Ancient Asia

Architectural Eloquence: Water Harvesting Structure in Chanderi, Madhya Pradesh (India)

RESEARCH PAPER

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ABSTRACT

Early settlements grew along river banks and around water bodies. In arid and semi-arid regions of India such as Rajasthan, Gujarat and Madhya Pradesh where rainfall and surface water became scarce numerous water harvesting structures were constructed such as lakes, stepped ponds, stepwells and wells in various forms and sizes to collect and store water. This paper attempts to study a water harvesting structure which is the only one protected by the State Archeology Department of Madhya Pradesh built in 15th century CE in Chanderi town located in Ashoknagar District in the State of Madhya Pradesh, India. Chanderi lies in the semi-arid region hence rainfall is scarce. It is mainly known for its handlooms. Chanderi also has many archaeological heritage assets such as the mosques, temples, caravaraserais, wells, stepwells, stepped ponds and lakes. This paper puts forth a systematic methodology to explore the characteristics and function of the water harvesting structure. Its basic features and elements such as form, size, retaining walls and staircase morphology are considered to understand the function of elements that hold and access water and in identifying its typology. An attempt has also been made to identify its heritage values with the help of key-informants and experts.

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INTRODUCTION

In India, human settlements since time immemorial grew along water edges like the rivers and around water bodies like lakes, wells, etc. "Great cities since antiquity and holy pilgrim towns have sprung up their banks attracting large numbers of pilgrims" (Varma and Sinha, 2011, p. 77). Water being an essential element for survival, people realized that the monsoon months only provided them with rainwater and after the monsoons, the earth seemed dry and water became scarce and hence they realized the criteria for selecting sites for settlement which would continuously supply water till the next rainy season. People observed and studied the topography and developed several features to collect, to access and preserve water and where naturally, the identification of a perennial source of underground aquifer led to the location of a town or village. (Jain, K and Jain, M, 2000, p. 169).

Indus Valley civilization sprung up along the rivers and the urban centers started international trade (Agarwal and Narain, 1997, p. 25). People realized for survival they had to find out ways and means to store monsoon water for dry months and when they realized they constructed water harvesting structures for conserving water in various parts of India (Varma and Sinha, 2011, p. 77).

Morwanchikar (2009) has described that India being a vast country, due to its geographical terrain and climatic factors there are regional variations in the temperature, climate, terrain and rainfall and that over the past several centuries India has developed techniques to harvest every drop of water which includes rain water and ground water hence, in different parts of India one finds different methods and practices to store water for utilization. He further elaborates that usually for habitation, water source was primarily considered as a nucleus and therefore, the settlements grew at important and along large water courses which were considered to be places quite advantageous for trade and commerce. He further states, that settlements started emerging on two different directions one being along the river course and the other around water bodies which gave rise to genesis of water harvesting structures that evolved in different regions of India. As is evident the studies done by Anderson, et al. (2003) showcase how rainwater harvesting had been developed in different historical periods. Their studies revealed that around 4500 BCE adaptation as a response for rainwater harvesting was initially done at Thar Desert, Rajasthan one of the origins of simplest earthworks to harvest rainwater, around 2300–1750 BCE, urban Harappan civilization developed earliest wells of their kind in South Asia; where most agricultural base thrived because of the rainwater harvesting and collection systems and as the surface water became scarce, stepwells were developed in Gujarat and Rajasthan around 7th century CE, in between 7th century CE and 13th century CE many artificial tanks and lakes were built, Chand *baori* (baori also meaning stepped pond in Rajasthan) and perhaps Bheru *baori* at Mandore, Jodhpur were constructed around 1460 CE, Jagu *baori* in Jodhpur was built around 1465 CE, construction of wells, stepwells, stepped ponds and tanks were built in urban areas of Kota and Bundi in Rajasthan around 15th century CE onwards and many more were built till the 18th Century CE. Many of these water harvesting structures with or without steps were known by their local names. Jutta Jain-Neubauer (1981) has identified the local names of water harvesting structures, in Rajasthan, big lakes are called talais, medium sized lakes are called as *taalabs, bandhi, sagar or samand* , stepwells *are called baolis*, *bavadis, bawari* or *jhalara*, a circular or rectangular pond as *tanka and a* small well is known as *kui*. In Gujarat, stepwells are called *vav* or *vavadi* hence, the genesis of architectural typologies such as wells, stepwells and stepped ponds were constructed to conserve water (Jain-Neubauer, 1981, p. 1).

