

Stepwells of Solapur Region: Architecture of Sustainability and Simplicity

Dr Seemantini Chaphalkar

: Academic Head and Professor, Vidya Pratishthan's School of Architecture.

Baramati, India

seemantini.chaphalkar@vpsoa.org

Abstract— Stepwells have been important objects of public utility in vernacular building tradition. On the hot-dry Deccan plateau water scarcity during summers prompted people to build such stepwells for public good. These are substantial efforts to meet people's needs. However, these are not decorated like stepwells of Gujarat and Rajasthan. Simple in planning and sturdy in appearance these stepwells dot the arid landscape. They have clean and neat lines, good proportions and very simple ornamental motifs, if at all. Built in local black basalt, probably quarried out in situ while digging for water, they are epitome of simplicity and sustainability. Some of them are more than 400 years old while some have just finished a century of existence. All of them have one thing in common, direct access to water. This paper looks at some such wells in Solapur region, in southeastern Maharashtra to bring out the beauty, simplicity and sustainability of these wells. Apart from the obvious function of providing water, they have been vibrant public places in their own right. Some have even played a cultural role in the nearby settlement. Using architectural documentation as the major research method, the paper looks at the historicity, cultural context and architectural achievements of the wells. The paper draws attention to their value in terms of continuing vernacular building tradition, sustainability and simplicity. The wells may offer an important lesson for architects today about minimalism and durability.

Keywords— *Stepwells, Solapur, Sustainability, Simplicity, Public Architecture.*

I INTRODUCTION

The south Asian tropical countries have developed responses, which are ingenious, sustainable and economic since ancient times to tackle the peculiar annual distribution of rain. In the inland region divided from coastal areas by the mountain ranges of Western and Eastern Ghats of Indian peninsula, life was very dependent on monsoon rains. Roughly, four months of rainfall, often scanty and unevenly distributed, made it imperative to store water for use through the entire year. This meant various kinds and sizes of surface water reservoirs and ways to tap groundwater resources. Every political regime in different eras made their own water management and distribution systems based on the hydraulic and engineering knowledge and technologies available at their disposal. These ancient techniques were often low maintenance and used gravity for distribution and manual or animal labour to access the water.

II TECHNIQUES OF RAINWATER HARVESTING AND DISTRIBUTION

Ancient development since 6th century of reservoirs (also called tanks) in the Dry zone river catchments and irrigation works in Sri Lanka made it a hydraulic civilization. This continued until the 12th century when a series of small tanks were built along the course of the stream thus harvesting every drop of water before it reached the sea. The ancient Sri Lankan engineers also invented the valve-pit or regulating wells, which could let them control the flow of water and facilitate de-silting of the reservoirs (1). Kerala in India is a region, which gets abundant annual rainfall and is known for its crops of Coconut, Areca nut, Spices and Bananas. The farmers in districts of Waynad and Kasargod use ancient techniques of tapping underground springs of water in the form of shallow wells or underground horizontal tunnels to sustain the crops and everyday village life (2). Sustainability scholars have looked at various aspects of rural tanks and their contribution to the well-being of rural agro-economic systems (3). However, the construction of rural tanks draws from some traditional practices and ancient wisdom, the discussion is based on current issues regarding them and their role in sustainable development. Various traditional systems of rainwater harvesting in north, east and western India have been well documented and are still in use that help people for sustenance of settlements and farming (4). The development of various types of water conservation systems and the rituals associated with them over the entire north India are mapped and discussed; the possibility of reviving the systems for answering contemporary water scarcity is explored (5). The very ancient technique of water harvesting and management invented by Persians and then spread through the entire world is the 'Qanat' technique. Some efforts have been made to combine the ancient wisdom with modern technology for better water-management systems today in cities such as London (6, 7, 8). Even in western India we find 'Qanat' tunnels (a type of underground water canal) in cities of erstwhile Islamic states such as Burhanpur, Aurangabad, Bidar and Bijapur whose rulers had connections with Turkey and Iran where 'qanats' developed (9,10).

