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# Manifestation of Water in the Formation of Iranian Art and Architectural Desert

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## ABSTRACT

Desert is known as one of the most strangest and metaphorical places in Iran. Desert, the infinite trace of dunes has human beings living inside who have made exquisite and wonderful elements by minimal facilities. One of the scare and extinct elements in desert is water. Water, the life-giving substances which has a great share in growth, completion and genesis in civilizations has been sainted by all people of the world, especially the people of this region. So, considering its role in continuity of life, water has a holy place among the people living in desert. On the other hand, recognizing the architecture elements connected with water and the cultural substructures and the historical links of our people with water has a great role in advancement of today's architecture science and continuing local and traditional architecture in the lost culture of contemporary machine-like life. Holiness of the buildings connected with water and protecting them in the culture and civilization of Iran as well as constructing and inventing exquisite places such as glaciers, cisterns, and Qanats (Aqueduct) which are masterpieces of Iranian architecture art and industry is the national and cultural task of all Iranians who value the architecture and grand culture of their territory. This article is an attempt to declare the effectiveness of water in formation of various kinds of special architecture and the related issues and the place of water in genesis of desert architecture and challenge how the continuity of this effectiveness in modern architecture would be reclamation of such spaces.

**KEYWORDS:** Desert, Traditional Architecture, Modern Architecture, Water, Civilization, Holiness

## 1. INTRODUCTION

"And we made every living thing out of water." [1]. Since the beginning of life, water has been caused gatherings, outspread and development of life. This substance has a very essential role in formation of human commons as well as placement of nations together. All of the first known civilizations were formed next to the streams or rivers. The name of civilizations such as Mesopotamia (between two rivers) and Transoxiana (next to the river) has been obtained from the rivers. After settlement of nomads and emersion of agriculture industry and dependence of human being to the water, the water got more advertence and the water turned to be honored and sacred in a way that the god of water was known as one of the most powerful gods during the ancient age. In our region, Iran, the water had an extraordinary importance too.

Our ancestors honored the water and its maintenance since they believed that water is the element their life and survival depends on. Desert is a place in Iran that severely depends on water for continuity of life. Desert, the boiling sea of dunes, with its vast expanse and calmness bur rare water has compelled our ancestors to look for innovative and different technics to detect, discover, exploit and save this valuable essence. The methods used for this purpose were unique and unparalleled. In this article, it has been tried to review the influence of water on creation of architectures related to the water, formation manner of water-related architecture elements, and desert interaction with architecture and water in order to find out a solution for today's human being who is captive with drought and water scarcity.

Since the old days, the subject of water and its protection has been mixed with the culture and soul of Iranian people. Placements of Iran in dry and arid region of the world, and dependence of human being to this valuable substance have caused our people to pay more attention to water. Iranian architect, as a person grown and emerged in this origin has linked water with architecture and its habitant properly and has heightened its place as high as possible.

"And his throne was (then) upon the waters." [2].

The Anahita temple in Kangavar is actually god-like sanctification of water in the concept of Iranian ancient architecture. It is the symbol of magnificence and glory of the element which has found divinity, which is from heaven and people pray for raining and celebrate rainfall joyfully. "He sends water from the sky." [3].

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Pray for rain is one of Islamic and ancient ethics, a part of advanced culture of people who believe that the secret of life in in prays and thralldom towards the God who are praising. So the place of such a sacred element should be found in temples, shrines, mosques, gardens and houses and in everywhere which includes life for its people. ” [1].

Iranian architect have designed these places considering a special elegance for designing the places for maintaining, cool-maintenance, taking the water as well as decorative uses of water.

Elements such as well and Qanats for taking water,

Water mills for preparing breed flour,

Springhouse, cellar, cistern and icehouse for cool-maintenance,

Runnel, tank, water well, pool for space subtilizing and space decorating. Now we will review the applications of these elements and how they have been used by Iranian architects to determine the architecture limitations in brief.

**Water mills**

Water mills called “Tahune” in Old Persian are all around the world in different forms which were used for flouring the wheat and other grains to make breed and other uses.

Water mills are known as historical places in Iran, especially in Yazd province which were usually made next to the villages, on the way of Qanats. There are manual mills in the old houses of Yazd which are made of two flat stones place on each. A handhold is connected to the upper stone which is turned by hand. The name of this mill is “Dastas” which is also called “Ardchi” or “Archi”.

The internal building of mills has a number of rooms for the purpose of miller’s rest and barn of wheat which are to be floured. The oldest mill in this province is “Ashkzar” water mill which dates back to the Ilkhanid era.

