Understanding a New Combination of Technology and Art in Historic AbbasAbad Garden-Behshahr, Iran

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ABSTRACT

A garden with exotic elements with a four-arched building among seemingly stagnant pool water which appears two different figures in hot and cold seasons; such a way that during pool dewatering, it completely submerges and is seen as an island in the middle of water and at other times appears as a two-storey building with a quiet and sedate appearance. This weird building that had been as the resort of Safavid Kings has had an interesting application in maintaining and activating the pool set, a logical application with precision and calculative engineering. Form and function beauty with stunning geometry in the middle of the pool, is associate with engineering application in the field of dam and its protection, and accurate calculation of water motion and flow penetration. What is discussed in this paper with descriptive and analytical method based on field data according to archaeological excavation and library is coordination and cooperation of form with function and dam engineering operations and water circulation system in this garden.

Key words: Persian Garden, Four-arched, Pool, Dam engineering, AbbasAbad Garden

Introduction

9 kilometers from southeast of Behshahr over Alborz heights, in a dense forest after Altapeh village, historic collection of AbbasAbad is located. AbbasAbad historic garden has been constructed on top of a natural hill; thus, engineers of Safavid period have created terraced and stepped garden by cutting the hill and creating step and platform and built the mansion on the highest part of the hill and based on obtained evidence is one of the most unique Persian Gardens. In addition to the mentioned mansion they built a large pool in the center of the central terrace and smaller pools around. On the basis of the ramp and also clay pipes, water had appeared as fountain from the upper part of central pool and the rest filled the lateral pools through clay pipes. The collection had included: dam, two brick towers, garden, bathroom, water distribution station area, the possible location of palace, water mill, industrial centers and cobblestone roads which had been built to the year 1020 to 1021 lunar calendars coincided with establishment of Ashraf-ol-belad or currently Behshahr, and to the order of Shah Abbas Safavi. The garden architecture has been constructed on the hill and almost toward Kiblah, based on available evidence sunrise and sunset was visible in the garden. And symmetry of passages and canals of irrigation made it beautiful.

Methodology:

This collection is about 5300 hectare. Although most parts of the collection have undergone erosion due to regional climate; in its every inch there are lessons to learn and points to discover; so, in this paper, it has been sufficed to explain four-arched function in the lake and water circulation system;
library and field methods and also data from archaeological excavations were used as collecting methods and descriptive-analytical method as research method.

The main question of this research is that how technical and functional performance of this garden is regarding dam construction and architecture science? And in line with this, subsidiary question such as how has been placing of recreational performance and technical function together. This research is based on the assumption that architecture elements and components in this garden from the perspective of Persian Garden-building and dam construction has reached its peak so that placing both recreational and technical performance together has been occurred the best possible. The architecture of this garden has also been influential on the architecture of other gardens in other parts of Iran Plateau.

In this regard, this paper first introduces AbbasAbad Garden-Behshahr and according to the role of water in the architecture of this garden and Persian Gardens, this issue is explained. Next, water circulation system of this garden regarding the four-arched in the pool is discussed. The base of these descriptions was archeological excavations in the garden and finally, technical performance of this garden was compared with contemporary examples in new dam construction. Meanwhile the effects of architecture of this garden on other Persian Gardens were also addressed.

**Fig. 1:** Four-arched building among pool

**Persian Garden:**

Before the Industrial Revolution and rapid growth of cities in the Muslim cities and even before it, relationship between human with natural environment and built environment was establishing consciously. Since ancient times, Iranian rites and rituals have established a very intimate relationship with sanctifying “trees” and “greenness”, in which, sanctity is experienced as an objective and scientific issue in skeleton. Paying attention to each of classical four elements in Persian Garden has old deep rooted: Soil, Water, Wind and Fire, each of which is used according to their feature in structure of the garden” [1].