Julia Hagewald (11) in her doctoral research covers the entire range of water architecture in South Asia. Neatly categorizing the structures in ghats, tanks, kundas, wells and ornamental pools she discusses the rituals, meanings and developments of these water structures spanning over the entire sub-continent. She reviews all the existing work before her but acknowledges that the entire body is not even representative let alone comprehensive about the sheer quantity and quality of the water structures spread over South Asia. This shows not only the intimate connection of the people with the water-bodies, but also the development of geological and hydrological wisdom, craft, technologies, rituals, meanings,

and philosophy about water. While all these authors discuss the environmental and geo-climatic aspects of water structures of different types, very few authors such as Julia Hegewald actually look at the material manifestation of the water structures through its form and construction. Dr Meghal Arya in her work 'Spatial Ecology of Water' (12) draws attention to the very close and multi-layered relationship between architectural form of the water structures and the socio-cultural and spatial ecologies of the place. Her work focusses on the different types of water structures that developed traditionally in the area in and around Jodhpur.

In Maharashtra step-wells were built since the times of Vakatakas; Rashtrakutas and Chalukyas continued the tradition after them. Circular, square and octagonal shapes were commonly used (13). In more recent times during Maratha rule in 18th century, Peshvas made great progress in town planning and water management for towns. Especially in Pune elaborate underground water supply, networks brought in water from the rain water collection tanks on the outskirts of the town (14). Historian A S Pathak's work about 'Traditional Water Management and Water Architecture of Maharashtra' (15) takes a comprehensive overview of the range of water structures built since ancient times till 18th century, but discusses only few important examples of step-well variety. These step wells were often many stories deep and were surrounded by pavilions, colonnades and chambers.

III THE CONTEXT

The hot dry and rain shadow region in and around Solapur district (see Fig. 1), in south eastern Maharashtra had always posed a challenge to the settlement planners and administrators of the region. Though the soil was quite fertile, farming was difficult due to scarcity of water after the rainy season. It became imperative to harvest rainwater as well as access groundwater to survive through the harsh summer months extending to almost half the year. Though the region is blessed with two major rivers Bheema and Seena which meander through its plains and their numerous tributary streams which drain the surface water, water became scarce during extreme summer months. The common response was to dig wells and properly build the side walls in an attempt to store water. Water was then drawn out for farming with the help of bullocks. In villages and towns however larger supplies were needed, the access needed to be ensured at all times of the day for everyone in the village.



Fig. 1. Location of study region: Solapur District (Source: <https://www.google.com/search?q=solapur+district+map>)

Many step-wells were built in towns and villages for public use. These step wells though not as ornamental as the step-wells in Gujarat (16) and Rajasthan (12) were very well built in local basalt stone using prevalent techniques and craftsmanship. During 16th to 18th centuries (roughly the later medieval period) contemporary Solapur district and its surrounds were alternatively part of various sultanates such as Adilshahas at Bijapur, Nizamshahas at Ahmadnagar and later

the Nizam at Hyderabad and the Marathas (The Peshva Court) at Pune (17). Many of the courtiers and nobles in these courts originally hailed from this region or were gifted land parcels (*Watan* or *Jagir*) in this region (18). During this time of relative stability and wealth, a great deal of building activity seems to have taken place. A number of courtyard houses of large scale-*wada*- were built in urban context and fortified large-scale compounds holding different buildings- *gadhi*- in rural context, whose remnants are still existing in the surrounds of Solapur (19). It is quite probable that the step wells were also built around this time.

The existing scholarly work is either limited to discussion of water structures of a specific region or a certain type or a comprehensive overview of the entire nation or subcontinent in which the wells of south Maharashtra are not included. The literature review thus establishes the scarcity of scholarly work on the medieval wells of south Maharashtra and proves its relevance. However, it points to the framework any work about water structure may use. This paper is focusing on the formal development of water structures and the socio-economic and political environment in which they thrived, giving rise to certain types of usage and meanings.

