rajasthan. The research highlights the architectural, cultural, and hydrological significance of stepwells, advocating for their integration into modern urban landscapes as functional water sources, public spaces, and tourist attractions. A multidisciplinary approach involving archaeology, urban planning, and hydrology is essential for their long-term sustainability. Reviving stepwells can offer a climate-resilient solution for water conservation while safeguarding these historical landmarks for future generations.

Keywords— Stepwells, Conservation, Heritage Management, Sustainability, Tourism

I. Introduction

Stepwells, or 'Vavs' and 'Baolis', are architectural marvels integral to India's heritage, especially in arid regions. A subterranean water-related monument that comprises of a water well and a stairway that descends from ground level to the underlying water aquifer is referred to as a "stepwell." Their purpose was to gather precipitation during India's intense monsoon season and provide access to water throughout the dry season.

This was particularly important in the arid regions of Gujarat and Rajasthan, where water was found hundreds of meters below the surface. The stepwells are an astonishing tradition that began in India in the third millennium BC and continued unbroken for centuries, reaching its zenith in the eleventh and twelfth centuries, coinciding with the height of traditional Indian architecture. In Maharashtra, stepwells not only served as vital water sources but also functioned as social and cultural gathering spaces. Unlike the grand and intricately carved stepwells of Gujarat and Rajasthan, those in Maharashtra are relatively smaller and exhibit a simpler architectural style. Primarily constructed near temples, these structures were often used for ritual cleansing before temple entry. Additionally, some stepwells were built to provide water in arid regions, ensuring accessibility for local communities. This research paper explores abandoned stepwells in Maharashtra, identifying their historical, architectural, and hydrological significance. It aims to locate these stepwells, assess their current condition, and develop a comprehensive management plan for their conservation. By restoring these structures, the study seeks to address water-related challenges while also preserving cultural heritage and supporting community needs.

II. Aim And Objectives

A. Aim Evaluate the historical and architectural significance of stepwells in Maharashtra and propose heritage management strategies that ensure their conservation, integration into modern water systems, and promotion through sustainable tourism.

B. Objectives

- 1. To examine the historical, architectural, and cultural significance of stepwells in Maharashtra and categorize them based on size, design, usage, and regional characteristics.
- 2. To conduct condition assessments to identify conservation challenges.
- 3. To develop a comprehensive conservation plan with restoration techniques, budgets, timelines, and a sustainable, community-driven project management model for their preservation.

III. Scope And Limitation

A. Scope:

The study focuses on identifying and analyzing stepwells in Maharashtra to develop a conservation plan that preserves their historical, architectural, and cultural significance while addressing water management and heritage conservation needs.

B. Limitation:

The research is limited to formulating a generalized management plan for the conservation of stepwells in Maharashtra, without considering variations in shape, size, specific usage, or current structural condition. General site-specific restoration strategies will not be addressed.

IV. Research Methodology

The paper abridges the characteristic features of stepwells by taking typical examples of stepwells, according to geographic regions in terms of its dimensions, depth, function, the material used for construction and the period of construction of the stepwell. It also proposes potential uses of these stepwells to enhance economic, social and environmental gain in those regions. A SWOT analysis (strengths, weaknesses as well as external opportunities and threats) of the proposed methods for their revival is also conducted to evaluate their suitability in the given contexts. The research methodology for this study will begin with a thorough review of relevant literature to understand the historical, architectural, and cultural significance of stepwells in Maharashtra. This will be followed by the selection of a representative stepwell for a case study, where a detailed on-site survey will be conducted to assess its current structural condition and identify any visible damage or threats to its integrity. Interviews and consultations with local communities, historians, and conservation experts will provide insights into the cultural value of the stepwell and the potential for its restoration. The next step will involve a condition assessment to analyze the structural and environmental risks associated with the conservation project. Based on the findings, a conservation plan will be proposed, outlining necessary restoration actions, estimated budgets, and timelines. The plan will aim to balance the preservation of the stepwell's cultural and historical significance with the practical aspects of structural stability and community involvement.

V. Literature Review

A. Title: Stepwells: Reviving India's Cultural and Traditional Water Storage Systems Authors: Meenakshi Piplani & Tarun Kumar

Published: March 2019 The research focuses on stepwells in Hampi, Karnataka, and their role in water conservation and cultural heritage. The study identifies neglect and pollution as major challenges in their preservation. The authors propose revival strategies, such as integrating stepwells into urban landscapes as parks, marketplaces, and tourist attractions, to generate revenue for maintenance while addressing water scarcity. Stepwells have long served as sustainable water conservation systems and cultural landmarks, yet many face challenges such as neglect, pollution, high restoration costs, and safety issues related to stagnant water. Historically crucial for water storage in arid regions, these structures have declined due to modernization and urban neglect. However, their restoration offers promising opportunities to enhance tourism, urban beautification, and sustainable water management with support from government and NGOs. The study highlights that stepwells not only functioned as essential water sources but also as vibrant social and cultural spaces. By proposing adaptive reuse strategies—transforming stepwells into public spaces and tourist attractions—the research underscores that integrating these heritage sites into modern urban planning can address water scarcity while preserving India's architectural legacy. Collaborative efforts among government bodies, NGOs, and communities are essential to secure their long-term sustainability.

