# Adalaj Stepwell: A Magical Resonance of Architectural Ingenuity

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The term Stepwell defined as "Well with Stairs" is a window to the ethnicity of forgotten civilizations. Stepwells are structures up to 3 to 5 storeys down from ground level, many of which are artistically designed with exquisite workmanship. These stepwells collect water during seasonal monsoons and in the deeper part of the ground with shadows around, such water bodies undergo slow evaporation process. In India, stepwells have been around since the age of Harappa and Mohenjo-Daro, about 4,500 years ago. During this period, bath wells with steps were created, with rooms surrounding the well-pit for resting. Such stepwells were once integral to the semi-arid regions of India, as they provided water for basic amenities for subsistence. These wells were also venues for colourful festivals and sacred rituals, paving the way for a rich cultural legacy. One such unique stepwell is located in Adalaj village in Gujarat, India, initiated by Raja Veer Singh in 1499 and completed by King Mohammed Begada for Rani Rudabai, wife of the Raja. The cultural and architectural representations in the stepwell at various levels are a tribute to the history, built initially by Hindus and subsequently ornamented and blended with Islamic architecture during the Muslim rule. But present-day perception, nurtured by technological advancements, has shifted. The paper focuses on the effects of the changing urbanscape on the architectural and visual connectivity with the cultural heritage of Adalaj so that adequate conservation measures can be proposed to preserve this icon of Indian architecture. Understanding the cultural relevance of such structures is crucial for their continued appreciation and protection.

## Introduction

From the dawn of creation, water has played an integral part in the evolution of mankind. The earliest of civilizations in the world originated on the banks of rivers such as the Nile, the Euphrates, the Tigris, the Yangtze and the Indus. Water is the lifeline that essentially decides the opulence of a community. Water is an indispensable element for survival; from the very first phase of the evolution of human culture, it played a vital role in the abundance of crops, prosperity in agriculture, and the birth and flowering of civilizations. Throughout history, numerous civilizations have peaked substantially and faded into oblivion just as suddenly. In most cases, the underlying cause for both their rise and fall was found to be the same - Water. This precious natural resource has been the impetus of progress in the past and will continue to be a determining factor for development in the present as well as in the future to come. According to the author Jared

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Diamond, the importance of environmental conditions has often been understated in the narration of human history.<sup>1</sup> His book "Guns, Germs and Steel," highlights the pivotal role that the environment played in the progress of societies. Most environmental diversities in different parts of the world stem from the presence or absence of water bodies in the surrounding area.

The study of ancient civilizations provides insight into how the present societies have evolved. The key aspect of development is the availability of water and how it was used to manage and sustain life. Today, water is an abundant resource and hence gets taken for granted. It is quite difficult to imagine how early civilizations operated and relied on water. Life cannot exist without water, due to which, mankind has always been evolving and adapting to new means of obtaining this life-sustaining element. In the past, several civilizations, identifying the importance of water as a means for survival, viewed it as revered. Water held a sacred position in the Indus Valley, Egyptian and Mesopotamian Civilizations, taking the essential role in rites and rituals.

Water has played a fundamental role in the development of early societies through its alliance with the agriculture sector. As the need for food supply increased due to the escalation in population, more water was needed for crops and cultivation. People began using a myriad of irrigation techniques to divert water from rivers and streams directly to their farmland. Designing such systems was a major step in development, one which ultimately helped bring societies together. Irrigation technology allowed societies to redevelop uninhabitable land into fertile, habitable land. Societies focused on weather patterns to understand the harvest seasons and to ensure maximum yield. Water aided agricultural activities, which enhanced the system of trade and economy between civilizations. Families and societies worked together to build irrigation canals, which developed class organizations leading to harmony and peace treaties. But water has also played a pivotal role in the harness of power by the leaders of society. Rulers would often threaten to cut off or re-direct water as they felt necessary, to maintain control over peasants.

Over time, the inevitability of water for the subsistence of life has been greatly overlooked and the availability of potable water has been taken for granted. But the superfluous and materialistic lifestyle, coupled with rising population and rapid development of technology has led to an urgent need for an alternative approach. Dwindling supplies, impending effects of climate change and a rising population have again brought water to the forefront of future development strategies. The climatologists, environmentalists and strategic planners of today are once again stressing the importance of water for the continuance of life in the future. Regardless of whether the core strategy to highlight the significance of water, is religious or scientific, the time has come for people to unite and make conscious efforts to manage water efficiently and preserve this precious resource for future generations.

<sup>1.</sup> J. Diamond, *Guns, Germs, and Steel: The Fates of Human Societies* (New York, USA: W. W. Norton& Company, 1997).

#### Aim and Scope

The paper aims to study the significance of stepwells in drought-prone regions of Northern India, particularly in Adalaj, Gujarat. The architecture of the stepwell, construction materials, designs and culturally significant motifs need to be understood to appreciate their aesthetics and functionality. The study can bring to light architectural practices of pre-Independence India and the evolutionary changes undergone by the stepwell through colonization and multiple battles. Understanding the architectural principles used in the construction of such water buildings can aid in the conception of technological models to obtain potable water in arid regions. The paper can also shed light on forgotten architectural monuments that have undergone years of damage, which is crucial for suitable conservation measures.

## Limitations

The study is limited to understanding the architectural principles and cultural significances of Adalaj Stepwell, Gujarat.

#### Methodology

The paper is a descriptive study carried out in three phases:

- The first phase involves understanding the importance of water in Indian culture.
- Stepwells from different regions of India were studied based on religious beliefs, climate, cultural significance and geographical positions.
- The stepwell at Adalaj village in Gujarat was analyzed in detail, tracing its history, evolution, architecture, community benefits, cultural significance and its present status.

## Sanctity of Water in India

Just like in many other parts of the World, civilizations in India also flourished around water sources, and rivers remain as the bedrock of development of the various dynasties in India. Rivers and other water bodies have an auspicious influence on the people. The seven important rivers - Ganga (the Ganges), Yamuna, Godavari, Saraswathi (underground river), Narmada, Sindhu (Indus) and Kaveri (Cauvery) spanning from the northern Himalayan ranges to the southern part of India, had connected the people with different lifestyles, languages, costumes, etc.