IV STRUCTURES FOR ECONOMY AND SUSTAINABILITY

This paper shall closely assess the shapes and forms of some examples of the step wells to comment upon the form development, materials and technology used. Based on the analysis of some examples it shall attempt to comment upon the nature of relation their patrons and users had with the wells and also the probable social and cultural meanings associated with the well structures.

A surge of interest is seen in last decade in the material evidence of by-gone era at local level. This can be partly attributed to the revival of socio-cultural concepts and practices of ancient India due to change of political regime at regional and national level and partly to the rise of social media afforded by technological advances in communication technology. The ease with which even ordinary people can record and communicate information in textual, graphical and audio-visual formats has made possible documentation of historic material objects irrespective of the remoteness of those objects.

Some examples of step-wells in Solapur district are discussed here based on field visits and observations made at different occasions in last few years. The historic information was collected from various secondary sources wherever available, or through discussions with local community. The analysis is centred on the architectural character established through the design, use of materials, construction technology, and design detailing. The shapes and sizes generally seem to have been decided by the size of plot and the amount of water available.

A dozen examples were picked from numerous step wells strewn around the district for their secular nature and their accessibility across castes and communities (See Fig. 2 and 3). *Kundas* and step wells attached with temples or mosques were deliberately left out as these have a set of different uses and meanings. In addition, the sustained patronage received by religious precincts makes such structures more ornate and better maintained.



Fig. 2. Location of step-wells included in this paper.

1 and 2- Two wells in Tulajapur town. 3,4 and 5. Wells near Pandharpur - Degav, Pakhalpur and Bajirao well at Wakhari 6. Well at Pangaon, Barshi 7. Well at Kedgav 8. Well at Uplai 9, 10. Wells 1 and 2 at Degav, Mohol. 11, 12 Step wells at Vairag (Source: developed by Author, based on field visits and <https://www.google.com/search?q=solapur+district+map>)

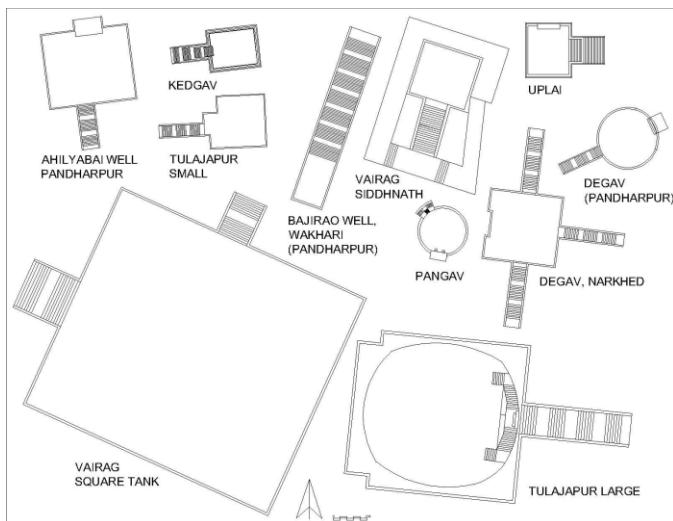


Fig. 3. Shapes and Sizes of Step Wells (to same scale and North pointing upwards. Source: Developed by the author from field visit observations and satellite images.)

V SUSTAINABILITY, ECONOMY AND ARCHITECTURAL MODERNITY

Modernity means dealing with the present problems without looking to the past for answers. Architectural modernity as we understand today means a practical response to contextual situations in minimum materials and contemporary technology. It also means evolving the aesthetics through honesty of materials and crafts. In that sense, these structures were the early modern structures of the region. Responding to economic constraints, they employ design principles such as neat and clean detailing, repetition of proportions and use of minimum elements. Symmetry is generally used, but sometimes some asymmetry is tolerated (See Fig. 6, 7, 8). Functionality is of prime importance, pause points are created regularly even though the steps are often steep to reach the depth in less space (See fig 4, 5, 11, 14). The straight lines of steps and walls, the dark grey colour of stone and thin horizontal lines of lime joints in addition to play of

light and shade, rustic non-slippery textures create a simple, sturdy physicality yet strangely soothing aesthetic experience. Though many of these features did continue from the recent architectural past of regional sultanate styles, this utilitarian construction of 'Maratha Era' completely refuses to use any of the ornamental elements of these styles.