The Persian garden, as a perfect structure, demonstrates a close relationship between cultural and natural backgrounds and indicates an adaptation and alignment between human needs and the nature. In the past, the Persian garden would help reveal latent potentiality of the environment and perceive its intricacies. The creator of the garden would rely upon his own experimental knowledge to create a place, which brought about the survival and dynamism of the natural background. [3] In the meantime, Persian Garden design has been influenced by the other nations without paying attention to the transposition and/or vice versa, “Persian Garden design in the after advent of the Islam has been designed based on square shape. This shape is mostly in complete square or rectangular shape. It can be confessed that structure of Persian Garden is designed based on Mandalay shapes with the distribution of water circulation in gutters [6]. Also, in geological aspect, Persian Garden was also constructed at the places which enjoyed potential talent of garden construction in terms of environmental capabilities” [4]. Paying due attention to the “vastness, landscape and respect” can be observed as salient architectural components of the Persian Garden. For this reason, interpretations such as "Rozat-e Jannat", "Jannat", "Rozat al-Sefat" and "Ferdows, meaning Paradise", etc. have been used for it in different times. The picture of AbbasAbad Garden is demonstrated in Fig. 2.
Generally, two knowledge attitudes, special of Persian Garden, can be observed in contemplation of design, construction and preservation of the Garden (Figure 3):

1- Climate Ecology
2- Commitment ecology

The role of water in Persian Gardens architecture:

The water, lifeblood, is not only stuff of childish games from long ago; but also is the basis of formation of cities and architecture of various periods; a goddess who was worshiped in various religions and repeatedly has been promised in its flow in paradise in our holy book. Basin is role of 4000 years old pottery bowls which later formed an exemplary model of Persian Gardens. What we read is a new game of water circulation in small paradises that Safavid architects built for healing wound of being driven from paradise and remembering what remains of paradise in our minds. Water is the basis of majority of Persian Gardens (Note 1). Water sound has been always pleasant and sweet for Iranian. In AbbasAbad building this beauty is fully abide in fountains and waterfalls which connected route of garden, lake and bathroom; while this water was used for circulating water mill at upper part, water bath supply and also as source of water storage as a dam.

AbbasAbad garden Introduction:

AbbasAbad Garden due to having salient and smooth landscapes as the lake scene on the south side, Behshahr landscape and Miankaleh Gulf on the northern part, gave spirit relaxation and special comfort to Shah Abbas Safavi. This garden was exemplary among Persian Gardens of its time; and
can be side that the description of Sir Thomas Herbert in his own itinerary of this garden is a witness to this claim. "AbbasAbad Garden is no more than 2 miles away from Behshahr and unique due to a rare summer palace in it and is beyond other similar palaces due to landscape, bathroom, water supply facilities and hunting in which there are various forms of play devices" [2].

The garden space is divided into two parts. Four-garden space and main garden space. The role of four-garden space is to distribute water to the main garden space, this transfer had been done through conduit pipes and outdoor based on height difference and existing topography [5]. The main garden space studied in this study includes dam, lake, four-arched among it which will be discussed in more detail.

Specifications of four arched of artificial lake:

In the center of artificial lake of AbbasAbad-Behshahr, there is a four-arched brick building that for a while upper surface formed building ground with wood and pottery ceiling. The four-arched submerged during dam dewatering and only its upper surface is out of water like and island. Basis of the four-arched was built on eight piers surrounding and a pair in the center. Piers dimensions are almost 4m×4m which are placed on a platform; what seems important is lack of brick stairs in the building and around the four-arched; it’s possible that building was first constructed to retrofit the dam and then according to dam dehydration was provided with recreational use. Based on repeated field studies that have been conducted, it can be side that water of two important springs Ghuri Cheshmeh and Sar Cheshmeh from upper part based on the ramp and also using related conduit containers which were protected by brick wall drove water to the upper. Probably based on the height difference of the two springs to the four arched and also law of related containers, water conduit was filled as fountain of central pool and than water overflow was divided into other pools through water ways and then the surplus was poured from the four arched to the pool. Water falling into pool caused water music sound or murmuring in the pool and the basis of AbbasAbad architecture is based on the same issue. According to what was stated, recreational use of mansion inside the pool is proved. For accessing the recreational use of building inside the pool; a deck-like wood bridge was established in the north of the building. But in addition to recreational use of the mansion, it has had other technical and scientific applications in dam construction.