Among the unique characteristics of this mill, Mogahrnas works of internal spaces, geometric designs around the walls, delicate brick work in the main area of mill, and its octagon floorage could be mentioned. Each mill includes different parts and the main part is named “Tanureh” which was designed in reverse cone shape in a way that the stored water inside it went off from a small hole to move the wings of mill stone with its pressure. The main space of mills is placed inside the ground and the visible parts are skylights and entrance of the mill. From other parts of the mill, the upper and down stones can be stated that the down stone was much resistant.

Nowadays the water mill of Garmsir in Taft is an active mill which could be utilized as an especial eco-touristic attraction in regional and global level. ” [4].

**Figure 1.** Water mill of Garmsir in Taft city of Iran

**Aqueduct and their background in Iran**

Qanat has been invented by Iranians and dates back to many centuries ago while Chinese learned the technic of digging Qanat from Iranians about 200 years afterwards. Our ancestors led the sweet water of mountains to desert sides by using the Qanat-making technics which was invented by them. In addition to leading sweet water to plains and desert sides, the Qanats can be used for drainage and conducting salty water and removing these waters from underground sweet water considering the geological layers of Iran.

Gobleaux, a French scientist who has lived for about 20 years in Iran and has carried out his studies in the field of water, found this ancient system of accessing underground water worth studying, and therefore by travelling to different parts around the world and using 534 scientific resources wrote his Ph.D. dissertation as a book under the title "Qanat, a Technique for Accessing Water in Iran." In his dissertation, he wrote “Everything is

witness to the fact that the first Qanats were constructed in Iran's cultural district. Now, we should find out how the Qanats were invented."

Having researched for several years and traveled to various regions Gobleaux believes that ancestor Iranians were working in agriculture field and as the water of rivers, springs and other sources were occupied by other Asian aboriginal people for agricultural uses, so Iranians tried not to have involvements with aboriginal people and use any other water sources. " [5]. Therefore they preferred to live and farm out in places that there was nobody living. In the meanwhile, they observed some streamlets which water was flowing inside and the water inside were almost fixed and perpetual.

**Figure 2.** Interior View of Aqueduct in Kish

Now, we should find out since when there are proofs for existence of Qanat, and this technic has reached to what level of advance in its origin, Iran, that has been exported to other regions of the world.


**Figure 3.** Canal in Dezful in Iran

**Qanat in Achaemenid Empire**

Rags or Rajs city (Rey) some kilometers from today's Rey City was one of the most populous cities in Achaemenid Empire. And other cities such as Ekbatan (Hamadan) and Pasargad could provide their water by using Qanat system and continue the life. Now, the deepest Qanat of Iran is the Qanat of Gonabad with about 340 meters depth that the main well of it is the longest Qanat in Yazd region. This Qanat with 100 Kmlength have 2500 years of history and irrigate more than two thousand hectares of agricultural fields of this region in traditional manner. " [5]. The most water-full Qanat in Iran is the Qanat of Akbarabad in Fasa and the oldest Qanat in Iran is the Qanat of Ibrahimabad in Arak. The strangest Qanat in Iran is two-floored Moon Qanat in Ardestan which has been constructed about 800 years ago.

**Figure 4.** Aqueduct

**Cistern Background**

Furthermore than constructing Qanats and dams, Iranian people considered making some places to store plentiful water of winter to be used in warm seasons of the year and for this reason, they have originated "cistern".

In addition to their important role in everyday life of people, cisterns had an especial place in the culture and beliefs of Iranians. The link between water and regional ethics continued after entrance of Islam to Iran in a way that Anahid temples turned to magnificent mosques outside of the cities. " [6].


**Figure 5.** Cistern of Larestan in Iran

Cisterns in the structure of Desert-side cities were the center of villages, towns and neighborhoods and they were considered as the greatest and most impressive architectural units in most of the neighborhoods.