The ancient civilizations of Harappa and Mohenjo-Daro have brought to light sacred truths behind religious practices emphasizing the role water played in the rich cultural heritage of India. In Sanskrit, one meaning of the word "Jeevan" (life) is "water." In other words, water is equivalent to life itself. Water is referred to as "Jeevanam Sarva Jeevanam" meaning that the entire world depends on water for survival.<sup>2</sup> Water is a vital part of many rituals, funeral rites, festivals and other auspicious events in many religious traditions around the world. This is most evident in India as water is always associated with births, marriages, and funerals. Most religious communities in India also believe that submerging oneself in the holy waters of the Ganges River will cleanse them of their sins. Another common notion is that in a parched land, the gift of Water was so precious that the simple act of providing water to quench the thirst of men and animals was deemed meritorious and worthy in the eyes of God, one that gained great merit for the donor. The philosophy behind this is that the only difference between life and death is Water. Accordingly, men and women of monetary means were active in proving funds and patronized the construction of wells and other water buildings for the use of the common people. It was believed that through such charitable acts, they could achieve immortality or "moksha."<sup>3</sup>

## Purification Powers of Water

From the Archeological excavations conducted in 1922 on the banks of the Indus River, it was discovered that the earliest form of bathhouses or "Public Baths" were seen in the Indus Valley Civilization. This became the genesis for the construction of individual baths in each housing units as established in the findings. This led to the conclusion that water houses or bathing areas were an essential part of the daily routine, and ritualistic practices required them to use such bathhouses regularly. As water is known to purify a person's soul, large water bodies were present in temple complexes for ritualistic purposes. The religious significance of water in the Indian traditions continues to the present day, evident from the use of the sacred water in religious buildings.

## Healing Powers of Water

In Vedic traditions, water is said to be endowed with exceptional magical and transformative powers; the dwelling places for water nymphs and spirits. Water is said to contain medicinal properties, on account of the mineral content in it. Referring to the healing qualities of water, the Rig Veda<sup>4</sup> states:

<sup>2.</sup> R. T. Savalia, *Gujarat naPrachinSarovaro, TalaoaneKundo* (Ahmedabad, Gujarat, India: University GranthaNirman Board, 2000), 94.

<sup>3.</sup> Moksha (also known as mukti) is the concept of ultimate freedom and liberation in Indian philosophy and religion. Derived from the Sanskrit word, mukt, which means "liberation," "release" and "emancipation," it is the release from the life-death cycle and from the limitations of worldly existence. To reach the state of moksha is to attain absolute freedom, peace and oneness with the Divine.

<sup>4.</sup> The "Rig Veda" is an ancient Indian text collection that compiles 1,028 Vedic Sanskrit hymns and 10,600 verses dedicated to Rigvedic deities. It is organized into 10 books, called mandalas. Together with "Yajur Veda," "Sama Veda" and "Atharva Veda," "Rig Veda" is one of the four canonical sacred texts of Hinduism, known collectively as the Vedas. "Rig Veda" is the oldest of the Vedas, and one of the oldest extant texts in any Indo-European language.

Healing are the watery billows. Water cools the fever's glow. Healing against every plague. Health to thee brings water's flow.

It is quite evident that the healing and curative powers of water in certain wells caused them to be venerated and held to the most auspicious standards in society. It was a common belief that bathing in many of these holy waters will cure people of various diseases. They presented offerings to the gods and other divine spirits that reside near the water bodies as well.

## Water and Fertility

From time immemorial, water has always been associated with fertility and childbirth; not merely for animals, but for humans as well. Many great poets have also compared water to feminine grace. This led to the construction of many shrines, adjacent to water bodies dedicated for the use of women and worshipping for safe childbirth, to cure barrenness, etc. became a common practice; one which is still being practised to this day.

Another commonly held myth was that *Apsarasor* celestial nymphs along with the *Gandharvasor* the divine musicians who preside over fertility are said to reside over water bodies. They take the form of aquatic birds and bless the women who honor them with their offerings. Therefore, beautiful carvings and inscriptions of various aquatic birds are depicted prolifically along the walls of many great stepwells in India.<sup>5</sup>Figure 1 illustrates a niched carving of Goddess Saraswati riding a chariot pulled by peacocks depicting feminine beauty and aquatic fauna.



**Figure 1.** The Motif of Swans with Goddess Saraswati, at Stepwells in Bundi, Rajasthan Source: www.ramaarya.com.

<sup>5.</sup> P. M. Bhatt, *Her Space, Her Story: Exploring the Stepwells of Gujarat* (New Delhi: Zubaan, 2014).

## Water and Climate

Large bodies of water generally affect the climate of an area to a great extent. The water heats up and cools down more slowly compared to land. Therefore, in the summer, the coastal regions will stay cooler and in winter warmer. A more moderate climate with a smaller temperature range is created. If there are no bodies of water to moderate the climate the same conditions follow as with vast, flat plains. Therefore, water plays an important role in controlling the microclimate of a particular region. Water bodies regulate temperatures in the surrounding area by the process of evaporative cooling. The process of turning water to vapour requires energy, which is called latent heat of evaporation. When non-saturated air (i.e., air that does not contain liquid water but only water vapor) comes in direct contact with water, evaporation occurs. During this process, the moisture content in the air is increased. The vapour leaves the surface, taking the extra heat with it. The result is a decreased amount of heat and thus, decreased temperature in the surrounding area. This is how evaporative cooling works.<sup>6</sup> India, especially in the arid regions, even a small body of water can make a huge impact in cooling the surrounding areas. As these cooler regions along the water's edge become a communal space, where cultural and racial boundaries are transcended, the primal need to escape from the heat to enjoy respite becomes the main objective. Such areas become a hub for a knowledge-sharing platform, as well as a religious and culturally influential area.

Thus, the influence of water on a region is not only cultural but also climatologically adept.