The wells are generally located by the wayside to serve the travellers or in the town or farm, depending on the purpose and patron. Four-point arches as gateways define some of the entrances to the well, but most of these are corbelled arches with edging stone chiselled to form the arch shape. True structural arches are rarely found. Shaded pavilions on the edge of the well are very rare and provided only when religious rituals are performed on the edge (See Fig. 8). In all other cases, they are conspicuously absent showing the utilitarian nature of these wells. However, shading is provided by the shadows of the sidewalls and great trees in the vicinity. Colonnaded pavilions are rarely found for public use such as resting. Often inscriptions are found on the walls, which are an authentic source of information about the patronage and construction year of the structure (See Fig. 15).

The black basalt is a hard and durable stone. Though it is hard to dress, the stone dressers had acquired great skill through years of practical knowledge and experience. Tongue and groove, clamped or mortise and tenon joints were used to interlock the stones. The stones are dressed with clean neat right-angled joints and are generally of uniform shapes and sizes. No other material is used. The dressed stones were used only for facing walls; on the inside, stone boulders and aggregate were used to support the sides. Generally, the walls rested on hard rock. The technique of building wells was mastered by the craftsmen in the region, as seen from the perfect condition of most of the wells, even after two- three centuries of existence.

The shapes are limited to square, rectangular or circular (See Fig 6, 10, 12, 13). Oblongs are used only when necessitated by the number and location of water sources. The sizes however range from a small one of 6 m diameter to as large as 40 mx 40 m. The steps lead to water, which is often more than one floor deep. The treads and risers of the stairs are generally of uniform shape. A straight flight of wide steps reaches the average level of water. Then the steps generally become smaller and bifurcate in two perpendicular directions or in a curving manner to provide access to lowering level of water during summers. Every well has an arrangement for pulling up water using bullock or human driven pulleys. Some small niches are provided along the main flight of steps for lamps. Some of the bigger niches perhaps housed idols of gods and goddesses such as *Shivalinga*, *Ganesha* or the goddess. Only few such idols were observed in place. Some niches are topped with four-point arches while some have flat tops (See Fig. 15). No carving or embellishments are generally found. There is no parapet on two sides, where the walls rise to the level of ground. In some wells, four-point arches are used at the gateways, and there are more than one approaches. Very minimalist, stark, crisp aesthetic language is thus created in these well structures.



Fig. 4. Large Step well at Tulajapur town (Source: Author)



Fig. 6. Small Step well at Degav (Tal: Mohol) (Source: Nitin Anavekar)