Mansion building consisted of eight piers in the surrounding and one pair in the center. The central pier has a related network pores which has operated as a valve if necessary; this way that after closing the dam valves and dehydrating its reservoir, if the dam was under pressure or if moved slightly; dam structure engineers didn’t empty water from dam valves but water draining was done through central dam reservoir. For example, if water draining was done when emergency through dam valve; pressure and influx of water for draining was important in accelerating dam destruction; to prevent dam destruction in an emergency after dewatering, presence of the four-arched with related lattice piers seems necessary. Thus, by building the four-arched and lattice piers (Fig. 3) in the middle of the dam prevented from dam destruction, such a way that water was sucked from reservoir center through the central lattice piers of four-arched and then driven downward through canals under the dam to about 200 m to reduce water pressure on the dam span.

Fig. 4: lattice piers in the middle of the dam [5]
Comparison of four-arched performance of Safavid age with today samples:

The world’s largest glory hole of “Monticello” dam is located in California. The cone-shape output when the dam reaches its extremity capacity, can swallow 1370 cubic meter per second and transfer to downstream. This type of overflow is basically a big concrete cone with a diameter of 22m that in the bottom reaches 8m. During dry months of year that dam water level is low enough, skaters and cyclists use overflow output as a place to practice.

Glory holes act like pool drainage wells but in a larger scale; while drainage wells are on the pool floor but overflows are at a certain height that if the water level behind the dam reaches a higher level, instead of moving through dam body which may lead to dam damaging, the water passes through the overflow and is guided to downstream. If there is not enough space at the dam site for constructing normal overflows that are like slide, glory holes are used. These overflows are like a cone at the top and transfer water to dam downstream through a concrete pipe that is located at the bottom of the cone. Shiravan dam in Iran has also glory hole. According to the stated items, four-arched of Safavid architects has also had the function of water lily outputs with fantastic image, pleasing landscape and the delightful sound of water music. As the first ShahAbbas had left his throne in Isfahan and to related the trip suffering; and every two years traveled to this region and spent Noruz in this beautiful place.
Comparison of the garden with similar examples of Persian Gardens in terms of appearance:

This historic garden has some similarities with Eelgoli Tabriz and CheshmehAli Damghan in terms of appearance; meaning that one building has been built among an artificial lake. It should be mentioned that the above examples have been modeled on the construction of AbbasAbad collection according to construction date; but what introduces AbbasAbad collection prominent than the two above collections is the amazing combination of performance and beauty, which if is not missed in today architecture, is definitely faded.

Fig. 7: CheshmehAli Garden, Damghan (http://www.tarikhaneh.com/damghan%20photos/images/cheshm-e-ali1.jpg)

Fig. 8: Eelgoli Garden, Tabriz (http://parvazz.bloghaa.com/files/2010/03/6u9mnw8.jpg)

Conclusion:

According to what stated, the four-arched in center of AbbasAbad dam reservoir, in addition to recreational application, scientific and technical applications in dam construction are also proved. Such that its existence increases dam foundation resistance and this relation and impact is undeniable. The function which passes 400 years since its implementation but it is still effective and as we observe in new dam construction this technology which was used at that time is also used as glory holes.

Moreover, although several gardens have been remained from Safavid period in Behshahr, AbbasAbad Garden is prominent than other Persian Gardens in this area for some reasons:
A) Lack of similarity of AbbasAbad plan with plans of other contemporary or older gardens.

B) Architecture element and components of Persian Garden, AbbasAbad reached its peak, that can refer to two brick towers and pool which is not observed in any other Persian Gardens.

C) Technical and functional application of dam construction along with recreational application is quite evident.

D) Due to strong reasons, architecture of this garden has been influential in two areas of North West and central plateau of Iran that Eelgoli and CheshmehAli of Damghan are significant examples which are influenced by art and architecture of central building and dam reservoir of AbbasAbad.

References