## Voices from the Deep - Stepwells of India

In 1864, the famous French world traveller Louis Rousselet stated that "[a] vast sheet of water, covered with lotuses in flower, amid which thousands of aquatic birds are sporting" at the shores of which bathers washed, surrounded by jungle greenery. It was not a beautiful lakeside scene or a Ghatian river bank he was describing, but one of the most ancient relics that have mesmerized Indians as well as foreigners alike - The Stepwells.

Stepwells in India are exquisite structures which consist of broad steps leading from the ground level to deep within the earth to the underground water reservoir; some going 8 to 10 storeys below the surface. These exceptional structures are not found anywhere else in the world. Stepwells are deep trenches or rock-cut wells or pools of water reached by a set of stairs or steps and are known by a variety of regional names like "bawdi," "baoli," "vav," "vavdi," "vai," "kalyani," or "pushkarni." The Sanskrit Silpa-Shastras<sup>7</sup> and ancient inscriptions refer to them as "Vapi" or "Vapika."

<sup>6.</sup> T. I. OH Koenigsberger, *Manual of Tropical Housing and Building - Climatic Design* (Hyderabad: Universities Press (India) Pvt. Ltd, 2010).

<sup>7.</sup> Silpa-shastra means the Science of Shilpaarts and crafts. It is an ancient umbrella term for numerous Hindu texts that describe arts, crafts, and their design rules, principles and standards.

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Stepwells are examples of traditional Water buildings, which came up for the purpose of storage of water and irrigation tanks that were developed in India, primarily to manage the seasonal fluctuations in the availability of water. Some of the other notable structures that are encompassed in the category of Water buildings are ponds, tanks, and temple tanks. Temple tanks (or tanks) are large reservoirs of water with a few steps leading to the water level (Figure 2). But due to the proportions, water is mostly used for bathing and in the case of temple tanks, used for ritualistic purposes. There were neither shaded areas around it nor any spaces for respite. These were purely utilitarian in nature and served specific purposes.



**Figure 2.** *Temple Tank at Vittal Temple Pushkarani at Hampi Source:* www.nativeplanet.com.

The basic difference between stepwells and tanks is that stepwells make it easier for people to reach the groundwater and to maintain and manage the well (Figure 3).

Western India has a hot and arid to semi-arid climate with capricious and often scanty annual rainfall. Therefore, the only option for obtaining water during the dry season was to harvest the rains during the Monsoon season in wells, so that they can be easily accessed by all. This practice was the inception behind the development of Stepwells. For centuries they remained an integral part of the western Indian communities as a hub for drinking, washing, bathing, socializing, as well as for celebrating colourful festivals and performing sacred rituals. They also became cool sanctuaries for caravans, pilgrims, traders and travellers during the heat of the day. But these magnificent structures were much more than utilitarian reservoirs. During the harsh heat of the day, when water is sparse and rains are scanty, these wells provided life-giving water to people as well as animals and birds, and also enabled the surrounding areas to become fertile.

One of the most intriguing aspects of the Indian Stepwells is that, during excavations, it came to light that 25% of these stepwells were commissioned or built by women<sup>8</sup> - queens, princesses, noble women, wives of merchants, ordinary

<sup>8.</sup> Bhatt, Her Space, Her Story: Exploring the Stepwells of Gujarat, 2014.

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women, courtesans, and even servant girls. This was done to attain immortality and to gain religious merit through the gift of water. Many other stepwells have been built taking inspiration from certain prominent women of the region. Thus, a common element of femininity shrouds these stepwells.

Stepwells served dual functions - providing water and respite as well as acting as the site for many rituals. The linked three worlds: the subterranean, the earthly and the celestial.<sup>9</sup>



Figure 3. Chand Baoli, Rajasthan Source: www.travelplanet.in.

## Stepwell Architecture

Most stepwells consist of two parts:

- 1. A vertical shaft—protected from the direct sunlight by a full or partial roof, which acts as the point of collection of the rainwater that is drawn into the inner well pit. The wells were excavated several stories below the ground to reach the water table; the level at which the soil or rock is always saturated with water content (for example, Figure 4).
- 2. The surrounding inclined subterranean passageway, the stairway or steps and the adjacent chambers or resting areas, which provided access to the well below (for example, Figure 5).

Though most stepwells have common features, they differ from one another in many ways. The four main types of Stepwells are:

- Nanda: Stepwells with just one entrance.
- Bhadra: Stepwells with two entrances.
- Jaya: Stepwells with three entrances.
- Vijaya: Stepwells with four entrances.

From these types, stepwells coming under the Viajaya type are usually the biggest and the most elaborate ones usually termed as "Dirdhika," meaning the

<sup>9.</sup> Ibid.

length of 3,000 bows. Stepwells which are known as "Living Stepwells" are so named because they are perennial sources of water; never devoid of water throughout the year. Stepwells are usually built using sandstones, Kota stones and other types of stones and rocks, mortar, bricks, rubble, stucco and in some cases, even marble.

The lattice-like walls with its intricately carved pillars, decorated towers in the surrounding areas and culturally blended style of iconography have made them exceptionally rich monuments of Indian architecture. Incorporating flights of stairs leading from the ground level down to the water, most stepwells functioned as Hindu temples as well; featuring colonnaded pavilions with elaborate stone carvings. Islamic versions had more sedate adornment and often incorporated arched side-niches. Both architectural types had cylindrical wells. Commissioned by royal, wealthy, or powerful patrons, they are complex engineering feats and are stunning examples of both Indian and Islamic architecture.

Each successive level of most stepwells, was punctuated by covered pavilions, which are accessed by ledges as the water level rose and are considered as vital sun shading devices, at the same time buttressing the walls against intense pressure. Many stepwells gradually narrowed from the surface to the lowest tier, where the temperature remained constantly cool. By building underground rather than above, a reverse architecture was created.