The study of water harvesting structure selected was in the town of Chanderi. This town has been recognized by INTACH (Indian National Trust for Art and Cultural Heritage) as a medieval heritage town in its nomination to UNESCO's (United Nations Educational Scientific and Cultural Organization) tentative list of world heritage sites (INTACH, 2011) located in Ashoknagar district in Madhya Pradesh State of India (Figures 1 & 2). Chanderi (Figure 3) has a warm and temperate climate (http://en.climate-data.org/location/796569). Sharma (1999) has mentioned that some official documents have described Chanderi as a "city" or "charming little city", its charm which comes from its geographical location, set amidst hills, forests, lakes and ponds.

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Figure 1 Map of India showing Madhya Pradesh State location. (Source: http://sehore.nic.in/images/maps/india_map.jpg).

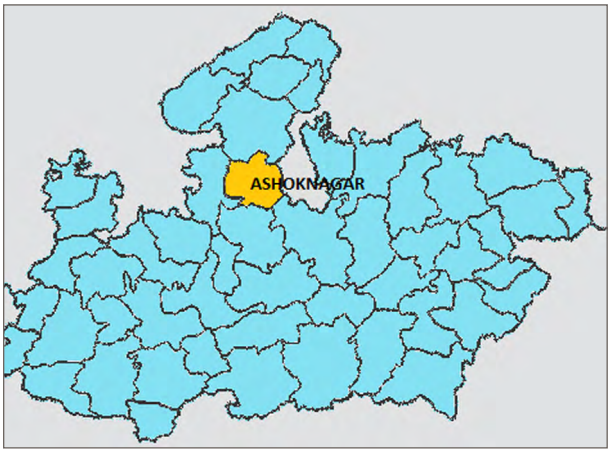

Figure 2 Map of Madhya Pradesh State showing Ashoknagar district. (Source: http://sehore.nic.in/images/maps/india_map.jpg).

Figure 3 Map of Ashok-Nagar district showing location of Chanderi. (Source: http://www.mvss.in/images/ashok-nagar.jpg).

The growth and evolution of Chanderi began from 10th century CE, during the Pratihara kingdom as it was a strategic location and a trade route connecting North and South India, where further around 15th century CE during Khilji dynasty, the rulers took over Chanderi where already the settlements had started to emerge at the foothills of the fort and so to provide water for the inhabitants many water harvesting structures were constructed (LASA, 2011, p. 4–3). Due to scarce rainfall and Chanderi being a trade route between North and South India, many water harvesting structures were constructed in 15th century CE to provide an assured water supply to the settlement, the water level usually being 5m to 10m below ground level (LASA, 2011 and Ansari, 2013). Water considered as sacred, the act of merit to provide water was considered holy hence was the main source of inspiration in construction of many water harvesting structures where they were associated with religious places which gave importance to them thus reducing water pollution and maintaining their sanctity. Many water harvesting structures are presently seen constructed in beige coloured local sandstone having different planning forms with varying sizes. Exploratory surveys in the core area of Chanderi revealed many water harvesting structures varying in shapes and sizes all known locally as *bavdis* (local name for water harvesting structures such as wells, stepwells and stepped ponds with or without steps) except the larger ones which were only two in the core area known as *taalab* (lake). In the core area of Chanderi there are many *bavdis* mostly circular in shape. Criteria for selection of the water harvesting structure Chakla *bavdi* was that it is the largest one in the inner core area of Chanderi measuring approximately 38.5 metres in length and 27.5 metres in width constructed in the core area of the town built in 15th century CE (Ansari, 2013, p. 118) displaying architectural and aesthetic characteristics and is the only one protected by the Madhya Pradesh State Archaeology Department.

METHODOLOGY

Reconnaissance survey was conducted to explore and critically review Chakla *bavdi* by direct observation along with secondary sources such as historical research with search of archival records, manuscripts, printed material, bibliographic and iconographic records, maps, drawings, designs, photographs, prints which helped for further analysis. The next step was to create a database in the form of measured drawings to study the planning form of the water harvesting structure. Data was collected in the form of field notes, photographs, sketches on graph paper, documentation and field photographs which were used as an adjunct to field measurements and most commonly were used for double checking accuracy. To classify the typology measured drawing helped to identify its basic features such as form, size, staircase morphology and construction of retaining walls to understand the function of elements that hold and access water.