B. Title: Stepwells as Heritage Sites: Exploring Their Roles for Sustainable Communities

Author: Kirti Nishant Nikam Published in: *Ancient Asia*, Vol. 15, 2024 The paper highlights the historical, cultural, and architectural significance of stepwells in India, particularly in the Nagpur district. It emphasizes their dual role in water conservation and heritage preservation, showing how stepwells were integral to both sustainable water management and social-religious traditions. The study on stepwells in Nagpur highlights their historical, architectural, and hydrological significance as vital water conservation systems and cultural landmarks. However, these structures face challenges such as neglect, urban encroachment, lack of awareness, and structural degradation. The research documents various stepwells by analyzing their history, design, and materials, and emphasizes their critical role in water management and cultural practices through field studies and expert evaluations. Key findings reveal that these stepwells boast unique architectural features like intricate carvings, pavilion-based designs, and strategic orientations for optimal water retention, which historically supported groundwater recharge and ritualistic practices. Yet, urbanization and neglect .

pose serious threats to their preservation. The study concludes that conserving stepwells in Nagpur can enhance water sustainability and preserve architectural heritage, while also promoting tourism and community engagement through adaptive reuse. Immediate conservation measures, including restoration, public awareness, and policy support, are essential for ensuring the long-term sustainability of these invaluable heritage assets

C. Title: A Comprehensive Review of the Potential of Stepwells as Sustainable Water Management Structures

Authors: Thirumalini Selvaraj, Prathiba Devadas, Jayashree Lakshmi Perumal, Anastasia Zabaniotou, Mahesh Ganesapillai Published in: *Water* (MDPI), 2022 This review explores the historical, scientific, and architectural significance of stepwells as sustainable water management structures. Stepwells were advanced hydraulic systems used in India for centuries, providing water security in arid and semi-arid regions. The study highlights their integration with traditional irrigation systems, cultural heritage, and sustainable urban planning.

Stepwells have been integral to India's water conservation tradition since the Indus Valley Civilization (3000 BCE), reflecting indigenous expertise tailored to local climatic and hydrological conditions. Comparable to ancient systems like Mesopotamian qanats, Persian channels, Roman aqueducts, and Egyptian reservoirs, these structures were designed to store and conserve water efficiently. Architecturally, stepwells feature multi-tiered staircases, deep reservoirs, and intricate carvings, constructed from durable materials such as sandstone, brick, and lime mortar, and showcase innovative techniques that minimized water evaporation and ensured resilience. Beyond their utilitarian function, stepwells served as vibrant community hubs for social gatherings, religious rituals, and cultural events, with notable examples including Rani ki Vav, Adalaj, Agrasen ki Baoli, and Chand Baori. In modern contexts, stepwells offer significant potential for groundwater recharge, rainwater harvesting, and urban revitalization through adaptive reuse as public spaces or eco-tourism attractions, supported by contemporary tools like GIS mapping. However, challenges such as urban encroachment, pollution, structural neglect, and weak policy frameworks threaten their preservation. Revitalizing these heritage structures requires a multidisciplinary approach that integrates archaeology, hydrology, and sustainable urban development to secure their long-term legacy and functional relevance.

D. 04. Title: Elements of spacemaking

Author: Yatin Pandya Pandya emphasizes that stairs are not merely functional elements but serve as a confluence of horizontal and vertical movement. They act as connectors, gathering spaces, and aesthetic components. This aligns with the design of stepwells, where staircases play a crucial role in guiding users through different levels, creating a rhythmic spatial experience. In *Elements of Spacemaking*, Pandya highlights how the visual and spatial impact of steps significantly contributes to the aesthetic composition of temple precincts. He illustrates that stepwells and kunds enhance architectural grandeur and symmetry through their geometric arrangements, drawing on notable examples such as the Sun Temple at Modhera— where the stepwell creates a ceremonial approach to water— and the Amber Stepwell, which exemplifies the sculptural beauty of well-proportioned staircases. This analysis shows that stepwells are more than mere functional water structures; they form an integral part of a temple's architectural language, characterized by repetitive patterns and balanced proportions that impart both utilitarian and sacred qualities. However, while Pandya offers valuable insights into these aesthetic and experiential aspects, his work does not delve into conservation or restoration issues, leaving a gap that calls for further research in heritage management.