**Figure 4.** *The Vertical Shaft of Adalaj Stepwell, Gujarat Source:* Photographed by Author.



**Figure 5.** Colonnaded Chambers of Rani kiVav, Gujarat Source: Photographed by Author.

## History and Evolution

The first rock-cut stepwells in India appeared between 2<sup>nd</sup> and 4<sup>th</sup> centuries A.D., born out of necessity in an erratic monsoon climatic zone that is bone-dry for most of the year but drenched by torrential rains for many weeks. It was essential to guarantee a year-round water supply of water, particularly in the arid regions of India where the water table could be inconveniently buried 10 stories below. Over time, design and planning of stepwells evolved into astoundingly complex structures. The next stage of evolution witnessed the construction of wells at Dhank, near Rajkot, Gujarat (550-625 A.D.) and of the stepped ponds at Bhinmal, in the Jalore district of Rajasthan (850–950 A.D.)<sup>10</sup> Continuing the legacy, around thousands of other stepwells, varying in proportion began to be constructed in various parts of western India. Stepwell construction saw its peak from the 11<sup>th</sup> to 16<sup>th</sup> century. But studies show that the construction of such structures might have originated much earlier than that. Following the reported discovery of as many as 700 wells in just one section of the city of Mohenjo-Daro, the scholars are led to believe that these "cylindrical brick-lined wells" might have been invented by the people of the Indus Valley civilization and may be the predecessors of the stepwell.<sup>11</sup> Scholars have estimated that by the 19<sup>th</sup> century, several thousand stepwells of varying degrees of grandeur had been built throughout India—in the cities, towns, villages, and eventually in private gardens where they came to be known as "retreat wells" as it was used by traders, who take

<sup>10.</sup>S. Chandra, "Steps to Water: Stepwells in India," *Chitrolekha International Magazine on Art and Design* 5, no. 2 (2015): 40-46.

<sup>11.</sup> Ibid.

refuge from the harsh climate. It was considered extremely meritorious to commission a stepwell, either as a charitable act or as a memorial to a loved one. Some notable examples of Stepwell Architecture are shown in Figures 6-9.



Figure 6. Chand Baoli, Rajasthan Source: Scroll.in.



**Figure 7.** *Mukundpura Baoli, Haryana Source:* Scroll.in.



Figure 8. Agrasenki Baoli, New Delhi Source: Scroll.in.



**Figure 9.** *Rani kiVav, Gujarat Source:* Photographed by Author.

## Contributions of Women to Stepwell Architecture

The pages of history give clear evidence of the significant part women have played in the construction of several significant stepwells. They are known to have inspired creation as well as commission of most of the stepwells. Women of means, albeit mostly royal women, have been donors and commissioned many great stepwells to be constructed. Some stepwells have also been commissioned by ordinary women. Common women, wives of merchants, courtesans and servants have also been donors to several great stepwells. The primary goal behind the intent is to construct a place away from domestic life, where women could be free and enjoy the company of other women and in the process gather water for their homes. This was especially significant in the past, where traditionally, the women were confined to the back service quarters of their homes, while the men would be free to enjoy their time in the spacious and open areas of the house. Women took the opportunity to socialize with themselves, learned new crafts, participated in rituals and special festivals and through all this, got exposure to a vivid life away from their domesticated stature. Throughout history, men have made a mark for themselves through the construction of grand and imposing temples, palaces, mausoleums, etc. Perhaps women also yearned to immortalize themselves, one way or the other and chose to aid in building utilitarian water houses that could benefit every other woman in the area as well as providing the sacred gift of water to all. In an era where women held little to no value in society other than to raise a family, this step towards commissioning works of architecture for the greater good was truly an inspiring step towards a progressive society - one in which women stood side by side with men and demanded a place for themselves in the pages of history. They created architectural marvels that inspired many generations to imagine, write poems and literature, and draw about. The stepwells allowed women to step out from the familial realm into the public domain. These structures also became the hub for community spaces which could transcend religious differences and sectarian conflicts. This form of religious and cultural tolerance and a spirit of assimilation were rarely witnessed elsewhere in India. Even when most Hindu temples suffered desecration when invaders attacked, most of the stepwells were left untouched. Realizing the practicality behind these structures they were allowed to remain intact. Hence, the walls of these magnificent structures can tell the tales of the women who built them and the life they had celebrated at that time.

## Stepwells of Gujarat

Stepwells are mostly seen in the hot and dry climatic zones of Northern and North-Western India like Gujarat, Rajasthan, Haryana, etc. But among them, the stepwells of Gujarat are few of the most enchanting, and well-preserved water buildings in history. As they follow their own traditional and cultural systems in the construction, they remain unique wonders even today. These underground structures peculiar to the Gujarat region was the outcome of the hot, arid climate and the severe paucity of water available for use. This outcome was further enhanced due to the sporadic nature of monsoon rains.

These stepwells celebrate water and take this style of regional architecture to its zenith. Stepwells can be found in towns like Patan, Jhinjuwada, Viramgam, Vadhvan, Sarsa, Dhadhalpur, Chobri, Anandpur, Gondal, Virpur, and Jetpur and all the way up to the coast in Somnath in Gujarat. There are hundreds of these "water shrines" in this region, but the stepwells of *Adalaj* (near Ahmedabad) and the *Rani-kivav* of Patan (the old Solanki capital in the north of Gujarat) are the ultimate examples of this style of architecture. They are also a testament to the grandeur and exquisiteness of the Solanki Architecture style.

Figure 10 illustrates a few of the notable stepwells found in Gujarat. These stepwells are located in the arid, desert-bordering villages which used to supply the local communities with drinking water during harsh summer months.

In the whole of India, especially in the western coast, Gujarat was known for its commercial activities. The social, cultural and economic activities held an important position due to the steady rise in its graph as an important commercial centre. It served as a convergence point whereby, traders from many parts of the country as well as from other Asian countries could conduct their business as well as pass-through to other regions of the country. In the network of the external trade of Gujarat, the commercial relations with the West Asian, South-East Asian and the African coast were most prominent. The coastal region of Gujarat, which had a flourishing maritime trade, extended from Dwaraka in the North to Chaul in the South. When Gujarat became a part of the Mughal Empire, the ports became the "sea-gates" of Northern India.