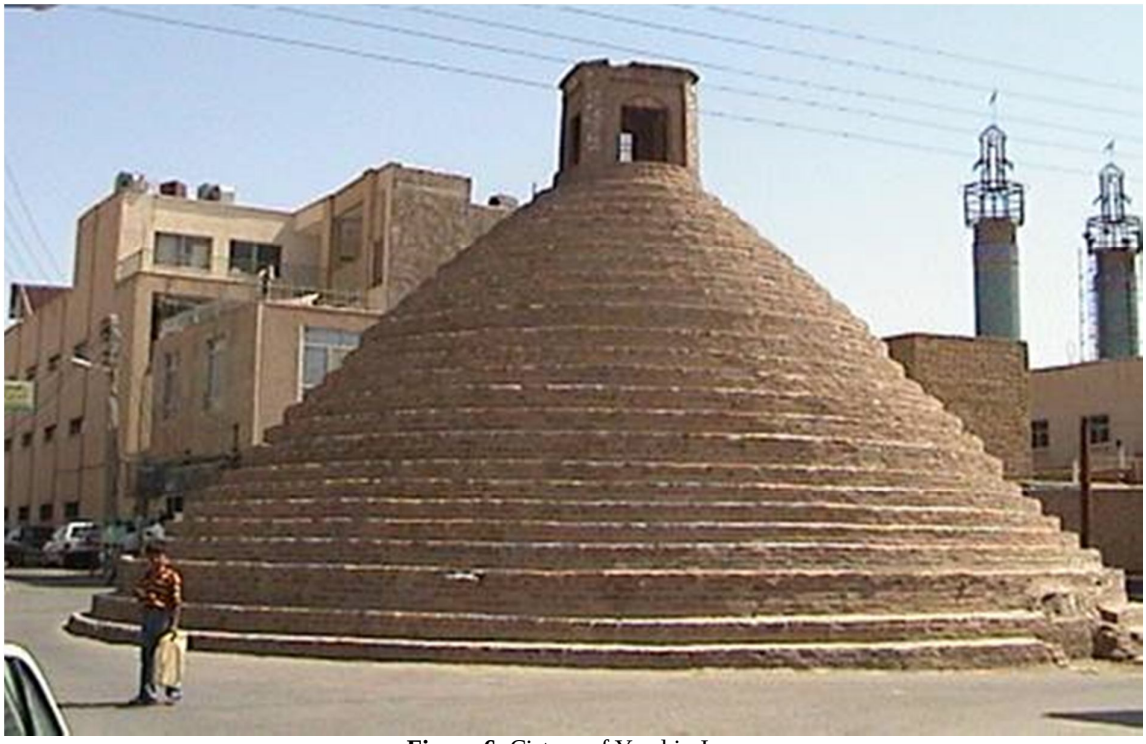

**Figure 6.** Cistern of Yazd in Iran

The construction technice and style of cisterns' building has an especial credibility, since the people constructing these units considered main issues such as the value of water pressure on the floor of the cistern, the internal insulations of the building, ventilation, liquidation and preventing water pollution with high degrees of precision and accuracy. " [5].

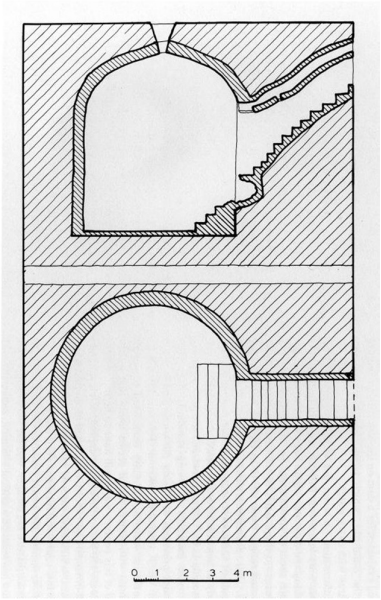


**Figure 7.** Plan and Section of Cistern

The art of decorating the external frontage of these cisterns, especially over their entrance is notable. In some cases, there are some poems as inscriptions over the entrances which show that these buildings had close and well-founded relations with the characteristics and morale of the people living around.

The reasons for storing and maintaining water in cisterns could be classified as follows:

a) Water vaporizing while having direct connection with solar heat and airflow.

b) Water spoilage in open air
c) Water warm up because of sunlight

According to their applications, various kinds of cisterns could be classified as follows:

1- Private cisterns:

These cisterns were built in urban and rural houses, mostly under the building or under the yard surface. The tanks of these cisterns are usually in cubic or rectangular cubic form with a flat or cradle-like ceiling. In these types of cisterns, if the tank is under the yard of the house, the water was taken by bucket through a hole in the ceiling or close to the ceiling by manual pump. But if the tank was constructed under the house, the water was usually accessed by Pashir. These cisterns have usually a hole or wind-catcher for ventilation which is extended to the roof of the house. The capacity of these cisterns is enough for three to four years in some cases. " [7].

2- General cisterns:

These cisterns are usually large and impressive buildings and they have been built by local benevolent people or nobles or rulers who have paid for the construction by their personal properties or public findings.

a) Urban cisterns: were mostly built next to the religious, educational, farewell and business places. Remained examples of these cisterns show that comparing with others these cisterns had more capacity and could supply the water needs of populous neighborhoods for months.