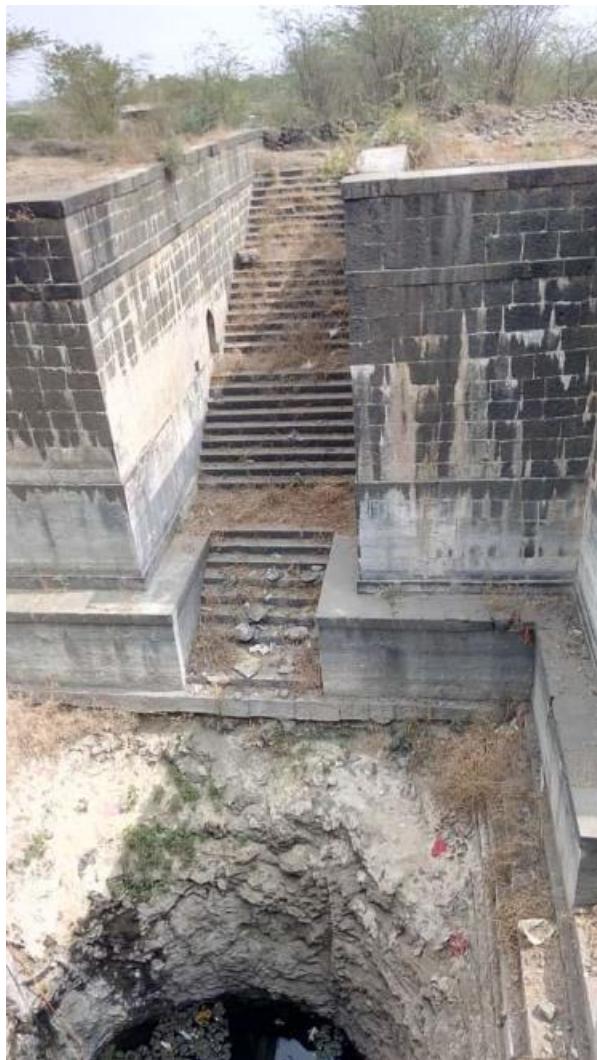


Fig. 5. Three side access Step well at Degav (Tal: Mohol) (Source: Author)



Fig. 7. Large square Step well at Vairag (Tal: Barshi) (Source: Author)



Fig. 8. Siddhanath Step well at Vairag (Tal: Barshi) (Source: Author)



Fig. 9: Ahilyabai Step well at Pakhalpur (Tal:Pandharpur) (Source: Author)



Fig. 13. Step well 11 at Pangav (Tal: Barshi) (Source: Amol Chaphalkar)



Fig. 14. Step Well at Kedgav, (Tal: Karmala) (Source: Shveta Kothavale)



Fig. 11. Bajirao Step Well at Wakhari, (Tal:Pandharpur) (Source: Author)



Fig. 12. Step well at Uplai (Tal: Madha) (Source: Author)



Fig. 15. Inscriptions and niches: Authentic source of information and minimal decoration. (Source Author)

VI CONCLUSION

The step wells of Solapur district are the harbingers of modernity in architecture through their simple, yet well evolved design style which uses minimalism, straight lines, few materials, and scarce ornamentation. They serve their functional purpose at the same time objectify the pragmatic, straightforward and minimalist approach of their builders. Through their existence they tell a story of the bygone time in which they enjoyed a meaningful existence at the centre of the village's social life. Modernity can be understood in two ways - being with the present time and breaking with the past (20). Architectural modernity is an attitude with critical self - reflexivity, diverting from uncritical repetitions of past conventions (21). Step wells of Solapur are modern by both standards. They break with the tradition of ornamentation; they deny associating themselves with a certain religion or deity. In addition, they use the available local material and craftsmanship, but maintain the highest standard of

architectural production in terms of design and execution. Denying to repeat immediate past conventions they evolve an austere language of utilitarian architecture not only suitable to their times but for times to come.

However, the advent of mechanized modernity made available alternative sources of water and the village social life considerably changed after the improvement of information technology. This has forced many of the historic and ancient step wells and their environs in oblivion. Their neglect not only points to the environmental loss but also indicates lack of awareness about local architectural heritage. Firm steps need to be taken by the concerned authorities to arrest littering, vandalism and encroachment at the premises of such historic wells. At the same time listing-documentation, protective measures and restoration must be taken up by the trustees, local bodies and voluntary social organizations in an effort to connect to larger networks of sustainability and tourism. This paper though limited in its scope in terms of region, time period and number of examples, tries to point out the need for further research and protection of step wells, which not only are the only surviving objects of late medieval period but also are the markers of our ancestors' significant achievement of designing for economy, simplicity and sustainability.

ACKNOWLEDGMENT

The support and participation of co-activists at INTACH Solapur Chapter, Ar Shveta Kothavale, Ar Pushpanjali Katikar, Ar Amol Chaphalkar and Nitin Anavekar during the fieldwork is gratefully acknowledged.