**Figure 10.** *Map Showing Prominent Stepwells of Gujarat Source:* Author.

All these factors led to the additional imposition on the scantily available water resources. Harsh climatic conditions also made it challenging for weary travelers to transport their goods and animals. This instigated the need for a system of effective water harvesting techniques that could preserve the resources, as well as provide respite to the travelers. Already the formulation of a primitive system of wells was prevalent from the Indus Valley civilization onwards. But more sophisticated means of trapping rainwater and creating reservoirs for the dryer seasons started surfacing. This led to the inclusion of resting areas or rooms for the traders and travelers with provisions for their animals to rest, below the surface of the ground. It was also understood that, as one moves down from the surface level, the temperature gradually decreases. The presence of a water body further enhances cooling of air through the slow evaporation process. Thus, a comfortable and safe haven was envisaged by the people. Many rudimentary versions of stepwells were constructed serving basic purposes. But the form got its full artistic voice during the 10<sup>th</sup> and 15<sup>th</sup> centuries when the artisans and craftsmen of the Solanki and post-Solanki era infused unique and exquisite regional art forms to these "subterranean shrines". The stepwells act as doorways to their era; offering a glimpse into architecture, religious practices, the daily life of the rich and the poor and the cultural sphere of the people.

#### Adalaj Stepwell, Gandhinagar, Gujarat

The stepwell at Adalaj which was built along the main caravan route of Ahmedabad and Patan (the then capital of Gujarat) districts, about 13 km away north of Ahmedabad, was commissioned in 1499 A.D. by Queen Rudabai who was the widow of the Rajput RanaVeer Singh Vaghela. Muslim Sultans who were ruling Gujarat, infused Islamic architectural style to the traditional Rajputani architecture. Adalaj Stepwell is a magnificent example of this fusion of Hindu craftsmanship and the floral, geometric patterns of Islamic architecture.

This five-storeyed subterranean structure is octagonal in form, with the main well in the centre (Figures 11-12). It is 250 feet in length surrounded by columns on all four sides. The five storeys of the stepwell had cross beams all along their lengths. This stepwell, of the three-faced type or "Jaya vav" (as it has three entrances) as described in the classical manuals of Hindu architecture, is a mesmerizing procession of arabesque designs, intricately decorated columns, ornamental balconies with exquisite carvings, carved walls and niches with shrines of Hindu gods and goddesses, elephants, flowers, birds and chhatris<sup>12</sup> seen throughout its five floors. There is an inscription comprising of 27 lines in Sanskrit and Devanagiri script<sup>13</sup> which states the origins of this stepwell. The inscription compares the waters of this stepwell to the holy waters of the Ganges River and Mount Kailash. The inscription is full of praises for Queen Rudabai and compares her to Sita, the heroine of the epic Ramayana.



**Figure 11.** *Adalaj Stepwell Source:* Photographed by Author.

<sup>12.</sup> Chhatrisare elevated, dome-shaped pavilions used as an element in Indian architecture. The word Chhatri means "canopy" or "umbrella."

<sup>13.</sup> Devanāgarī, (Sanskrit: deva, "god," and nāgarī (lipi), "script of the city") also called Nāgarī, script is developed from the North Indian monumental script known as Gupta and ultimately from the Brāhmī alphabet, from which all modern Indian writing systems are derived. In use from the 7<sup>th</sup> century and occurring in its mature form from the 11<sup>th</sup> century onward, Devanāgarī is characterized by long, horizontal strokes at the tops of the letters, usually joined in modern usage to form a continuous horizontal line through the script when written.



**Figure 12.** *AdalajStepwell Shaft Source:* Photographed by Ar.Akshat Gupta.<sup>14</sup>

## A Passage to the Past

The history of the stepwell was established with the help a Sanskrit inscription found on a marble slab positioned in a recess on the first floor, from the eastern entry to the well. Its construction was started by Rana Veer Singh of the Vaghela dynasty. But he was killed in a war, where after the Muslim king Mahmud Begada continued the construction in the Indo-Islamic architectural style, in 1499 A.D. The cultural and architectural depictions in the deep wells at various levels pay a tribute to the history of the stepwell, built initially by Hindus and subsequently ornamented and blended with Islamic architecture during the Muslim rule.

The construction of Adalaj Vav started in the late 16<sup>th</sup> century by King Rana Veer Singh. He was from the Vaghela dynasty; they were the rulers of Dandai Desh, which became the present-day Gandhinagar, Gujarat. At a time when rains were scanty and drought was prevalent, Gujarat was under the control of Mahmud Begada (Sultan of Gujarat). Rana Veer Singh realized that people in Adalaj were suffering from severe water crisis and they had to walk miles to get water for their daily needs. Hence, he decided to create a Vav to solve this crisis. But before completing this structure, he died in battle against Mahmud Begada. After his death, his wife, Rani Rudabai continued the construction. She proposed many rooms to be added, to be used as resting areas for the weary travelers along with many areas for worshippers and pavilions for rituals or festivals to be conducted. She drew money from her treasury for this purpose and was praised by the people for her generosity. The Sultan Mahmud Begada, who fell in love with the Rani proposed marriage. The grief-stricken widow agreed on the condition that the Sultan completes the construction of the stepwell. Mahmud Begada accepted this condition and made significant efforts to construct an outstanding and unparalleled Vav, which is a fusion of Hindu, Jain, and Islamic traditions and architectural styles. The artisans who were responsible for producing this marvel were killed by the Sultan after the structure was completed, to prevent the possibility of the style

<sup>14.</sup> Akshat Gupta, B.Arch, M.tech MBEP/Freelance photographer, CEPT University.

of architecture being replicated. Hence Adalaj Stepwell will always remain unique.

By 1599 A.D., the construction of Adalaj Vav was completed. While showing her the completed stepwell, Rani Rudabai committed suicide by drowning herself in the well. The heartbroken Sultan could not marry the Rani and preserved the stepwell to honour her. Even today, Adalaj Vav is described as *Rudabai Vav*, named after the queen who sacrificed her life instead of marrying a Sultan. The tragic story associated with Adalaj Vav became a favourite theme of Gujarati folklore and poems. The people of Adalaj will forever cherish the memory of the Rani who was immortalized through sculptures and inscriptions describing her beauty, generosity, courage, and loyalty.

