

Review Study of Step Wells

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ABSTRACT

Irrigation is a process of suppling water for the crop cultivation, step well is one of the ancient build form which is still serving the purpose found in various parts of India. Understanding the water scarcity and increasing water demand, chunks of money invested on recent irrigation project having various short comings it is a high time to study these build form. India has thousands of step wells exhibiting the influence of the then architecture style. The present work is to forward the learning from the secondary survey of step wells and forward recommendations on the basis of SWOT analysis done.

Keyword : - irrigation, step well, project, architecture, SWOT analysis.

1. INTRODUCTION

Water is the source of life, planet Earth is covered by 97% by water and 3% by land mass. Even though there is huge amount of water available on Earth the net usable amount is very less and is depleting day by day. Global warming, industrialization, urbanization, population growth, increasing food demand has boosted to strain the water cycle. Thus, calling to inject the efficient use of available water resources for various purposes. India has worshiped water as a deity and always had special status in every walks of life, which can be seen from various scripts, structures and books.

1.1 Step Well

A well is man-made structure constructed by digging, excavating vertical shaft in Earth so as to reach the aquifer and access water. Step wells are the gift of India to world Architecture. Step wells are found in India. A step well is a type of well in which water can be reached by walking through steps. The term “stepwell” defines a subterranean water-related structure which consists of a water well and a downward stairway leading from ground level to the underground water aquifer. They were created to collect water that precipitated during India’s torrential Monsoon and made it available in the dry months. This vertical shaft is surrounded by corridors, chambers and steps which provide access to the well. They were profusely carved and served as a cool resting place in summer. They may be multistoried and are found in various dimensions, shapes viz. circular, square, rectangular, pentagonal and even octagonal, capacity and purpose.

Understanding the local climatic conditions, site topography, and water demands the Kings of the respective dynasty had constructed the step wells for various purposes like irrigating crops, drinking, washing, bathing, religious and even cultural purposes. In past the size and the number of flights in the step well was to replicate the magnitude of that king’s supremacy. It is generally observed the step wells are generally constructed near the religious places. The step wells have proved to be sturdy and reliable source of water even during drought conditions and can serve the purpose still today.

The Directorate of Tourism, Maharashtra State under the Maharashtra Stepwells Campaign has mapped 1500+ step wells number of them are even 300 to 400-year-old too. They are called vav or vavadi in Gujarat, and baolis or bavadis in Rajasthan and northern India and Paayvihir in Maharashtra. These step wells are classic example of planning, architectural features, carvings, depicting the holy deities with main motive to conserve water.

2 PAST STUDIES

Piplani and Kumar carried out the case study in Hampi region and Meenakshi Amman Temple of Madurai Karnataka analysing 8 number of step wells. Paper forwards various features of the respective wells in terms of shape, size, depth, functions etc. paper briefs the classification of step wells in India on the basis of function, characteristics, material used dimensions, period of construction dynasty. The paper forwards the revival strategies for step wells like developing parks, melas, haat bazars, plazas, religious place in its vicinity and their SWOT analysis.

Pathak and Kulkarni in their paper stated the historic information of step wells in Maharashtra with special context of religious, historic scripts, folk culture. It states the civil engineering features, historic and general information of the step wells, present at Mukhed Nanded, Yevati Nanded, Marlak Nanded, Mahur Nanded, Pingali Parbhani, Mahakala, Jalna, Mukhed and Upala district Osmanabad and Hampi Karnataka.

Mirajkar and Agarwal carried the work at Nahargarh Fort built in 1734 at Jaipur Rajasthan to study its water harvesting and water carriage system. The studied the present 2 large and 1 small step wells called as baoli and

kund respectively. The fort has canals and drains to carry the rain water from higher altitudes to the step wells at lower altitudes which has provision of filtration and the complete system is self runned without the use of pumps or motors. Studying the details of a fully gravitational flow, flawless network of the channels, properly spaced outlet and highly efficient purification plant in upright condition, the study area proves to be sustainable in terms of water harvesting and carriage. The said study can also be developed as tourist place to generate livelihood for the people living in its vicinity.

Subhankar Debnath et. al. in their work the research studied various traditional irrigation system found in various parts of India. The study showcased various irrigation system with their names, use, place found. In India depending upon the climate, geomorphology, topography, purpose and capacity needed, command area, population to be feed etc. the then irrigation systems viz. kund, baoris, bunds, naula, dongs, jhoras etc. were developed. Practice of locally developed traditional irrigation systems are common throughout India. The material used were locally available ranging from stone to even bamboo.

Parmara et.al. Researchers stated the application of fractal geometry used in the architecture of step well used in India. Researchers studied the step wells and kundas found in India especially in Gujrat, Delhi, Rajasthan, Andra Pradesh, Karnataka, Madhya Pradesh, Uttar Pradesh. Paper focuses on the salient features of step wells and water tanks (kunda) as engineering structures and distinguishes between the two. It states that steps in the step wells can be represented by golden ratio in the Fibonacci series. Step wells and kundas shows fractals with symmetry repetition used both intentionally for stability and unintentionally for aesthetic purpose. The complex geometry was found in the step wells associated with the status of Kingdom.