Literature studies on heritage value assessment helped the researcher to identify the stakeholders who are involved in the decision-making simply as insiders and where the outsiders have little access to making or shaping the most important decisions of the site (Mason, 2002) hence, heritage values were identified by experts having special expertise to comment on the water harvesting structure selected from various departments such as Archaeological Survey of India-Chanderi, Chief Municipal Officer, Municipal Councillors, Public Health Engineering Department and INTACH members. Heritage values in the context and historic environment of Chanderi were selected by key-informants and experts which comprised of indicators that people wanted to enjoy and sustain for the benefit of present and future generations, at every level. Fifteen key-informants and experts from Chanderi were asked to evaluate the heritage values of Chakla *bavdi* on a 5 point ordinal scale of excellent, very good, good, fair and poor/ negligible who are involved in decision-making such as opinion of archaeologists, municipal councillors and INTACH members.

LITERATURE STUDIES

To study the typology of Chakla *bavdi* many secondary sources were referred. A comprehensive study with a holistic approach to the subject of water architecture was done by Hegewald (2002) where she has specifically studied numerous and spectacular water harvesting structures in South Asia mainly India, Nepal and Sri Lanka which explores their regional context, location, various forms and parts, function, interpretation, meaning and

construction where five types of water structures have been identified such as *ghats* (steps into water), tanks, *kundas* (deep stepped basins), wells and ornamental pools in palaces and water gardens were identified from simple to complex forms of architectonic forms. Bunce (2013) has studied the well and tank forms of the Indian subcontinent and has categorized them based on their form, size and shape and has very well presented the measured drawings along with dimensions, proportions which unravels the different elements of the water structures. Jain-Neubauer (1981) who is an art-historian has classified five main types of stepwells in Gujarat based on the architectural ground floor plan and its basic architectural characteristics along with description of the monuments. Based on the above literature the author meticulously studied each and every category which included its location, archival records, measured drawing and physical characteristics so as to help in identifying the architectural typology of Chakla *bavdi*.

Through the literature studies and data collected there are mainly three types of stepped water harvesting structures such as the lakes provided with steps, stepped ponds and stepwells.

Kirtane and Gandhi (2006) touched upon aspects where many lakes (*talabs*) were constructed and maintained by people in Bundelkhand region where these lakes help in increasing the water table of the nearby areas and are used for irrigation. Their studies highlighted that as a result of direct irrigation from these tanks, they become empty much before the onset of summer, whereas their original purpose was to provide water throughout the year as well as to store water for use in drought years (Kirtane and Gandhi, 2006, p. 97, 98). Manuel (2006) gave an account of large open lakes or tanks near ancient temples and habitation sites which showed the perceived importance of *in situ* rainwater storage mechanisms. Large reservoirs which accumulate rainwater are seen in many towns which act as water reserves for the communities (Hegewald, 2001, p. 78).

Due to unavailability of water, artificial tanks were constructed on site (Jain, 1985, p. 53). Many temple tanks were built in the vicinity of temples. Stone was quarried for construction of temples and the same large excavation was used to design the temple tanks with or without steps to store water since water is considered sacred and holy in Hindu religion. The rivers, underground streams and ground water were accorded sacred importance. Water management system with regard to medieval temples in Western Maharashtra, especially stepped pond, locally known as *Pushkarni*, at Loni Bhapkar built in 14th century CE was studied by Mate (2006) where he concludes that this *pushkarni* was built adjacent to the temple. Sanskrit meaning of a pit or pond is a *kunda* which is constructed as a large square, octagonal or oblong having various sizes (Jain-Neubauer, 1981). As Hegewald (2002) mentions that tanks are shallow structures having a large surface area on the other hand comparatively *kundas* are deeper and have a smaller surface area where the methods of collection and drawing water depend on the differences of the construction techniques where usually tanks collect rainwater or water from channels and stepped ponds (*kundas)* are usually fed by ground water and are sacred water structures connected to religious buildings (Hegewald, 2002, p. 73).