The vital importance of these buildings leads to more attentions while selecting the materials and quality of the buildings and in addition to the essential parts and components inside, spacious forecourts (Jolo khan), Portals and porches, wide steps, high wind-catchers as well as varied kinds of decorations were used.

b) Rural cisterns: were usually built in Main Square of the villages. These cisterns had very simple architecture and they were formed by available materials in the region, mostly without decorations and ornaments.

c) Castle cisterns: were very simple and usually in the form of covered pools. Their water tank is almost small and deep in the form of square well in the central part of the cistern. Some of them have been combined with the set of castle building in a way that the rain water flowing on the roof and court of the castle could be cumulated and stored.

The architecture of cisterns in Caravansaries (travelers' inns) could be considered as influenced by these types of cisterns and they could be studied under this category. These buildings are usually constructed as covered pools in the middle of court and on the main axis of the Caravansaries.

d) Road cisterns: were usually formed in travelling roads and next to the Caravansaries. They have cylindrical water tanks and dome covered buildings and some of them include some rooms and summerhouses for praying and resting of the travelers.

e) Wilderness cisterns: were mostly built in dry deserts to water domesticate animals. The water tanks of these cisterns were usually made in square form and their wall were two meters higher than ground surface. " [7].

**Figure 8.** Wilderness Cistern in Iran

**Architecture of desert glaciers in Iran**

There are a lot of buildings in Iran (such as mosques, schools, cisterns and Hosseiniyehs) that always attract researchers but the architecture of old glaciers are the strangest architectural elements which have been almost forgotten after invention of refrigerators. There are some secrets in the existence of glaciers which were supplying the cool water in hotness of summers which shows the courteous miracle of adobe and powerful hands of a wise architect who was creating a masterpiece in desert architecture. " [8]. Unfortunately there is no information about historical background of adobe glaciers until Safavid era. There is only a hint in the 11$^{th}$ century itinerary of Dr. John Frier who states in his diary about travelling to Iran: "In this era, preservation of ice is a common and old custom and it is possible that this custom has been entered to Iran by Moghuls."

Mainly the glaciers are constructed from three parts; long shady walls, ice reservoir and ice preparing pools. Shady wall is a very long and tall wall. The elevation of these walls reaches 10 meters in some cases, to prevent sunshine to be reached on the iced waters in the pools. Sometimes, for more solidity of shady wall, a retaining wall was constructed to support the main shady walls.

At the base, shady walls are very thick, but gradually lose their thickness as they get altitude. Ice preparing pools are pits in rectangular form, dug in parallel with pools and shady wall in the northern part and their length is a little smaller than the wall's length and its depth is 30 to 50 centimeters and more in some cases. This pit was the place for preparing ice in cold winter nights. Ice reservoirs are usually next to the shady wall and in southern part of it and in some cases there were one or some entrance channels to northern part. Ice store is also some big and deep pit dug in the middle of Ice reservoir. The shape of these pits in domed glaciers is circle-like with a diameter about 4 meters or more in some cases. " [9].

Walls of the pit are constructed from stone or brick, covered with thatch. The other side of the walls is filled with insulator materials like coal-soil or other materials. Small stairs are used to get access to bottom of the pit. Also, there is a narrow channel built at the lowest part of reservoir named sewage. This sewage goes through a deep outside well and is used to flow ice water out. Finally, it should be stated that the design principles of all glaciers are identical and ice should remain insulated and dry. But despite availability of appropriate and resistant materials, climatic situations and development of ice-making industry have decreased the cultural value of these constructions and it is the responsibility of tourism and cultural heritages officials to rebuild these glaciers to reclaim their applications in a way that these masterpieces of architecture find their glory back in deserts.

**Figure 9.** Glacier of Yazd in Iran

The issues stated in the present article were just some samples of creating spaces by Iranian architecture related to water. Despite dominance of dry ground of the desert, other parts of architecture art could be searched in using water-ways, decorating gardens by water channels, the pools inside the houses, palaces and lakes.

The garden of Shah Nematolah Vali in Mahan, garden and bath in Kashan's Fin, Springhouses of Noble people are all some symbols of the link between water and the culture of this region.

## 2. DISCUSSION AND CONCLUSION

Today's Iranian architect should preserve the value of water and recognize the role of water in architecture space and use them in the architecture of his region.

It is inevitable that transparency and fruity of the spaces are known as an inseparable part of today's architecture, a part that we have it in our traditional costly architecture. Water, is an element including both transparency and fruity in its essence and as stated before, desert architecture in past days owned the link between this element with spaces. It is an assumption for Iranian architect that next to the machine-like life in tiny apartments, use this key element in his designs so that he would use the color of sky in his works as well as taking a share in subtilizing the space in compatibility of nature with urban life.

Also the Iranian architects, followers, lovers and preservers of Iranian architecture should consider these valuable collections of desert architecture to preserve and reclaim them in order to survive the desert and utilize the profitability of tourism industry and show the original and reach architecture of Iran in the global exhibition.

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