3. SWOT ANALYSIS

SWOT Analysis is to be carried out so as to identify the internal Strength, weaknesses, external opportunities and possible threats. The SWOT analysis of these ancient build form can be used to set benchmarks to achieve and overcome the hurdles to efficiently use the available step wells (SW) without exploiting the structure.

Table -1: SWOT Analysis

Strength	Weakness	Opportunities	Threats
SW are time proofed stable and durable structure.	Increase in population since the time of its construction, SW can fulfil limited water demand.	Can be developed as tourist place, parks, recreation place.	If not maintained may be breeding place for mosquitoes and insects.
Maintained SW still serve the purpose.	Prone to accidents when not well illuminated.	Can be used as supplementary source of water for various purposes.	Prone to be abandoned.
Water can be used for multiple purposes like drinking, bath, washing, irrigation etc.	Needs high will power for its upkeep and survival.	Can be used for revenue generation of local governing body.	If not maintained SW build form will deteriorate.



Fig -1: Riddhapur Stepwell at Ridhapur Amravati M.S.

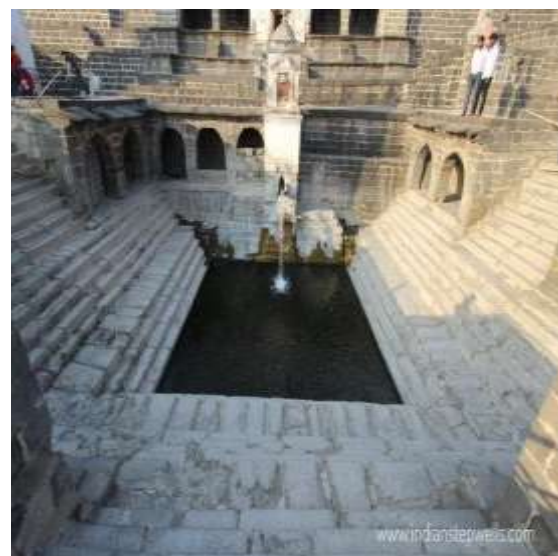


Fig -2: Gomukh Temple Stepwell Lonar, Buldhana M.S.

4. CONCLUSION

Step wells are the gift of India to world architecture as they exhibit excellent geometrical symmetry, usability, stability, durability and serviceability. It will be no wrong to state that no SW is similar in terms of shape, size, depth, volume, angle of flight, number of openings and even tales associated with it. The study of this build forms on the grounds of usability, structural stability and durability, enhancing its yield needs to be done. Government should develop policies for multiple use of SW as a tourist spot, recreation spaces and center of attraction which will be generating revenue and also extend financial aid to use it as a supplementary water resource. NGO's can act as a driving force for creating required awareness, importance and even maintenance.

5. REFERENCES

- [1]. Meenakshi Piplani, Tarun Kumar, Stepwells: Reviving India's Cultural and Traditional Water Storage Systems Proceedings of Conference: World Resources Forum Geneva, Switzerland pp 135-141,
- [2]. Arunchandra Pathak, U. D. Kulkarni, Influence of Chalukya architecture on Hampi stepwell, National Seminar on Water & Culture Hampi Karnataka, June 25-27, 2007
- [3]. Dhanashri Mirajkar, Nilesh Agarwal, Unfolding Aqueduct System of Stepwell at Nahargarh, Jaipur. Proceeding of the International Conference on Architecture and Civil Engineering, Vol.1, Issue 1, 2020, pp. 103-111, DOI : <https://doi.org/10.17501/26731029.2020.1107>
- [4]. Samirsinh P. Parmara, Debi Prasad Mishra, Fractal Geometry in Water Conservation Structures: Step Wells and Tanks in India Indian Journal of History of Science, Vol. 55.2, September 2020, DOI: 10.16943/ijhs/2020/v55i2/154675,
- [5]. Subhankar Debnath, Sirisha Adamala, Mahesh Palakuru, An overview of Indian traditional irrigation systems for Sustainable agricultural practices, International Journal of Modern Agriculture, Volume 9, No.4, 2020
- [6]. Roberts K., Reiner M., and Gray K., Northwestern University Research in Jaipur in Summer 2013, January 2014, Water Scarcity in Jaipur, Rajasthan, India.
- [7]. Toraskar, V. V., Prof. Gouri .A. Mhetar, G. A., Patil M. R., 2017, Study of Architecture and Planning of Jaipur City in context with Vastushastra, Volume 10, Number 1, 2017,
- [8]. <https://www.indianstepwells.com/2020/02/maharashtra-stepwells.html>