According to Jain-Neubauer (1981), stepwell itself indicates the architectural characteristics in the form of a step and a well which characterizes its architectural features. A typical water related deep underground structure composed of a circular water well having a stairway leading down to make it easier for people to reach the ground water were constructed for utilitarian purpose sometimes having architectural significance is usually described by art-historians and architects as a stepwell (http://en.wikipedia.org/wiki/Stepwell). Jain (1981), describes basic typologies of stepwells based on the features of architectural ground plan such as stepwells with straight descending stairway, with L-shaped stairway turning at right angle, if the required length for a straight stairway to reach the groundwater table was not available a circumambulatory passage around the well was given, often with rooms and chambers in various storeys below surface, and with a cross shaped plan and four descending passages meeting in the Central well. Shah (2005) too categorizes the typical stepwell as square, circular or octagonal well approached by a long flight of steps with landings. He further states that the increased complexity of the architecture as the steps descend is a typical feature of the stepwells as there is nothing much to be seen at ground level but just the entrance regarding this the stepwell represents an unique "upside –down architecture" (Shah, 2005, p. 130).

Stairs act a movement guide towards the source and acts as a physical link between the confluence of horizontal and vertical movements and the flight of steps have nodes and landings at intervals which act as pause point (Pandya, 2005).

To evaluate heritage values, indicators play an important role. Heritage value assessment would act as viable basis for recommendations, guidelines and policies which would help to enrich such structures. Literature related to architectural conservation was studied with an in-depth understanding of heritage values. Various charters and heritage values were identified in context to the study.

Avarami, E., et al. (2000) report the need for heritage values. Low.S, (2002) has described ethnographic methods for assessment of Cultural Values in Heritage Conservation. To distil good practice in site studies the principles, policies and guidelines have been documented in English heritage (2008) which provides a comprehensive range of heritage values arranged in groups which can be attached to a place.

> "Places with heritage values can generate wider social and economic 'instrumental' benefits, for example as a learning or recreational resource, or as generator of tourism or inward economic investment, although their potential to do so is affected by external factors, such as ease of access" (English Heritage, 2008, p. 27).

The heritage values were classified by Feilden, B (1989) under three main headings as Emotional (Identity, Continuity, Religious and Symbolic), Cultural (Documentary, Historic, Archaeological, Architectural, Social and Scientific) and Use values (Direct, Indirect, Bequest and Economic). Bal, M., et al. (2011), paper identifies the relationship and the role of values between urban lakes systems (ecological systems) and governance (social systems). Carneiro, A., et al. (2012) helped the author along with experts to identify heritage values for Chakla *bavdi* of Chanderi with a view towards formulating indicators for heritage value assessment. After having listing down the heritage values they were seen overlapping but were directly significant for the indicators mentioned. Mason's (2002) paper puts forth criteria's for selecting appropriate methodologies (strategies) and tools (tasks) to assess heritage values as part of integrated conservation planning for heritage value assessment.

Alonso and Meurs's (2012) article emphasized for evaluating values indicators linked to cultural heritage. Mason's (2002) objective was to know the perception and opinion of people about the structures and whether they are worth conserving to further help and suggest the degree or level of significance and recommendations for the same (Mason, 2002, p. 24).

To defend our heritage on a long term basis Chainani (2009) puts forth that it should be through heritage regulation and legislation. In heritage conservation briefs on Legislative and Organisational policies for India he further writes that, a good definition of the physical heritage that we seek to preserve would be "buildings, artifacts, structures, areas, streets and precincts of historic or aesthetic or architectural or cultural or environmental significance and natural features of environmental significance or of scenic beauty including but not restricted to sacred groves, scenic points, walks, rides, paths, hills hillocks, water bodies such as lakes, kayals (and the areas adjoining the same), open areas, wooded areas etc" (Chainani, 2009, p. 9). He goes on to add that special attention needs to be paid to water bodies which are integral parts of our natural heritage.

Bal, et al. (n.d) in reference to socio-cultural values in India describe that traditional step-wells and stepped ponds are an important aspect and are still considered to be sacred, the values during historic times were used for domestic and utilitarian purposes and with modernization, the community managed water systems were shifted to State for maintenance and managing them, in recent times spatial planning and development altered the existence of water bodies that were State owned where the State is seen as service provider, while community is the user. They further elaborate that value based approach is a driving factor for changes in the urban conservation fabric. They mention that the water systems today are at a major risk for urban societies since the opportunities to integrate and inter-relate are limited, the deteriorated state of these after revival and integration can accelerate the transition and again become a source for societal development, anthropogenic activities and degradation of water resources brought ecological and sustainability values high on the water management and