E. 05. The Iconography of Water

Author: Fredrick W. Bunce This book explains how water plays quintessential role in our life. Its harvesting, preservation and careful use are paramount importance, especially those regions where rains are scanty. Bunce has identified that many of these are within precincts of temples and mosques, built in timespan of seventh to twentieth century CE. It is a comprehensive study that explores the cultural, religious, and architectural significance of water structures in South Asia, particularly stepwells, tanks, and reservoirs. The book delves into the symbolic and functional roles of water in sacred and secular contexts. This book talks about water as sacred element explaining its iconography and symbolism. It also talks about its architectural and spatial analysis with comparison with other water structures. Frederick W. Bunce's *The Iconography of Water* provides a detailed geometric and spatial analysis of stepwells, emphasizing their shapes, depths, and overall planning, and enriching the discussion with iconographic examples such as Rani ki Vao, Ugrasen ki Baoli, and several kunds in Vijayapura. The book focuses on categorizing these water structures based on their structural forms, highlighting how analyzing depth, shape, and layout is essential to understanding their functional and symbolic roles in ancient

water management. While its strength lies in offering a robust framework for field studies and heritage research, the work primarily concentrates on design aspects, without addressing practical conservation or restoration strategies—a limitation that suggests the need for additional resources in heritage management. Despite this gap, the insights provided serve as an invaluable resource for documenting the diversity of stepwell designs across India, establishing a comprehensive basis for further academic inquiry and case studies in the realm of heritage water structures.

VI. Case Studies:

A. Janai Mata mandir Stepwell

Location: Jejuri, Maharashtra Coordinates: 18.277043°, 74.157836°



Figure 1 Janai mata mandir stepwell, Jejuri

B. Sai Baba Mandir Stepwell Location: Jejuri, Maharashtra Coordinates: 18.277686°, 74.159288°



Figure 2 Sai Baba Temple Stepwell, Jejuri

C. Girls' High School Stepwell Location: Jejuri, Maharashtra Coordinates: 18.275715°, 74.162219°



Figure 3 Girls' Highschool Stepwell, Jejuri

D. Ballaleshwar Stepwell

Location, Jejuri, Maharashtra
Coordinates: 18.267593°, 74.166409°



Figure 4 Ballaleshwar Stepwell, Jejuri

E. Ambi Khurd Stepwell

Location: Ambi Khurd, Baramati, Maharashtra
Coordinates: 18.320592°, 74.295105°



Figure 5 Ambi Khurd Stepwell, Baramati

F. Baneshwar Stepwell

Location: Talegaon Dabhade, Pune
Coordinated: 18.7244016°, 73.6890736°



Figure 6 Baneshwar Stepwell, Talegaon Dabhade

G. Baman Doha

Location: Talegaon Dabhade, Pune, Maharashtra
Coordinates: 18.7257822°, 73.6880983°



Figure 7 Baman Doha, Talegaon Dabhade

H. Ghumtachi Vihir

Location, Talegaon Dabhade, Pune, Maharashtra
Coordinates:



Figure 8 Ghumtachi Vihir, Talegaon Dabhade

I. Someshwar Temple Stepwell

Location, Pimpri Dumala, Maharashtra
Coordinates:



Figure 9 Someshwar Temple Stepwell, Pimpri Dumala

TABLE I. SURROUNDING ANALYSIS OF CASE STUDIES

Sr. No.	Surroundings				
	Name of stepwell	North	East	West	
A	Janai Mata Mandir Stepwell	Adjacent Road	Adjacent Road	Residential Area	Janai Mata Temple
B	Saibaba Mandir Stepwell	Adjacent Road	Saibaba Temple	Adjacent Road	Pay and Park Area
C	Girls' High school Stepwell	Vacant Land	Adjacent Road	Vacant Land	Adjacent Road
D	Ballaleshwar Stepwell	Adjacent Road	Adjacent Road	Bajirao Peshwe Lake	Farm Land
E	Ambi Khurd Stepwell	Another well	Poultry Farm	Grazing land	Adjacent Road
F	Baneshwar Stepwell	Hindu Crematorium	Residential Area	Baneshwar Temple	Residential Area
G	Baman Doha	Kedareshwar Temple	Railway Track	Railway Track	Vacant Land
H	Ghumtachi Vihir	Temple Landscape area	Residential Area	Kedareshwar temple	Railway Track
I	Someshwar Temple Stepwell	Someshwar Temple	Adjacent Road	Farm land	Adjacent Road

TABLE II. CASE STUDIES ANALYSIS

Sr. No.	Condition Assessment			
	Name of Stepwell	Shape	Condition	Conservation Status
A	Janai Mata Mandir Stepwell	Rectangular	Poor	Not Conserved
B	Saibaba Mandir Stepwell	Rectangular	Poor	Not Conserved
C	Girls' High school Stepwell	Rectangular	Poor	Not Conserved
D	Ballaleshwar Stepwell	Rectangular	Excellent	Conserved