Though the tales behind the stepwell are tragic, the legacy which was started by the Rana lives on as a symbol of loyalty and solidarity between Hindu and Muslim dynasties. The legend has been kept alive for centuries and is now being depicted in movies and literature. The magnificence of the stepwell can be experienced in every carving and pillar (Figure 13). There are many stone inscriptions singing praises to Rana and the Sultan as well as the Queen.



**Figure 13.** A Sketch of the Beautiful Carving on the Lintels Source: Sketched by Ar.JefrinJabbar.<sup>15</sup>

#### Architectural Features

Adalaj Stepwell was built in sandstone in Solanki architectural style. Solanki architecture mostly flourished in Gujarat. It closely resembles the Rajasthani style of architecture, with intricate stone carvings and trellis work. The fundamental features of Solanki architecture style are closed halls, hypostyle pavilions (Figure 14), a porch that is connected both internally and externally, and intricate and themed carvings on the walls and pillars. The stepwell consists of two well pits - one for everyday purposes and another one solely for the purpose of rainwater collection (Figure 15). The latter one will usually overflow into the main well pit during the monsoon season. This ensured a year-round supply of water for the people.

<sup>15.</sup> Jefrin Jabbar, B.Arch/Freelance Architect.

Sriparvathy & Salahsha: Adalaj Stepwell: ...



**Figure 14.** *View of Colonnaded Upper Levels Source:* Photographed by Ar.Akshat Gupta.<sup>16</sup>



**Figure 15.** *Adalaj Stepwell Water Level Source:* Photographed by Ar.VisakhKurien Zachariah.<sup>17</sup>

The most striking feature of Adalaj Stepwell, and for other stepwells as well, is that there is a stark contrast between the ambient temperature at the ground level and inside the stepwell. As a person descends, the temperature keeps reducing. This is attributed to two possibilities:

<sup>16.</sup> Akshat Gupta, B.Arch, M.tech MBEP/Freelance photographer, CEPT University.

<sup>17.</sup> Visakh Kurien Zachariah, Architect/Urban Designer, CEPT University.

- 1. The air gets cooler due to the stone and the ground below acting as thermal buffers.
- 2. Evaporative cooling due to the presence of the water body.

#### Architectural Details

The five-storeyed structure is an octagonal polygon in plan (Figure 16). The Adalaj Stepwell is 75.3 meters in length and is oriented along the North-South direction. Each floor is spacious enough for the congregation of people. It was dug deep to access groundwater at the lower level, accounting for seasonal fluctuations in water level due to rainfall during seasonal monsoons. The air and light vents in the roof at various floors and the landing level are in the form of large openings with some being ornate with trellis decorations. The entrance is from the South with three staircases along the South, West and East directions leading to a spacious landing. Four small rooms with oriel windows<sup>18</sup> decorated with minutely carved brackets are provided at the landing level, at the four corners (Figure 17). At the bottom of the well is a square stepped floor in the shape of a funnel extending to the lowest plane for the ease of water collection.



Figure 16. Plan and Cross Section Source: Author.

<sup>18.</sup> Oriel window: a large upper-storey bay with a window, supported by brackets or on corbels.



**Figure 17.** *Oriel Window Source:* Photographed by Author.

From the first storey level, three staircases lead to the bottom water level of the well, which is considered a unique feature. The structural system is the traditional trabeated style with horizontal beams and lintels. A square stepped platform is chiselled into a circular well. Above the square floor are, columns, beams, wall and arched openings spiral around; a feature that continues to the top. The top of the well is a hollow open-to-sky shaft (Figure 18). The four corners of the square are strengthened with stone beams, set at 45 degrees angle.



**Figure 18.** *Main Stairway Source:* Photographed by Author.

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Adalaj Stepwell is a brilliant example of the fusion of Hindu craftsmanship and the floral, geometric pattern of Islamic architecture. Every floor uses cross beams throughout the length. Every major milestone in the construction of this stepwell is recorded on the walls through Hindu architectural elements but subsequently followed by Islamic designs (Figure 19). Step wells were used as meeting and resting places during summer since their cool interiors offered unbelievable respite from the scorching sun outside.



Figure 19. Intricate Carving Source: Photographed by Author.

The three entrances meet in the first storey below-ground in a huge square platform. This platform has an octagonal opening and rests on 16 pillars, 8 on the corners, and 2 in front of each main side for built-in shrines, with doors, windows and balconies, marking the 4 corners of the platform (Figure 20). Walls of the stepwell are a veritable showcase of sculptures and ornamentation in a blended style crossing religious boundaries.

A notable feature of the structure is the sculpture of *Navgraha*<sup>19</sup> at the farthest corner of the well which is believed to protect the historic site from evil spirits. The octagonal stepwell is supported by a large number of pillars (Figure 21). Every floor, as well as the landing spaces, had enough space for people to hold gatherings (Figure 20).



Figure 20. Common Landing Source: Tripadvisor.

<sup>19.</sup> Navagraha means "nine celestial bodies" in Sanskrit and are nine astronomical bodies as well as deities in Hinduism. These are the Sun, the Moon, Mars, Mercury, Jupiter, Venus, Saturn, Solar Eclipse, Lunar Eclipse.



**Figure 21.** *The Pillars are in the 'Bhadrak' Style*<sup>20</sup> *Source:* (Left) Jatin Chhabra, (Right) Photographed by Ar.Achuth H.<sup>21</sup>



**Figure 22.** *Corridors with 1 m High Parapet Wall with Rounded Topping Source:* Photographed by Author.

The motifs of flowers and graphics of Islamic architecture blend very well with the symbols of Hindu and Jain gods carved at various levels of the well. The dominant carvings on the upper floors are of elephants (3 inches/76 mm) in size,

<sup>20.</sup> Bhadrak column are intricately carved square columns with recesses and projections facing four sides.