conservation agenda and where economic-socio-cultural values are considered necessary for ecological sustainability, integrated water management and sustainable water management are the main conceptualizations of the attempt to find balance between the social systems and water systems (Bal, et al. n.d). Rohilla (2007) states that Value-Based Approach is simply an approach to urban conservation that identifies the values attributed to built heritage by all stakeholders and incorporates value-assessment in deciding any future use, alteration, repair or development (Rohilla, 2007, p. 100). According to Mason (2002), values in conservation can be defined as simply as a set of positive characteristics or qualities perceived in cultural objects or sites by certain individuals or groups. Mason's paper argues for a deliberate, systematic, and transparent process of analyzing and assessing all values of heritage. It explores issues, methodologies and tools applicable to value assessment to assess heritage values (Mason, 2002, p. 4–5).

According to author Bernard Feilden (1989), 'Values' assigned to cultural heritage come under three major headings:

> "*Emotional Values:* a)wonder; b)identity; c)continuity; d)spiritual and symbolic.
> *Cultural Values:* a)documentary; b)historic; c) archaeological, antique; d)aesthetic and symbolic; e)architectural; f)townscape; landscape and ecological(issues such as land, water, bio-diversity and environmental health are ecological values); g)scientific and technological.
> *Use Values:* a) functional; b) economic (issues such as economic performance, benefits, production and consumption, waste generation and management are economic values) c) social (issues such as equity, health, education, awareness, security and demographic pattern are social values); d) political" (Feilden, B. 1989. p. 4).

Many authors have defined different aspects of heritage values. Mason (2002) has tabulated summary of heritage value typologies shown in Table 1 (Mason, 2002, p. 9).

Table 1 Summary of heritage value typologies devised by various scholars and Organizations.

REIGL (1902)	LIPE (1984)	BURRA CHARTER (1998)	FREY (1997)	ENGLISH HERITAGE (1997)
Age	Economic	Aesthetic	Monetary	Cultural
Historical	Aesthetic	Historic	Option	Educational and Academic
Commemorative	Associative-symbolic	Scientific	Existence	Economic
Use	Informational	Social (including spiritual, political, national, other cultural)	Bequest	Resource
Newness			Prestige	Recreational
			Educational	Aesthetic

Mason (2002) has defined identity value as a place attachment which refers to feelings of affiliation and which relates to the social uses of the historic environment, which help to reinforce community identity and build social capital and foster social cohesion (ibid, p. 12). A living form of heritage which is continuously recreated and which evolves as we adapt our traditions or techniques in response to our environment has continuity value (http://www.unesco.org/culture/ich/en/faq-00021). Mason (2002) refers that religious value or spiritual values emerge from the philosophy and belief system of organized religion as it also gives a sense of secular experience of wonder, awe, and so on while visiting heritage sites, he describes symbolic value to those who have a sense of association with heritage structure that may not be specifically historic and refers that documentary value has special importance and should be documented for next generation (ibid, 11). A historic value is the capacity of a site to convey, embody, or stimulate a relation or reaction to the past (ibid, p. 11). English heritage document defines historic value as the events of past history of people and their life to the present context since it tends to be illustrative or associative (English Heritage, 2008, p. 7).

The archaeology value lies in the potential to gain knowledge about the past in the future (Mason 2002, p. 11). Carneiro, et al. have defined architectural value as that which refers to the types of construction and materials of the components that hold the character (Carneiro, et al., 2012, p. 38). 'Social value is associated with places that people perceive as a source of identity, distinctiveness, social interaction and coherence (English Heritage, 2008, p. 32). Scientific values from the point of view of science (Roders, 2013, p. 4). To understand the relationship between value and environment Bal, et al. (n.d) highlight the role of values to understand the relationship between value and environment. They further describe Kolstad's total economic framework where drinking water, ground water re-charge, bathing and washing as direct use values while experiencing water, the landscape, fauna and flora which are examples of indirect use-value (Bal, et al., n.d, p. 3). Economic Value is defined as the most powerful tool in which society identifies, assesses, and decides on the relative value of things (Mason, 2002, p. 12). Bequest value evolves from the wish to bequeath a heritage asset to future generations (ibid, p. 13).

Alonso and Meurs (2012) paper aimed at reviewing various theoretical perspectives for the evaluation of the performance of conservation activities, as well as the various indicators that have been used for assessing both their positive and negative impacts. They further emphasize that indicators are useful for evaluating long-term trends and informing on planning and policy making and indicators should be dictated by aims of conservation and by the values linked to cultural heritage that we are trying to protect. Carneiro, et al., (2012) have concluded that one of the requirements for conservation is the elaboration of an inventory and indicators to monitor the level of conservation and have tabulated a set of heritage values of Burle Marx gardens in Recife and their respective indicators of conservation.