Sr. No.	Condition Assessment			
	Name of Stepwell	Shape	Condition	Conservation Status
E	Ambi Khurd Stepwell	Circular	Good	Needs Regular Maintenance
F	Baneshwar Stepwell	Rectangular	Good	Needs Regular Maintenance
G	Baman Doha	Circular	Average	Needs Regular Maintenance
H	Ghumbachi Vihir	Rectangular	Good	Needs Regular Maintenance
I	Someshwar Temple Stepwell	Rectangular	Good	Needs Regular Maintenance

TABLE III. OBSERVATIONS AND RESTORATION STRATEGIES FOR STEPWELLS

Sr. No.	Observations and Restoration Strategies			
	Name of Stepwell	Current Status	Observations	Solution
A	Janai mata mandir stepwell	Mismanaged and polluted	-overgrown vegetation, -fallen parts of boundary wall, -garbage dumping	-removing overgrown vegetation -reconstruction of fallen parts, -removal of garbage -regular maintenance
B	Saibaba mandir stepwell	Mismanaged and polluted	-overgrown vegetation -garbage dumping -not maintained	-removing overgrown vegetation -removal of garbage -needs regular maintenance
C	Girls' High school Stepwell	Polluted and overgrown vegetation	-overgrown vegetation -surrounded by garbage -No maintenance	-removing overgrown vegetation -removal of garbage -need to restore some parts of the structure -needs regular maintenance
D	Ballaleshwar stepwell	Very well restored	-well conserved -water was polluted due to dry tree leaves -needs proper maintenance	-needs maintenance team to take care of cleanliness
E	Ambi khurd stepwell	Not maintained	-in good shape -needs some maintenance	-needs maintenance team to take care of cleanliness
F	Baneshwar stepwell	Fallen parts and no maintenance	-some parts of structure are fallen -some garbage seen in area -needs minor restoration	-need to appoint conservation architect for its restoration -needs maintenance team for regular maintenance
G	Baman doha	Lack of maintenance	-some garbage seen in area -needs minor restoration	-needs some structural maintenance -regular maintenance

Sr. No.	Observations and Restoration Strategies			
	Name of Stepwell	Current Status	Observations	Solution
				regarding cleanliness to be done
H	Ghumbachi vihir	Well conserved	-very well restored	-need to appoint maintenance team to take care of cleanliness
I	Someshwar temple stepwell	Well maintained	-needs some restoration -well maintained and clean	-consecration architect to be appointed to carryout conservation of stepwells. -carryout conservation of stepwells.

VII. Conclusion

Stepwells were meticulously constructed as heritage structures, blending architectural ingenuity with engineering precision. Designed for both functional and cultural purposes, they embody centuries-old wisdom in water conservation while serving as significant social and religious spaces. Their intricate carvings, multi-tiered staircases, and deep reservoirs reflect the craftsmanship of their time, often showcasing mythological depictions and geometric patterns. Thoughtfully designed to ensure year-round water availability, these structures were vital, particularly in arid and semi-arid regions. Recognizing their value, states like Rajasthan and Gujarat have undertaken extensive conservation efforts, restoring stepwells as historical landmarks and functional water systems. Through governmental and non-governmental initiatives, these stepwells have been reintegrated into public spaces, promoting heritage awareness and sustainable water management.

In contrast, case studies from Maharashtra reveal a starkly different reality, where stepwells have suffered from neglect, encroachment, and misuse. Many have been reduced to dumping grounds, filled with garbage and debris due to a lack of awareness and maintenance. This deterioration not only erases a vital part of the region's architectural heritage but also diminishes an important water resource that could still serve communities today. Without intervention, these structures risk being permanently lost. It is crucial that Maharashtra recognizes the historical and environmental significance of these stepwells and undertakes systematic conservation efforts under the guidance of conservation architects, historians, and urban planners. Structural rehabilitation, waste removal, and adaptive reuse strategies could help restore them to their former prominence, ensuring their historical and functional relevance is not forgotten.

Beyond their architectural value, stepwells continue to hold immense potential for sustainable water conservation. If properly maintained, they can aid groundwater recharge, provide potable water, and support local ecosystems, especially in drought-prone areas. Additionally, stepwells near religious and historical sites, such as those in Jejuri, could significantly contribute to heritage tourism. Given the thousands of devotees visiting such places daily, restored stepwells could serve as cultural and historical attractions, educating visitors on traditional water management while enhancing local tourism economies. Their conservation serves a dual purpose—preserving history while promoting sustainability and tourism. By integrating stepwells into modern urban planning, tourism strategies, and water conservation initiatives, these forgotten structures can be revived, ensuring their continued relevance and appreciation for future generations.

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