<sup>21.</sup> Achuth Harikumar, Architect/PG student, Urban Housing, CEPT University.

each of different design. The niches at Adalaj Stepwell are either filled with lotus medallions (Figure 23) or with a depiction of the great goddess. The great goddess is represented by her vehicle (vahana in Sanskrit) — the lion who carries a trishula (trident). This trishula could be interpreted as symbolizing the goddess.



**Figure 23.** Ornately Embellished Niches Source: Photographed by Author.

The Adalaj Stepwell is both, a celebration and a tribute to water as well as a record of the societal life of the people who used to come there. One can only marvel at the organizational capacity needed to erect such a structure. Some niches have leafy branches that resemble the decorative aspects of some of the mosques in Ahmedabad, known for their glorious weaving of the Hindu and Muslim styles. An inscription in a niche declares that this stepwell of Queen Rudabai will stand as long as there will be sun and moon in the sky. Here, the string-courses run on pure beauty; the embellishing of all parts of the structure is just a pretext to create further beauty in stone. Each wall is a procession of divine sculptures; each panel creates the impression that this architecture was not created by human hands but rather some divine power from heaven had gently lowered it onto the surface of the earth.

The sculptures and figurative carving on the walls and pillars illustrate the nine planets, beautiful representations of the mother goddess, tigers, elephants, peacocks and other birds and animals, celestial dancers, other gods and goddesses, musicians, poets, people in amorous poses, objects of daily life and scenes of the domestic lives of ordinary women.

## Role of Stepwell in Evolution of the Cultural Heritage of Adalaj

The Adalaj Stepwell was instrumental in shaping the traditions and creating a continued legacy in Gandhinagar, Gujarat. This stepwell not only served the mundane purpose of supplying water for regular activities but was also a cultural hub, where many dance and music festivals took place. The wide, spacious landing areas served as platforms where travelling artists could showcase their talents in a cool and stunningly picturesque backdrop. This made the Stepwell quite notable throughout history. The intricately carved walls and pillars of the stepwells make it a live museum exhibit, where the art and architecture at the peak of the Solanki dynasty coupled with the ornate Islamic style were showcased. The multitude of carvings and sculptures depicting the daily lives of the common people are perhaps the only reminders of the rich culture and traditions that existed in the past. They also served the purpose of being mini-temples, as statues of various gods and goddess were carved into them and many of the rituals were done by women, exemplifying the status and power of women in society.

This subterranean marvel, being 5 storeys below the ground level with a permanent water body at the lowest level will always have a 5 to 6 degrees temperature drop compared to the outside ambient temperature. This is due to the slow evaporation rates of the water which is shaded on all sides by massive walls; which in turns tempted the people to remain longer here and thus became an ideal rest stop for weary travelers.

The historical sacrifice and construction origins of Adalaj prompted it to become a place where religious and cultural differences were surpassed. All sections of society would congregate here and participate in the events that were conducted. This was truly a remarkable phenomenon during an era of religious disparities and wars.

Rich biodiversity also flourished in the vicinity of the stepwell, as many birds and animals were attracted to the cool waters of the well and food from the various rituals and festivals that were left behind. Even today, many rare migratory birds found a haven in the vicinity of this great stepwell.

#### **Present Scenario**

The magnificent Stepwells representing the finest examples of water architecture that inspired hymns and folklore for centuries ceased to be built after the establishment of the British rule in India in the nineteenth century. The British regarded water in these stepwells as dirty and unhygienic and prohibited the use of these wells. They introduced pumps, taps and tube wells. Many stepwells were declared off-limits which led to many of them crumbling to the ground, victims of neglect and disuse. Some of these wells were demolished and the stones that made up the walls were carted off for other construction activities. The few that survived the rampages of time stood out as silent reminders of the past; echoing the sounds of laughter, music and the many stories that the walls of these structures became privy to. But a subterranean universe where people and animals coexisted cloaked in music, dance, divinity, and exquisite architecture will never cease to astound visitors today.



**Figure 17.** *Shrine at the Entrance of Adalaj Source:* Photographed by Ar.Achuth H<sup>22</sup>

The social scenario has shifted and India has witnessed many of these Stepwells being reclaimed mostly by women. They have been transformed into small shrines where they can worship local goddesses and female deities. Women are once again claiming a unique space for themselves, where the performance of rituals and worship centred around fertility, health and family prosperity is continuing. Construction of small shrines containing the sculptures of local goddesses adjacent to the stepwell will ensure sustained use of the space (Figure 24). Adalaj Stepwell has a similar shrine located adjacent to the outer wall which is being maintained by the local Brahmin women of the community. Women from the neighbouring communities come here to perform the rituals and pray for the blessings of the goddess. The convergence of many women to this stepwell will keep the legacy of the ancient wonder alive and relive its traditional purpose.

The present state of Adalaj Stepwell is mainly focused on the maintenance and preventative restoration of the sculptural elements within the structure. Protective balustrades guard sculptural elements against direct visitor interaction, and watchful caretakers ensure their upkeep. The more sensitive areas as defined by the architectural conservation organizations like the primary water collection pit or the octagonal *vav* and certain shrine areas are currently off-limits to the general public. These measures prevent further damage to the structure. With the help of circular grill-covering above the well pits at the surface level, contamination of the water from waste dumping or bird droppings can be prevented.

Though the state of many great stepwells has deteriorated considerably over the years, a renewed interest in such water structures has slowly emerged at the turn of the century. In the last few decades, these stepwells have been revived and revitalized, not just for worshipping and obtaining water, but also as a backdrop for many concerts and performances. Many of these stepwells have been

<sup>22.</sup> Achuth Harikumar, Architect/PG student, Urban Housing, CEPT University.

proclaimed as World Heritage Site by UNESCO and have been granted protection under the Archaeological Survey of India (ASI) like Adalaj, Rani kiVav, etc. The ASI along with the Gujarat Archaeological Department (GAD) is striving to protect and preserve existing stepwells. They have also been instrumental in restoring these structures and cleaning the stored water in these wells. At places, communities and organisations have taken it upon themselves to restore the crumbling structures. Provisions under these government bodies have granted monetary as well as technical support to local organizations to conserve and restore local stepwells. Under these government schemes, Jal Sampatti Vibhag (Gujarat Water Supply and Sewerage Board) has conserved the Khodiyar Mata ni vav in Devdi village, Ahmedabad to such a degree that locals use it as a resting place today. But in the process of restoration, they have covered the entire structure in cement plaster and whitewash. The stepwell now acts as a shrine, and porcelain tiles bearing the image of goddesses have been added in the niches.