RESULTS AND DISCUSSIONS

Chanderi has many archaeological structures built during the 15th century CE such as the mosques, temples, caravaraserais, wells, stepwells, stepped ponds and lakes. Most structures are dressed in its unique beige stone masonry.

Chakla *bavdi* is located away from the main road and has an enclosed compound wall on all four sides as seen in Figure 4. The information panel written in Hindi script (Figure 5) is placed at the West main entrance which leads towards two domed shaped pavilions (Figure 6) having twelve columns (Figures 7 and 8) giving it a formal symmetrical shape. The main water harvesting structure can be accessed from the East and West flight of steps.

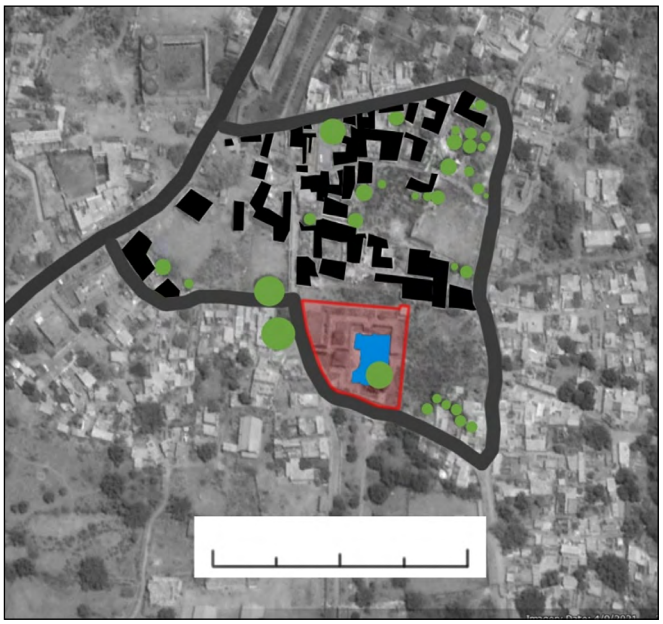

Figure 4 Location of Chakla *Bavdi*.
Source: Author (location of Chakla bavdi, roads and a few settlements superimposed on Google Earth Pro).

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Figure 5 Information panel written in Hindi script. Image Source: Author during field visit.

Figure 6 View of two domed pavilions from the entrance. Image Source: Author during field visit.

PHOTOGRAPHS

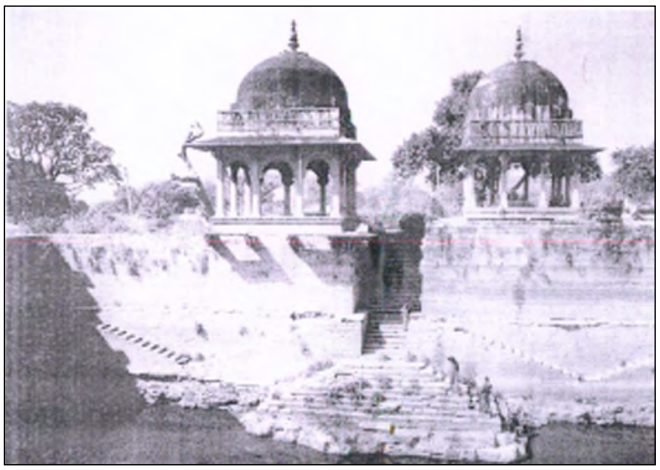

Figure 7 Two domed pavilions seen and triangular formation of steps seen from inside along the four retaining walls. Source: (Sharma, K.L. (1999). fig.142).

Figure 8 Two domed pavilions seen and triangular formation of steps seen from inside along the four retaining walls. Image Source: Author during field visit.

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Figure 9 View of the rectangular stepped pond showing the niches in the walls and triangular formation of steps to access water. Image Source: Author during field visit.