REFERENCES

1. Ranaweera, M. P. Sustainable Development, Ancient Wisdom and Sri Lankan Technology. International Conference on Sustainable Built Environment (ICSBE-2010). 2010, pp. 14–26.
<http://hdl.handle.net/1853/33871>. Accessed 15 Apr. 2025.
- 2 Nair, G. S. U. 'Harvesting Water- The Traditional Way'. Science Reporter, 2016, pp. 42–45.
- . 'Traditional Wisdom in Harvesting Water'. Journal of Traditional and Folk Practices, vol. 02, no. 04, 2016, pp. 50–53.
3. Balamurugan, P. 'An Appraisal of Rural Tanks and Their Role in Sustainable Rural Development: A Study in the Deccan Plateau'. Spring, vol. 1, 2013, pp. 48–53.
4. Bhattacharya, Sayan. 'Traditional Water Harvesting Structures and Sustainable Water Management in India: A Socio-Hydrological Review'. International Letters of Natural Sciences, vol. 37, AOA Academic Open Access Ltd., Apr. 2015, pp. 30–38,
<https://doi.org/10.18052/www.scipress.com/ilns.37.30>
5. Singh, A. P., and K. Singh. 'Integrating Traditional Wisdom of Water Resilience in Architecture and Urban Integrating Traditional Wisdom of Water Resilience in Architecture and Urban Design'. National Conference on Sustainability in Built Environment, 2021.
6. Boustani, F. 'Sustainable Water Utilization in Arid Region of Iran by Qanats'. World Academy of Science, Engineering and Technology, 2008, pp. 213–216.
7. Mostafaeipour, Ali. 'Historical Background, Productivity and Technical Issues of Qanats'. Water History, vol. 2, no. 1, Springer Science and Business Media LLC, July 2010, pp. 61–80, <https://doi.org/10.1007/s12685-010-0018-z>.
8. Taghavi-Jeloudar, M., et al. 'Review of Ancient Wisdom of Qanat, and Suggestions for Future Water Management'. Environmental Engineering Research, vol. 18, no. 2, 2013, pp. 57–63.
9. Raghubans, Kishore. 'Qanat System at Bidar District in Karnataka, India'. Hydro Nepal Journal of Water Energy and Environment, vol. 17, Nepal Journals Online (JOL), Aug. 2015, pp. 18–23, <https://doi.org/10.3126/hn.v17i0.13269>.
10. Kallappa, O., and V. Salimani. 'Water Management System under the Bahmanis and Barid Shahis - A Study of the Karez System and the Bagh-E-Hammam of Bidar'. International Journal of Research and Analysis in Humanities, no. 1, 2021.
11. Hagedwald, J. A. *Water Architecture in South Asia: A Study of Types, Developments and Meanings*. University of London. 1998.
12. Arya, M. *Spatial Ecology of Water*. Ahmedabad: AADI Centre. 2019.
13. Jamkhedkar, A. P. *Maharashtra: Itihas- Prachin Kaal - Sthapatya v Kala*. Vol 1 Part 1. Government of Maharashtra. Edited by A. S. Pathak, vol. 1, 2002.
14. Mate, M. S. (2008). *Maratheshahi Vastushilpa* (1st ed.). Continental Prakashan. 2008.
15. Pathak, A. S. *Maharashtratil Barav Sthapatya Ani Paramparik Jalvyavasthapan*. Aparant Publication, 2017.
16. Pandya, Y. *Architectural Legacies of Ahmedabad, A Saga of Creative Regionalism*. Vastu Shilpa Foundation, 2001.
17. Oturkar, Kunte, editor. *Solapur District Gazetteer*. Government of Maharashtra. 1977.
18. Deshmukh, G. *Solapur Jilhyacha Itihaas* (1st ed.). Pandharpur: Revu Prakashan. 2009.
19. Gajare, S. D. *Solapur Jilhyatil Madhyayugin Gadhya, Wade v Puratattviy Sthale Yancha Aitihasik Abhyas*. Tilak Maharashtra Vidyapith. 2016.
20. Latour, B. Can there be a non-modern style?. *Domus*, 866 (2004 Jan), 62–63. 2004.
21. Setiawan, A. (2010). *Modernity in Architecture in Relation to Context* [Georgia Institute of Technology]. <http://hdl.handle.net/1853/33871>