Realizing the cultural significance of stepwells, the Government of India along with the Reserve Bank of India has used the image of Rani ki Vav as the face of the new 100 rupee note (Figure 25). This is another great step to uplift the status of stepwells to a cultural and architectural milestone in the construction history of India.



Figure 25. Rs. 100 Note Showcasing Rani ki Vav Stepwell Source: Google.

Today, research organizations like the Urban Management Centre (UMC) in Ahmedabad provide technical assistance to city governments to identified and conserve stepwells, especially around the Ahmedabad-Gandhinagar region in Gujarat. They are doing extensive research on conservation measures which not only preserve these structures but also encourage sensitive adaptive reuse for them. Similarly, through Awareness Drives and Clean Stepwells campaigns in Patan, Ambaji, Mehsana, Palanpur and other areas in Gujarat, the NGO called Historical and Cultural Research Centre were able to generate cleaning initiatives to salvage some of the lesser-known stepwells.

The major causes which lead to the degradation of any stepwell are pollution and dumping waste materials by visitors, as well as antisocial activities and vandalism. Curbing these can greatly impact the general management of these structures. Plastic bottles, wrappers, and other urban waste can stagnate and contaminate the water. Addressing these issues can pave the way to further technical conservation measures. After due consideration and analysis of the local culture, climate, environment, social and economic context, revival strategies have been recommended that rejuvenate and retrofit these structure into public recreational areas. Parks, walking plazas, markets or *bazaars* are some of the space design strategies recommended to restore stepwells.

The truly unique and elaborate detailing on the walls and pillars of Adalaj Stepwell has made it one of the most visited World Heritage Sites in Gujarat. As a tribute to the rich historical and cultural history of Adalaj Stepwell, each year a Water Festival is held in the month of November to celebrate World Heritage Day. During the festival, musicians from around the country make the brilliantly lit walls and pillars of the stepwell reverberate with the sounds and storytelling, bringing life to the sculptures with their rhythmic tunes. It is an important cultural event attended by scores of people from around the world to celebrate this architectural marvel. Listening to the music and the rhythmic instruments allow the new generation of youth to rediscover the magnificence of this ancient wonder and in the process, will be exposed to the rich history of their ancestors. Queen Rudabai would have rejoiced that her prophecy, found in a stone inscription was coming true –"as long as the sun and moon shine, may there be joy and steadfastness."<sup>23</sup>

#### Conclusions

With the advent of industrialization, mass production has risen. Consumerism, materialistic exploits and over-exhaustion of natural resources has led to large scale pollution as well as depletion of these so-called renewable resources; not to mention an upheaval in global climate. Acute water shortage is the ultimate consequence. Most countries in the world are suffering from extreme scarcity of drinking water which has resulted in a rise in the death toll. This has greatly affected the agriculture sector which in turn has ten-fold repercussions on a global scale. Most modern technologies are striving to achieve solutions for this crisis. In light of this situation, a look to the past has greater significance; as the realization that past civilizations could survive in harsher odds through time tested means, has surfaced.

India has the second largest population growth rate in the world but is facing an acute water crisis with over 600 million people suffering from little to no water availability. This situation is only expected to worsen, threatening the country's food security as over 80 percent of water is used in agriculture. This has led to an awakened consciousness towards the quest for finding more sources of water. Even the groundwater table has started to deplete rapidly and coupled with pollution and industrial waste being dumped rampantly, the scarcity of clean water is being felt in all levels of society. At this juncture, we find ourselves looking at the collection of rainwater as one of the most significant ways to replenish the water table. According to Purnima Bhatt, author of Her Space, Her Story, with the advent of modern irrigation and water systems, it is not very likely that the

<sup>23.</sup> Bhatt, Her Space, Her Story: Exploring the Stepwells of Gujarat. 2014.

stepwells would be used in the future for the purpose they were built for. However, they are knowledge banks for age-old water conservation strategies which can be incorporated into community-based water harvesting techniques, especially in drought-prone regions.

The relevance of ancient stepwells utilizing the basic points of Rainwater Harvesting is starting to gain notability. Regions, where rainwater harvesting and/ watershed development techniques were utilized, showed great potential in overcoming their water crisis. This has solidified the belief that clean and sufficient water is a fundamental right of all human beings which needs an immediate response.

The failure of adequate government support to address the water crisis in many Northern and Western Indian states who suffer from prolonged scarcity has led to shifting the focus to more alternative solutions in addition to existing approaches. There has been a revival of many community-based water harvesting initiatives undertaken as affordable solutions to water scarcity in many villages. For example, a community rainwater harvesting system was established in Junagadh district of Gujarat where around 2,500 underground rainwater storage tanks have been built which provided abundant drinking water at close proximity. Through semi-circular check dam with iron bars and stones in river sand bed, the run-off from monsoon rains gets stored in levels and ultimately collected in the underground tanks. Through these tanks, water for irrigation is pumped to the fields which practice crop rotation to retain the fertility of the soil. Such initiatives were spearheaded by government bodies like the Ahmedabad Municipal Corporation and the Narmada Control Authority. Thus, awareness of the greatest threat of the 21<sup>st</sup> century is awakened when studying about these ancient marvels as well as offering affordable solutions for it.

It is time to reflect on the words of the beloved Gujarati poet, Dayaram Dalpatram (1896) who, more than a century ago, predicted the crucial role of stepwells in the quest for water, in the years to come through numerous references in his writings and stated:

Resettle the abandoned villages. Seek out the stepwells, wells, rivers, streams and revive the old traditions. Make this your sacred Dharma. (Bhatt, 2014)

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