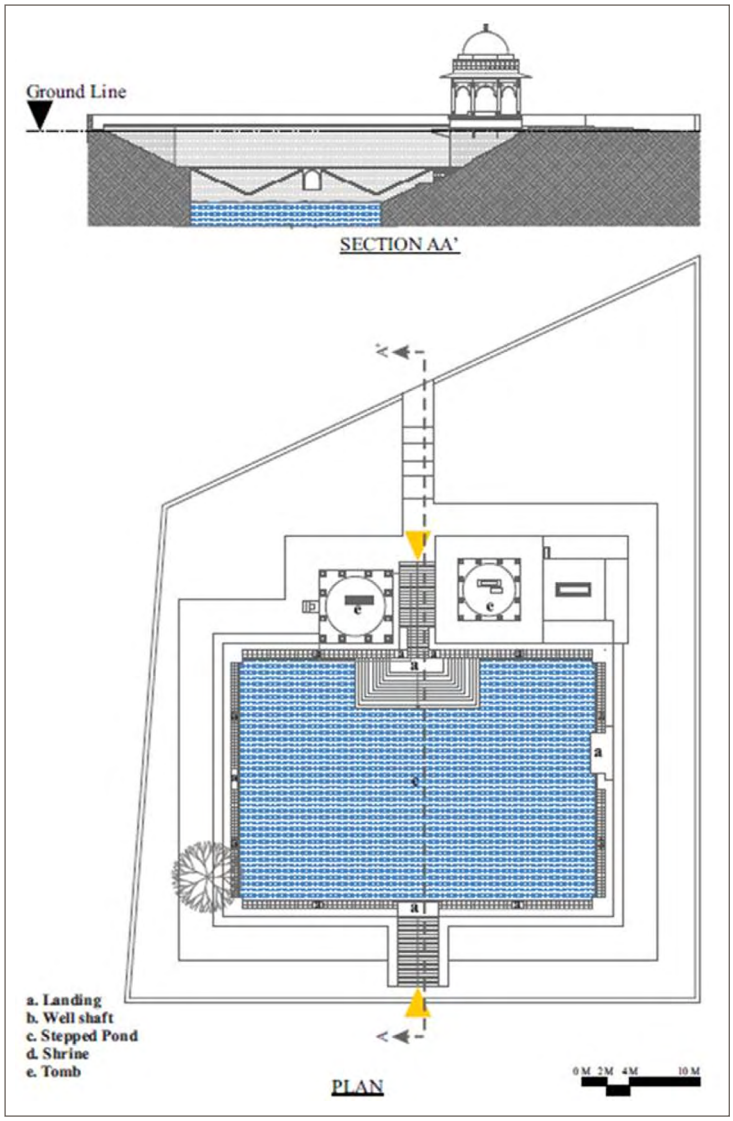

Figure 10 Measured Drawing of Chakla stepped pond.

All the wells, stepwells and stepped ponds are known as *bavdis* by the local people of Chanderi. From literature studies and primary surveys done on site and after analyzing all the eloquent characteristic features of the water harvesting structure it can be said that the architectural typology identified of Chakla *bavdi* is that it is mainly a stepped pond. The Chakla stepped pond has dome shaped pavilions on either side which act as directional foci built over two tombs, wherein one belongs to the queen (Sheikh Raji's wife) while the other is without an inscription and probably of a saint as per archival records.

The architectural analysis includes the form and size, access, circulation and the construction skills. The measured drawing (Figure 10) revealed the dimensions of the stepped pond having length 38.5 metres and width 27.5 metres with more than 10 metres depth hence the form and shape was huge and rectangular. Pavilion towers on west side act as a directional foci. Access was from two opposite ends West and East. A narrow ledge surrounding the interiors

of the stepped pond descends towards the water body from two accesses on opposite sides. The most distinguishing feature was arrangement of steps. Triangular formations of steps in a crisscross manner (Figures 7, 8 & 9) were seen on all four sides which added to the aesthetics of the stepped pond. A space for water lifting device was located at the Centre of the North face of the stepped pond. The construction indicated the creativity with respect to form and shape. The stepped pond is retained by retaining walls to sustain the thrust pressing against the vertical side walls and to resist the lateral forces from the earth. Pavilion towers sustain the thrust pressing against the vertical side walls in the ravine-like stepped corridor. Riser-Tread ratio is 1:1.6 (180mm: 300 mm) which is fairly comfortable to descend and ascend. Since, it is protected by State Archaeology department its access to people is limited.

The built form, size and scale were constructed using local beige sandstone masonry by traditional processes, technology and knowledge systems. Chakla stepped pond has historical significance since the surroundings and town in which it exists, have a rich history dating back to the prehistoric times established by the discovery of a rock shelter with Mesolithic and Chalcolithic paintings at Nannon (LASA, 2010, p. 4–3). INTACH (2011) reports that Chanderi peaked under the Mandu Sultans (1401 CE-1558 CE) of the Malwa region, when the city flourished in arts, architecture, literature, music, textile weaving and other disciplines where most of the temples, tanks were constructed. Chanderi, thus overtime records heterogeneous civilizations: the Jains, Hindus and Muslims where they co-exist in harmony and synergy (INTACH, 2011, p. 7).

Literature studies and field surveys revealed that Chakla stepped pond was an interaction zone for social and recreation activities meant for bathing of the royal household ladies and not the common people integrating the daily routine within their existences. Chakla stepped pond is in the vicinity of the ruins of a large palace, possibly also of the Khilji period (Ansari, 2013, p. 118; http://chanderi.org/page/10). Chakla stepped pond being huge has a good effect on the microclimate. Also one observes a great amount of bio-diversity due to vegetation around it. Chakla stepped pond forms an important component of Chanderi, as it reflects the historic layers. Architectural value is the most important aspect, the reason being that there is uniqueness in the eloquence of architectural typology forming the tangible heritage along with traditional materials and building techniques representing the architectural richness of every phase of evolution. The variant architectural style is a major part of Chanderi's cultural landscape. Hence, it can be said that Chakla stepped pond being built during 15th century CE has heritage values.

With the help of fifteen experts and from literature studies the author along with the key-informants and experts from Chanderi town identified sub heritage values under Emotional, Cultural and Use Values for application towards heritage value assessments. Each value and sub-heritage value helped the experts to evaluate on an ordinal scale of excellent, very good, good, fair and poor/ negligible (Table 2). These values varied from expert to expert based on their perceptions.

Chakla stepped pond was rated excellent and very good for most of the heritage value categories.

Table 2 Heritage value assessment given by experts.

VALUES	SUB-HERITAGE VALUES	EXCELLENT	VERY GOOD	GOOD	FAIR	POOR/ NEGLIGIBLE
Emotional values	Identity	15	0	0	0	0
	Continuity	0	0	9	6	0
	Religious	0	0	0	0	0
	Symbolic	12	3	0	0	0
Cultural values	Documentary	6	5	4	0	0
	Historic	11	4	0	0	0
	Architecture	9	6	0	0	0
	Archaeological	13	2	0	0	0
	Social	0	0	4	11	0
	Scientific	5	4	6	0	0
Use values	Direct	0	0	0	15	0
	Indirect	3	4	8	0	0
	Bequest	15	0	0	0	0
	Economic	14	1	0	0	0

All the key-informants and experts scaled identity value and bequest value as excellent as the society identifies it and the region has got its identity and also as it needs to be conserved for future generations, 14 of them rated economic value as excellent in which they interpreted that in which the society assesses and decides on its relative value, since these have been built more than 100 years ago they are irreplaceable and also have a tourist potential, archeological value was scaled excellent by 13 of them as the components that hold the character of the water source and has special importance, 12 experts scaled the structure as excellent and termed it as being symbolic since it is a part of an event and the of the persons in the past and also a part of the historic environment as it was built in the memory of a person and also as a landmark in the area.

CONCLUSION

This comprehensive study and an in-depth understanding of the water harvesting structure lead us to a conclusion that the structure not only responds to water but influences the eloquence of architectural characteristics it creates. The significance of the architectural manifestations and construction of Chakla stepped pond indicated the creativity with respect to planning form, size and access. Pavilion towers on West side seen from the entrance gate act as a directional foci, they also sustain the thrust pressing against the vertical side retaining walls in the ravine-like stepped corridor. The stepped pond was rectangular where the most distinguishing feature was the triangular formation of steps which added to the aesthetics. It had stone retaining walls made of sandstone which had one basic feature, regardless of their size that they store water in a volume of space seen employed to a great depth as their walls were self-supporting and distributed a lateral force of the surrounding earth. Possible conservation of Chakla stepped pond will not only help improve the physical attributes but would also help in larger context. The importance of heritage values is not only to transfer our past values to future generations but utilizing the water heritage asset wherever possible as a significant source to facilitate and improve their conditions, besides having heritage values which can also help to overcome the water scarcity issues if integrated with proper planning and execution.

COMPETING INTERESTS

The author has no competing interests to declare.

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